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World Dialogue on Regulation for Network Economies

Report on the
World Dialogue on Regulation

Stimulating Investment in Network Development: Roles for Regulators

Case studies and research from
WDR Research Cycle 2

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The World Dialogue on Regulation for Network Economies (WDR)

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WDR facilitates an international dialogue to generate and disseminate new knowledge on frontier issues in regulation and governance to support the development of network economies.

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Preface

There is a growing consensus in the development community that information and communication technology (ICT) will only become an effective and mainstream tool of poverty reduction and sustainable development if the proponents of *ICT for development* can provide more rigorous evidence, strategies, benchmarks, indicators, and good practices that are directly relevant to the core poverty-reduction and development priorities of developing countries and their international partners. Reflecting this, in 2004 *info*Dev adopted a new strategy designed to strengthen the linkages between knowledge, policy, experimentation and donor programs in harnessing ICTs for development. The principal focus of *info*Dev's activities now is on how ICTs can substantially advance progress toward the Millennium Development Goals, and how developing countries can extent the benefits of ICT to all and promote ICT enabled innovation.

*info*Dev has launched an intensive program of support for research, analysis, and evaluation, impact monitoring, and toolkit development focused on distilling the lessons of experience from the past ten years on the impact of ICT on poverty, with a particular focus on mainstreaming and scaling up successful ICT approaches and applications. *info*Dev's Work Program is now organized around three interdependent themes: Mainstreaming ICT As Tools Of Development And Poverty Reduction; Enabling Access for All; and Scaling Up ICT enabled innovation and entrepreneurship in developing countries. Details can be found on the *info*Dev website, <www.infodev.org>.

The World Dialogue on Regulation for Network Economies (WDR) is a flagship *info*Dev project that is facilitating the achievement of *info*Dev's new strategy through its programme of applied research, web-based dialogue, expert forum meetings with policymakers and regulators, and publication of timely research and reference material, such as this report. Stimulating investment in network development is a fundamental issue for developing countries, and unfortunately in far too many countries telecom policy and regulation tends to increase rather than decrease investment risk. This report focuses specifically on the roles of telecom regulation in stimulating or retarding network investment opportunities in developing countries. By detailed hands-on case studies in seven countries and in-depth analysis of some key generic issues, the report is able to draw out the key problems and point directions for their resolution.

*info*Dev recognizes that the success of the WDR project has required support from several other funding participants to support the full range of WDR activities. In particular, I wish to acknowledge the major support provided by IDRC Canada, and by the LIRNE.NET university network of ICT policy research centres managed from the Center for ICT (CICT), Technical University of Denmark, as well as funding provided by a variety of supporters for individual WDR activities and events.

I commend this report to decision-makers in this important field of telecom reform and information infrastructure development for information societies, and to others who wish to be as informed as decision-makers. The evidence, analysis, insights and recommendations here provide a foundation for improved decision-making on the roles of regulators in stimulating, rather than retarding investment in network development.

Mostafa Terrab,
Program Manager

*info*Dev

GICT Department
The World Bank

Executive Summary

This report is the result of dialogue and research focusing on the World Dialogue on Regulation (WDR) theme *Stimulating Investment in Network Deve*lopm*ent*: *Roles for Regulators*. It comes at a time when investment in developing country networks has come to a virtual standstill, focusing attention on the fact that most national telecom regulatory environments create 'regulatory risk' that drives up investment risk, when regulation should be providing a degree of confidence that would reduce investment risk.

The framework of analysis for this report, outlined in Chapter 2, reviews the interrelations between network investment and telecom regulation, and identifies five major areas in which regulatory risk can be assessed. The following chapters provide evidence and analysis on several generic issues (interconnection, prepaid mobile, internet and radio, e-commerce, benchmarking national regulatory authority websites and indicators for assessing regulatory risk), and seven detailed country case studies (Sri Lanka, India, Bangladesh, South Africa, Ghana, Somaliland and Denmark).

The first area of regulatory risk assessed is the degree of regulatory independence from capricious interference from politicians and/or a dominant incumbent operator, where the evidence shows that all of the developing countries studied here are having major difficulties in establishing a credible regulatory process, a notable contrast to Denmark, the developed country benchmark adopted here. This evidence underscores the point that regulatory independence and credibility cannot be immediately created simply by passing legislation. Rather independence is earned over time by the actions of the regulator and the reactions of the government, the incumbent and the courts. Only as all parties come to understand and trust the new structure does regulation acquire the independence that investors equate with assurance of objective decisions based on facts and evidence. Most developing countries are understandably still in a learning period and will be for the near term future.

The second area of regulatory risk concerns clarity of the policy directions that the regulator is supposed to implement, and the discretion on technical and specialized matters delegated to the regulator. This is associated with the Minister and Department for the regulatory delegations specified in the policy and legislation. The case studies illustrate that in all the developing countries studied here, investment risk was increased by arbitrary and unexplained usurpation of regulatory decisions by ministers or government departments, often at the bidding of incumbent operators. Yet, when Sri Lanka

had a period of demonstrable regulatory independence, investment risk declined and investment in network development increased significantly not only by new entrants but by the incumbent as well.

The case studies provide illustrations where regulatory processes (the third area for assessing risk) in some countries provide a major barrier to entry as a result of a lack of transparency, accountability and efficiency. This raises investment risk substantially, in several cases to the point where investment has been driven away. The application of substantive regulatory standards (e.g., price caps, cost standards, spectrum standards, etc.) is the fourth area of regulatory risk. The case studies provide evidence that acquiring and maintaining both technical and strategic competence is a major problem in all developing countries studied. The shortage of investment in human capital is as severe as the shortage of investment in network development.

The final area of regulatory risk relates to the attention paid to demand as well as supply conditions by regulators in analysing sector issues and justifying regulatory decisions. The research shows that the policy/regulatory environment has given priority either to protecting the incumbent's interests or to maximizing revenue to the government through license fees, rather than achieving network development that will eliminate waiting lists, develop universal access, or stimulate the rollout of new services. The case study of Somaliland is notable as it demonstrates that despite complete lack of operational telecom laws or regulations, and no interconnection among operators, Somaliland has achieved better results than some countries with regulation that has provided a major barrier to investment. The chaotic market in Somaliland raises market risk, but the operators are not subject to the regulatory risks that can arise from political interference and an incumbent's monopoly power.

The chapters examining fundamental issues puncture some myths about the forces that are likely to drive network development in developing countries, and point the way to a more realistic assessment of some of the opportunities. Morten Falch emphasizes that interconnection remains a cornerstone issue for network development. Indeed reference interconnection offers in developing countries are still rare. Amy Mahan demonstrates that prepaid mobile is not the panacea often claimed for providing universal access, especially for internet services. Robin Mansell shows that the hyperbole about how electronic commerce is going to drive economic growth and network development in developing countries fails to consider a host of other factors that are essential for e-commerce to provide significant benefits, including facilitating regulation that is absent in most developing countries.

Bruce Girard brings into the network development picture the special case of synergy between internet and radio in providing access to rudimentary communication and information services for poor people who under present circumstances have no hope of obtaining access to conventional telecom services. Unfortunately telecom policy and regulation, and incumbent operators, have not supported such pioneering applications that focus beyond the end of the formal telecom network, and often have provided formidable barriers and prohibitions.

The availability of reliable indicators and benchmarks is important to judging investment opportunities anywhere. Investment risk in developing countries is increased because of a dearth of credible indicators. Amy Mahan's benchmarking of African national regulatory authority websites as vehicles for demonstrating transparency, efficiency and accountability has already had a positive impact. Rohan Samarajiva's new methodology for assessing the telecom regulatory environment across five dimensions of regulatory risk, which has been trialed in several of the country case studies, will provide useful information for both investors and policymakers/regulators. The regulatory environment is examined because in most developing countries, including the case studies in this report, the cause of most regulatory failures lies with the Minster, the Department or the incumbent, rather than the regulator.

The research reported here demonstrates that network development requires a much broader focus if anything resembling universal access in an internet environment is to be achieved. The case studies of prepaid mobile, internet and radio, and several country case studies provide important illustrations of network extensions achieved outside the bounds of official universal access policies and practices. The horizons of participation in network development must be expanded, particularly with respect to the roles of local involvement, facilitating intermediaries, and attention to demand as well as supply-side conditions. Participation by all interested parties will not just have to be accommodated, but facilitated and supported by telecom policy and regulation. Therefore the WDR theme for dialogue and research for the third cycle beginning in 2005 is *Diversifying Participation in Network Development.*

The epilogue to the report by Randy Spence introduces a new IDRC initiative to support experimentation on fostering Pro Poor Pro Market opportunities through policy and regulation. This will be an important part of the next WDR research and dialogue cycle. Other parts of the programme will focus on public sector driven initiatives and public-private partnerships, especially at the local level. One early test will be the policy/regulatory responses to voice over internet protocol (VoIP) as its opportunities become increasingly possible in developing countries. Early developments on the next WDR theme can be found on the WDR website <www.regulateonline.org>.

Acronyms

ABTO	Association of Basic Telecom Operators
ADC	access deficit charge
ADP	Annual Development Programme (Bangladesh)
ADSL	asymmetric digital subscriber line
AGR	adjusted gross revenues
AkTel	Telekom Malaysia International Bangladesh
AMI	Andersen Management International
ARPU	average revenue per user
B2B	business-to-business (electronic commerce)
BBTT	Bangladesh Broadcasting Telephone & Technology
BDT	Bangladesh taka (currency)
BOT	build-operate-transfer
bps	bauds per second (modem speed)
BR	Bangladesh Railway
BRTA	Bangladesh Rural Telecom Authority
BSNL	Bharat Sanchar Nigam Limited (India)
BSO	basic service operator
BTRC	Bangladesh Telecommunications Regulatory Commission
BTTB	Bangladesh Telegraph and Telephone Board
CAM	cost accounting manual
CDMA	code division multiple access
CEC	Commission of the European Communities
CEO	chief executive officer
CMC	community multimdedia centres
CNN	Cable News Network
COA	chart of accounts
COAI	Cellular Operators Association of India
CPP	calling party pays
DCFRN	Developing Countries Farm Radio Network (FAO)
DEL	direct exchange line
DKK	Danish kroner (currency)
DoT	Department of Telecommunications
EDC	embedded direct costs
ERP	Economic Recovery Programme
EU	European Union
FAQs	frequently asked questions
FDC	fully distributed cost
FDD	frequency division duplexing
FDI	foreign direct investment
FTP	First Telecom Project (Ghana)
FTTH	fibre to the home
FWA	fixed wireless access
G-7	Group of Seven countries (Canada, France, Germany, Italy, Japan, the UK and the US)
G-8	Group of Eight countries (G-7 plus Russia and the EU)
GATS	General Agreement on Trade in Services
GoM	Group of Ministers
GPRS	General Packet Radio Service (for GSM networks)
GSM	Global System for Mobile communications
GT	Grameen Telecom
HBTL	Hutchison Bangladesh Telecom Limited

HDI	Human Development Index (UNDP)
ICASA	Independent Communications Authority of South Africa
ICT	information and communication technology
ICT4D	information and communication technologies for development
IDRC	International Centre for Development Research (Canada)
IFC	International Finance Corporation
ILD	international long-distance
IMF	International Monetary Fund
IP	internet protocol
IPO	initial public offering
ISD	international subscriber dialling
ISDN	Integrated Service Digital Network
ISP	internet service provider
IT	information technology
ITA	Information Technology Agreement (WTO)
ITM	Informativo Tercer Mundo
ITU	International Telecommunication Union
IUC	interconnection usage charges
LCSL	Lanka Cellular Services
LICUS	Low Income Countries Under Stress (World Bank programme)
LIRNE	Learning Initiatives on Reforms for Network Economies
LKR	Sri Lankan rupee (currency)
LRAIC	long run average incremental cost
LRIC	long run incremental cost
MMS	multi-media messaging service
MNC	multi-national corporation
MoF	Ministry of Finance
MoPT	Ministry of Posts and Telecommunications
MPP	mobile party pays
MRTPC	Monopolies and Restrictive Trade Practices Commission (India)
MTNL	Mahanagar Telephone Nigam Limited India
NATO	North Atlantic Treaty Organisation
NCA	National Communications Authority
NFAP	National Frequency Allocation Plan
NITA	National IT and Telecom Agency (Denmark)
NLD	national long-distance
NRA	national regulatory authority (or agency)
NTP-99	National Telecom Policy 1999 (India)
NWD	nationwide dialling
ODGT	Office of the Director General of Telecommunications (Sri Lanka)
OECD	Organisation for Economic Co-operation and Development
Ofcom	Office of Communications (UK)
Oftel	Office of Telecommunications (UK, now defunct – see Ofcom)
PBTL	Pacific Bangladesh Telecom
PC	personal computer
PCCS	prepaid calling card services
PDA	personal digital assistant
PGCB	Power Grid Company Bangladesh Limited
PHS	Personal Handy-phone System
PSTN	public switched telecommunications network
PTT	(Department of) Posts and Telephone and Telegraph
QoS	quality of service
RIA!	Research ICT Africa!
RIO	reference interconnect offer
ROI	return on investment
RPP	receiving party pays
Rs	Indian rupees (currency)
RSA	Republic of South Africa

SADC	Southern Africa Development Community
SAP	Structural Adjustment Programme
SATCC	South African Transport and Communications Commission
SBC	Southwestern Bell Company
SDCA	short distance calling area
SIM	subscriber identity module
SLT	Sri Lanka Telecom (now SLTL)
SLTL	Sri Lanka Telecom Limited (formerly SLT)
SMEs	small and medium-sized enterprises
SMS	short messaging service
SNO	Second National Operator (fixed-network)
SOE	state-owned enterprise
STD	Subscriber Trunk Dialling
STP	Second Telecom Project (Ghana)
TDD	time division duplexing
TDSAT	Telecommunications Dispute Settlement and Appellate Tribunal (India)
TELRIC	total element long run incremental cost
TISA	Trade and Investment South Africa
TRAI	Telecom Regulatory Authority of India
TRASA	Telecommunications Regulators Association of Southern Africa
TRCSL	Telecommunications Regulatory Commission of Sri Lanka
TRE	Telecom Regulatory Environment
TRIPS	Trade Related Aspects of Intellectual Property (WTO)
TTO	Telecommunication Tariff Order 1999 (Sri Lanka)
UK	United Kingdom
ULL	unbundled local loop
UMTS	Universal Mobile Telecommunications System
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
US	United States
USAL	under-serviced area licence
USD	United States dollar (currency)
VANS	value-added network service
VHF	very high frequency
VoIP	voice over internet protocol (telephony)
VPT	village public telephone
VSAT	very small aperture terminal
VSNL	Videsh Sanchar Nigam Limited (India)
WB	World Bank
WDR	World Dialogue on Regulation
WiFi	wireless fidelity
WiMax	worldwide interoperability for microwave access
WLL(M)	wireless in the local loop (limited mobility)
WMO	Wireless Monitoring Organisation
WPC	Wireless Planning and Co-ordination
WSIS	World Summit on the Information Society
WTO	World Trade Organization
ZAR	South African rand (currency)

1. Introduction

This report is the result of dialogue and research focusing on the theme of *how to stimulate investment in network development*. In particular, the World Dialogue on Regulation (WDR) forum has been concerned with the *role of the telecom regulator* and the potential of national regulatory authorities (NRAs) to have impact on this fundamental aspect of the telecom and information infrastructure development.

This theme is the second in a series of three that WDR is undertaking, assessing different approaches to regulation in a rapidly changing telecom environment. With the advent of privatisation, competition, and converging infrastructure sectors, the role of the regulator is in a transitional sphere. The first World Dialogue on Regulation research cycle assessed two emerging regulatory trends: *convergence regulation and multisector regulation* (Melody et al. 2003). The discussion and research focused on different regulatory components and approaches in light of the trends in sector development around the world, documenting how different circumstances in different countries were leading some countries in the direction of ICT convergence regulators and others in the direction of multisector utility regulators. The research and dialogue demonstrated that the best regulatory structure for any particular country for the immediate future would be determined by an informed positive response to local conditions, not a simple copying of textbook solutions as is often recommended.

Throughout this dialogue and research, one issue remained paramount. Given different regulatory approaches and their intersection with different state bodies, technologies and institutions: what role can regulators play in stimulating the much needed investment in infrastructure development? Traditionally, neither regulators, policymakers, industry players or analysts have considered that stimulating investment in network development is a priority goal of regulation. Rather regulation has been seen as primarily concerned with issues of distribution rather than production, i.e., reasonable prices, universal access. Yet it seems clear that for the immediate future, stimulating investment in network development will be essential to ICT sector policy objectives.

For this reason, the research and dialogue theme for the second WDR cycle has been, *Stimulating Investment in Network Development: Roles for Regulators.* This report is the result of this research and dialogue. Its analysis of the theory and literature in light of a number of detailed case studies demonstrates that investment in network development has not received, and is currently not receiving the priority attention by

regulators needed for significant network development. We hope the WDR research and dialogue cycle, and this report will help rectify this deficiency.

Throughout this second research cycle, WDR has hosted online discussions and research meetings to collect input from researchers, regulators, consumer advocates, the private sector, etc. This report provides a synthesis of the research that was generated to inform these discussions and presentations. A full record of the year's activity is also available at the WDR website <www.regulateonline.org>.

Background and Framework for Dialogue

During its second research cycle, WDR focussed on possible roles that the national regulatory authority could assume to contribute to conditions for stimulating investment in network development. The detailed reasons for choosing this theme went beyond recognition of the desperate need for network rollout in most developing countries and concerns about the slow rate of broadband network upgrading in most developed countries. T, but also from the drying up of investment funds for the telecom sector in the wake of the stock market collapse, the financial fraud in the US industry, and the extortionist prices resulting from government auctions in the large European countries for 3G spectrum licenses had all but terminated investment in network development in developing countries. Those who control the flows of investment capital had simply turned off the tap in a dramatic over-reaction to the these and other negative market developments.

Do telecom regulators have any responsibilities, or any capabilities for doing anything about this? We conclude that in most countries, the answer is yes. Some of the research did some preliminary testing of the relation between the state of sector development and the perceived quality of the regulator. Healthy network development, while not a definitive measure, is certainly indicative of a likewise healthy regulatory environment. As noted by Samarajiva et al. (this volume), there is no one-to-one correlation between the regulatory environment and investment – indeed, there are many other mitigating factors. That said, the ability of infrastructure sectors to address market failures while simultaneously encouraging privatisation and competition requires effective regulatory institutions and practices. At a time when many states are establishing national regulatory agencies, it is important to clarify regulatory practices that encourage both economic and social goals.

The overall framework for this dialogue and corresponding research has been to examine the variety of ways that telecom regulation does influence and can influence investment in network development, and to consider the range of potential activities that regulators might consider undertaking, so they can be prioritised and critically examined. Some issues are generally applicable to telecom regulation everywhere; others are applicable to countries at particular stages of the telecom reform process, different levels of network development, and different economic circumstances; still others will be country specific.

The structure adopted for presenting the issues in this report is intended to organise the results and outcomes of the WDR dialogue. Accordingly, the report is divided into two sections.

Section I – *Fundamental Issues*, introduces the concepts and issues used to set the parameters for the WDR discussions throughout the past year. Chapter 2, by W.H. Melody, examines cross-cutting themes that have bearing on investment issues, and more specifically which shed light on the project of institution building and regulatory reform. In its initial form, this chapter served as a briefing document to inform the case studies and working paper series. This is followed by three chapters addressing the intersection telecoms and the network of networks – the internet. Robin Mansell assesses internet, e-commerce issues and interconnection for developing countries, and considers some of the particular challenges for network expansion and rollout in terms of developing countries' preparedness for participation in the information society and economy. Amy Mahan and Bruce Girard in their respective chapters focus on the importance of combining technologies and avoiding the pitfalls of assuming a 'one-technology solution fits all' approach. In a subsequent chapter, Mahan assesses where national regulatory authority websites to see how they are useds are at in terms of establishing an online presence for conducting business, providing information and establishing transparency. The section concludes with Morten Falch's discussion of cost-based interconnection as an essential element in terms of promoting competition and investment.

Section II presents a collection of *Case Studies* from seven countries: Sri Lanka, India, Bangladesh, South Africa, Ghana, Somaliland and Denmark. Evidence from these different regions and countries with very different economies, highlight varying levels of investment and their particular regulatory conditions. The presentations and discussions engendered by the WDR case studies were key to informing the dialogue during the second WDR research cycle. The diverse contexts raised issues for investment and network extension – and indeed, highlighted the need for appropriate and particular regulatory strategies. The perhaps underlying theme of all the country studies is that regulation is constantly in transition and must be dynamic and responsive to changing conditions.

During the second WDR research cycle, Rohan Samarajiva developed and refined a Telecom Regulatory Environment (TRE) methodology, which his research team applied to the case study of Sri Lanka. Later in the research cycle, other WDR researchers further applied the methodology to their country studies (India and Bangladesh). The uniformity of assessment mechanisms across these three case studies provides a rich and comparative overview of countries in this region. The goal in this exercise is to establish some indicators for regulatory performance in developing countries that are linked network infrastructure development.

The conclusion highlights some key issues that have come out of this research and dialogue that are particularly important for future regulation and network development. Perhaps the most important is that regulators, as well as policymakers and

others, must broaden their horizons on the issue of who can contribute to network development and how. The telecom sector used to be the sole province of a national telecom monopoly in most countries, most commonly a government PTT. With reforms to-date, a commercialised or privatised incumbent operator with quasi-monopoly power, and a few smaller competitors have set the scope of consideration on policy and regulatory issues. This report demonstrates that contributions by others can facilitate network development when they are allowed to do so.

For the future, the horizons of participation in network development must be expanded still further, particularly with respect to the roles of local involvement, intermediaries, and attention to demand as well as supply-side conditions. The framework for analysis outlined by Melody in Chapter 2 for the research in this report illustrates how this expansion can be accommodated. Building on the second research cycle, we have adopted *diversifying participation in network development* as the WDR research and dialogue theme for the third cycle beginning in 2005. Early developments can be found on the WDR website <www.regulateonline.org>.

The report concludes with an epilogue contributed by Dr. Randy Spence, senior economist for IDRC. His contribution, *Pro-poor, Pro-market ICT Policy and Regulation: Global Initiative, Scaling Up,* highlights initiatives for ICTs and poverty reduction. He also identifies priorities for policy and regulation – which all too often are obstacles to such initiatives. The epilogue points the reader forward, to next steps, or as Spence puts it, 'scaling up'. How is it possible to take the examples of the success stories, such as the Grameen Bank telecom initiative he describes, and leverage them for large-scale successful application? This indeed is the most significant challenge for those working on issues of development.

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Section I

Fundamental Issues

2. Regulation and Network Investment: A Framework for Analysis

William H. Melody

1. Regulation and Investment Risk

Although regulation relating to telecom reform, information infrastructure development, next generation internet, e-commerce and related matters is not always perceived as being directly associated with the level of investment in the sector, clearly regulation plays an important role in shaping the environment and the incentives for investment. This is evidenced by the fact that all regulated telecom operators and potential investors include 'regulatory risk' as a key factor in determining their investment strategies. The foremost element of this regulatory risk is that regulatory decisions affecting investment in the sector will not (or cannot) be made independently and objectively on their merits in a fully transparent regulatory process.

A proactive approach to regulation will prompt a serious investigation into the areas for which regulators (and policymakers) can consider specific rules, standards and actions that will not only minimise regulatory risk, but also provide a positive stimulus for network development. Possibilities range from steps to strengthen the credibility of the regulator, to improving the efficiency of the regulatory process, to reducing barriers to participation in network development, to managing public resources (e.g., spectrum, rights of way) in such a manner as to facilitate network rollout, and clarify rules where ambiguity and uncertainty exists, e.g., on interconnection and access conditions. Effective regulation need not add a new element of risk that increases investment risk. Rather it can reduce and stabilise the inherent uncertainties in cyclical oligopoly network markets. It can be a force for reducing overall market risks and enhancing investment opportunities in the sector.

Success Stories

There are a number of examples where informed policy and regulation has stimulated a wave of investment in network development. Chile introduced an imaginative programme of reverse subsidy auctions for serving rural areas (Wellenius 2001). Morocco introduced a clear and transparent process for licensing mobile operators

that directed their competition to rapid network rollout (ITU 2001). Korea has adopted a number of strategic policy and regulatory rules to stimulate investment in both mobile and broadband rollout (ITU 2003). Unfortunately, these success stories are exceptions to the norm, and although most of them have been well documented, they have not been fully analysed as transferable lessons for regulators in other countries attempting to stimulate investment in network development.

Pritchett and Woolcock (2003) speak of arriving at such success stories in terms of the ideal of 'Denmark' – in which Denmark is a stand-in for a model state with well-functioning and effective state institutions. In this report, the Denmark case study describes regulatory conditions that provide minimum barriers to entry and a clear commitment by the regulator to rapid unbundling of the local loop stimulated the incumbent to upgrade its national network for broadband services ahead of the rest of Europe (Melody 2002; Henten this volume). However, the case study section also includes examples from less mature regulatory environments, and indeed, in the case of Somaliland, an example of complete absence of regulation – where there is, albeit uneven, investment in network development driven by need, and a form of negotiated competition. This latter is by no means a success story – as investment only focuses on a very narrow market strata for which regulatory influence could do much to coordinate interconnection and provide imperatives for quality and reach of service, as well as ostensibly create conditions for more pervasive infrastructure investment.

Regulation and Investment in Stable and Dynamic Markets

Attention to the investment environment has always been central to effective regulation. The primary standard that regulators applied for judging the reasonableness of consumer prices during the monopoly era was rate of return on investment, and it is still widely used today not only by many regulators, but also by investment analysts and investors. In theory, the regulated return on investment calculations should be set to attract the capital necessary to support the desired rate of investment. Unfortunately, in practice, the failure of the PTTs (and their governments) in many countries to attend to the conditions necessary to attract capital and stimulate investment has been the primary cause of massive under-investment in network development, and the creation of long waiting lists of potential subscribers, ready, willing and able to pay for the service, but unable to get it.

The rate of return standard as a basic tool of regulation was developed and refined in the US under conditions of relatively mature and stable industry development. The primary purpose of this regulation was to prevent private monopolies from earning excessive returns in telecom and other utilities for which universal service had been virtually achieved. Annual growth rates in customers, volumes of service and investment requirements were stable and predictable. Regulation was preoccupied with preventing over-investment as a way to realise monopoly profit. The more dynamic period of network rollout and market development for voice telephone services had been completed earlier.

Application of the rate of return standard today by regulators is useful for assessing the performance and price levels of incumbent and other operators with significant market power. However the major concern in the current environment is convincing entrepreneurs and new investors, as well as incumbents, to invest in dynamic markets involving greater risks than have prevailed in traditional stable utility markets in the most advanced developed countries. Investors need to be convinced that returns reflecting the risks that will be incurred can be realised from new investments in infrastructure rollout to new customers and for new services.

Efficient network development in these dynamic telecom and ICT markets requires innovation and continuous learning on the part of investors, operators, service suppliers, consumers, regulators and other participants in the process. By reputation, telecom regulation is seen by most investors, investment analysts, entrepreneurs and established operators as slow, unimaginative and adding a new element of investment risk. The challenge for regulators is to demonstrate that they can be an institution for reducing risk and increasing investment opportunities.

Unbalanced Network Investment

During the euphoria of investment in the ICT sector, investment was directed primarily toward very specific network elements. At the same time there was a scarcity of investment in other elements. The investment euphoria was focused primarily on, 1) fibre optic transmission facilities in the US, Europe and across the oceans; 2) internet software, service provision and content, mostly in the US, but also in other developed countries; and 3) the mobile sector explosion in Europe and Asia. This buoyant telecom investment climate in specific network elements in the developed countries carried over into many developing countries with investments primarily in mobile operators, and secondarily in privatised incumbent operators.

In the developed countries there has been insufficient investment in network broadband upgrading for enhanced internet services both in local fixed networks and in network connections to smaller cities, towns and rural areas. For developing countries there has been insufficient investment in national fixed network rollout in most countries. The case studies in this report provide evidence of this from different developing countries. The investment euphoria did not provide the investment needed to achieve the broadband universal access objectives of developed countries or the universal fixed network access objectives of developing countries.

Changed Conceptions of Universal Access

However, these investment patterns in new technologies and services have contributed significantly to changed conceptions of universal access, and how best to achieve it, in both developed and developing countries. In most developed countries the incumbent telecom and cable operators have not been responsive to the challenge of universal

access to broadband services. The universal access initiatives are being led by municipal governments, local cooperatives and small businesses, reflecting a locally-based private/public demand pull model of network development, rather than a nationally-based supply push model. This is very similar in fact to that which achieved universal telephone service at an earlier time in many developed countries, including the US.

In developing countries, the innovations of poor people in both urban and rural areas in adapting prepaid mobile service to meet their needs have fostered unanticipated dramatic growth in mobile to the point where mobile penetration exceeds fixed line penetration in many countries, and has much broader geographic coverage. For the future the major vehicle for universal access to voice and related services will be mobile. In particular, Alison Gillwald's South Africa case study observes some of the more pernicious aspects of mobile networks being used as a stand-in for meeting universal service targets, while in fact, decreasing levels of service to consumers. In the same vein, Amy Mahan considers future information network needs that may not be met with the pervasive use of mobile and the decline of fixed line rollout.

Access to internet services in developing countries is being achieved via privatised incumbent operators only to their core fixed networks of more affluent subscribers, with very limited extensions beyond that. Network extensions to rural areas are pursued primarily by intermediary organisations such as telecentres, teleboutiques, community centres, schools, cooperatives, or other local organisations. These are often funded by investment in physical and human capital from local or national government agencies, international development agencies or NGOs. In these cases, limited fixed network extensions are negotiated to facilitate limited network access to serve local demand and needs. Here also, a public/private locally-focused demand-led model for network development is underway.

Under-Investment in Human Capital, Skills and Applications

It is now apparent that the preoccupation with investment in new technologies has led to massive over-investment in physical capital on certain components of the supply side of network development, i.e., facilities; and under-investment in associated human capital on the demand side, i.e., skill development and applications. New technologies don't mean much if potential users have no appreciation of their capabilities, the necessary skills to use them effectively, or an understanding of how they can be used in some beneficial way.

Despite all the visionary statements about the importance of investment in human capital in the new network economies and knowledge societies, there is little evidence that it has been occurring beyond excessive management salaries and stock options in companies that are now mostly bankrupt. Clearly an investment profile for successful network development must encompass investment in human capital to facilitate demand as well as physical capital to create supply.

In helping to shape an environment for productive investments, investors, policy-makers and regulators will need to look beyond the narrow issues of creating a supply of network physical capacity by telecom operators. They will need to attend to issues of demand and human capital, as well as the facilitation of demand – key factors influencing successful network rollout toward universal access objectives that are too often neglected.

2. Can Telecom 'Microeconomic' Regulators Stimulate Investment?

Telecom regulators do not have powers to directly influence financial markets or the instruments of macroeconomic policy and regulation that attempt to stabilise national and international capital markets and economic growth. As microeconomic regulators of one increasingly important sector of national economies, they must react to the overall macroeconomic environment and its implications for the telecom industry specifically and the ICT sector more broadly. This raises a question as to whether telecom regulation can do anything about the overall environment for investment in the industry and the sector.

Telecom regulation cannot compensate for boom and bust cycles in financial markets and the macro economy. But telecom policy and regulatory decisions clearly have an impact on the investment climate and investment opportunities in the industry and the ICT sector during both boom and bust cycles. We know from experience that credible (i.e., competent, objective, transparent and accountable) regulation is a great attraction for new investment. Expeditious interconnection regulation is a key element in attracting new investment. Asymmetric cost-based termination prices will attract investment to previously unserved high cost areas by making them potentially financially viable (see Falch, this volume). Governments (or regulators) using their monopoly power to auction licenses and spectrum on the basis of up-front cash payments of monopoly prices will suck investment capital out of the industry. The risk of unilateral imposition of unjustified fees and charges on industry players reduces incentives to invest. Barriers to entry to protect incumbent operators reduce both the incentive to invest and the investment opportunities of potential new entrants. Indeed most decisions by regulators affect the investment climate in their countries as, for example, discussed in terms of the South Africa case study.

However, given the current state of 1) depressed financial markets; 2) the legacy of over-investment in the sector in recent years and excess capacity arising from it; 3) the large levels of debt accumulated by many large players; 4) the perceived increased risk of telecom/ICT sector investments; and 5) the badly burnt fingers of investment bankers and many telecom/ICT sector executives from their recent experiences, one might ask whether in this environment there is anything significant telecom regulators can do to stimulate investment in network development. What might have been effective in a more hospitable investment environment may be ineffective in the current one.

Whatever regulators do to stimulate investment in the current environment will have a positive impact on long-term network development. The uncertainty is how much impact it is likely to have in the short-term. Regulatory initiatives to stimulate investment are worth taking in any event. The current depressed investment environment, and the compelling need for investment in network development, makes it more urgent that regulatory activity to stimulate investment be taken as soon as possible.

3. The Basic Structure of the Investment Environment

Investment Priorities for Network Development

The opportunities for telecom regulators to stimulate new investment in the sector will vary by region, country, network component, service and demand/need conditions. From the supply side, the challenge is to stimulate investment in those network components that are required to facilitate completion of national information infrastructures capable of providing universal access. Investment in local networks is needed almost everywhere; investment in national network extensions to provide universal access is needed in most countries.

However, in most cases, stimulating this investment in the current environment will require a shift in focus from the supply of network physical capacity to the stimulation of sufficient demand to justify the investment. This in turn will require greater investment in facilitating the awareness, skill, and capabilities for service applications by end-users, especially SMEs, public institutions and individuals. This is an area that was neglected during the boom investment period, and which traditionally requires investment from both private and public sectors. E-commerce applications, for example, will be a source of some of this new demand and will require significant network and services upgrading and investment. The sources of investment in developing human capital and stimulating demand must go well beyond the investment of industry players in building facility networks.

Sources of Funds

The major traditional sources of investment funds include:

A. Internally generated funds (from retained earnings and depreciation) by the firms in the sector, and new debt or stock issues that these firms choose to acquire so they can take advantage of perceived profitable market opportunities. For telecom, in some countries the dominant investor is the incumbent operator, but in others it is the mobile operators. In recent years the equipment manufacturers have taken over a major share of investment in network R&D and software development for network management.

B. New investment (often foreign) in domestic operators (e.g., privatisation of the incumbent), new licensees (e.g., mobile), and new service providers (e.g., call centres, VSATs, ISPs, etc.). The largest investments in developing countries have involved major foreign telecom operators investing in partially privatised incumbents, sometimes supported by funds from an investment partner. Suppliers of internet-related value-added network services (VANS) and content services have become significant in some countries.

C. Investment by end-users and intermediary organisations that facilitate end-user awareness, skill development and services applications. This includes investment by public and private organisations, corporations, co-operatives, SMEs, government agencies, schools, individuals, aid agencies and others. The investment is for whatever is needed for end-users to use network services effectively: terminal and network termination equipment, training and skill development, new (including experimental) applications of services, and organisational restructuring to allow greater use of ICT and communication services. It includes the creation of intermediary organisations that facilitate services applications, as well as related activities that support the creation of new demands for services.

   This is an amorphous, and not clearly defined or even understood area of investment that is difficult to measure and rarely attempted. Yet it seems apparent that in aggregate it involves a significant amount of investment in a diverse array of activities. For the immediate future this may be the most important area for investment. It will be needed to provide a major stimulus to demand that will be necessary to get the attention of those currently cautious about investing in further facilities network development.

4. The Directions of Regulatory Activity

From Regulatory Restraint to Regulatory Stimulation

For the current environment it is clear that regulators must take a more comprehensive view of the factors that determine investment in the sector. In the first stage of telecom reform, policymakers and regulators generally faced a robust investment environment in which the licensing process was viewed as a competition for the privilege of being allowed to invest in the sector. Regulatory concerns focused on how best to extract money payments to the government or obligations for the rollout of networks and services. The supply of investment capital for the sector exceeded the demand.

Now the demand for investment in the sector significantly exceeds supply. Licenses are no longer special privileges to invest in perceived lucrative telecom markets. In a number of cases, licenses are not being taken up. In many, license obligations established during the 'boom' period cannot be met. Established operators have scaled down investment programmes dramatically.

Policymakers and regulators who continue to try to apply the practices from the boom period will be creating major barriers to investment. They must now turn their attention to the other side of the equation. How can they reduce regulatory barriers to investment to an absolute minimum, and what can they do to reduce regulatory risk and investment risk in the sector? What can they do to foster the stimulation of demand, the most important element determining future investment?

Regulatory Relations Affecting Sector Investment

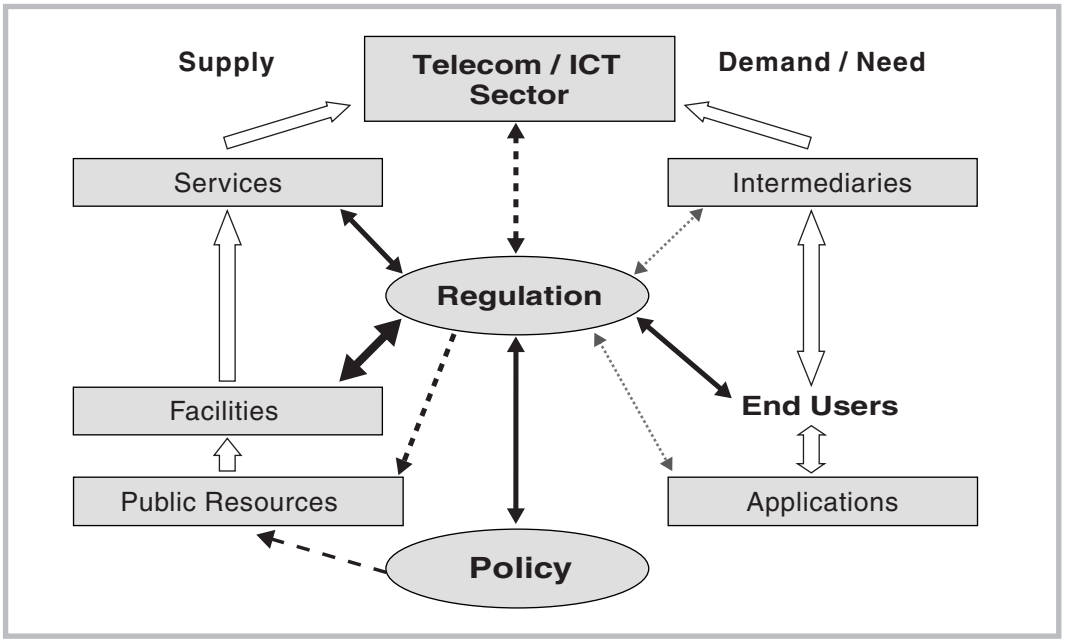
Figure 1 illustrates the paths of regulatory relations that have bearing on the telecom industry and ICT sector market environment. In a sector of the economy that is in a process of transformation by new technologies, services, demands and applications, the market must provide an environment for innovation, experimentation and learning as suppliers and users are induced to take risks and respond to one another's innovations. The market is the essential learning laboratory. In the present depressed investment market conditions, the environment in telecom/ICT is not supporting significant innovation, experimentation and learning activity. This activity is what regulators need to try to influence in a positive manner so as to promote investment in learning by both suppliers and users, as a foundation for the rollout of network facilities and services.

A dashed line links regulation to the telecom/ICT sector market environment because regulators typically do not see themselves as acting specifically to influence it. They tend rather to see themselves being influenced by the overall market environment, which affects how they apply regulatory standards to the operators. A more strategic view would recognise that the link can run both ways. Proactive regulators can develop strategies to influence the market environment directly, e.g., by publishing information and providing support activities to facilitate awareness, opportunity, innovation, experimentation and choice.

The arrow linking regulation to policy in Figure 1 is solid to reflect that regulators are implementing policies that proscribe their responsibilities. They are implementing policy which directs and constrains them, but also implies they should be proactive and innovative to ensure the policies are actually implemented effectively. The arrow to policy runs both ways as proactive regulation will provide feedback to policymakers on the effectiveness of policy implementation and the need for changes in policy as the dynamic market environment changes.

The heavy arrow linking regulation to facilities reflects the traditional preoccupation of regulators with the operators who supply the network facilities, including the incumbent, mobile operators and others. The vast majority of regulation deals with this relationship, e.g., licensing, interconnection, pricing, etc. The solid arrow linking regulation to end-users reflects the responsibilities of most regulators for providing some form of consumer protection, typically the reasonableness of prices, levels of service quality and minimal standards of universal access. In the era of monopoly, these two relations pretty much defined the scope of regulation.

Figure 1 – **Regulating relations affecting sector investment**



The dashed lines linking both regulation and policy to public resources represent rules and decisions relating to the spectrum, rights of way, numbers, and more recently domain names. In some countries, these are the responsibilities of regulators; in others, policymakers; and in still others, both regulators and ministries working together, usually with the ministries (of communication or finance) setting the rules and standards and the regulators administering them. These relations can vary significantly from one resource to another. Often public management of rights of way lies outside the scope of either communication policy or regulation. The lines are dashed in Figure 1 because the regulatory responsibilities of most regulators are highly constrained, e.g., whether or not to auction spectrum. Decisions with respect to the allocation and utilisation of public resources are most often taken without adequate consideration of their implications for network and services development. The European 3G auctions provide the best recent illustration.

With telecom market liberalisation, services have become separable from facilities, and regulators have had to fashion standards for examining wholesale and retail services markets. This unbundling of services from facilities has spawned VANS and the internet, and is making a variety of e-economy services markets possible. Regulators have developed relations with the new services sector, but to-date they have been focused primarily on resolving disputes between services suppliers and facilities operators on competition issues, e.g., network interconnection, access, pricing, etc. There has been relatively little attention to stimulating services market development in ways other than simply providing services suppliers access to the network.

The white arrows in Figure 1 linking public resources to network facilities, facilities to services, and services to the market environment reflect a simplified version of the supply chain. The supply of resources, facilities and services must be coordinated to bring services to the market in an efficient and timely manner. As regulation influences the public resource, facilities and services components of the supply chain, it directly affects the structure and efficiency of the supply side of the market. Inadequate regulation can impose inefficiency in the supply of resources, facilities, services, or all three. Regulators seldom have occasion to examine the coherence of their regulatory activities for the whole supply chain in the context of the particular market environment.

The demand/need side of the market environment is illustrated on the right side of Figure 1. Much less is known about demand than supply issues. This is partly due to the fact the transition from monopoly to a more competitive market environment is still at an early stage of development in most countries. Under conditions of monopoly supply of a public necessity service, attention to demand is not a priority. This supply side approach to market development has also been fostered by the fascination of many old and new operators with the technical capabilities of the new technologies. The prevailing view has been characterised as, "if we build it, they (the customers) will come." Now that this has been proven wrong, demand side factors should get more attention in investment analysis. Hopefully the WDR dialogue will help to restore a better balance between supply and demand in the attention of all parties involved in network development issues, including regulators.

The existence of intermediary activities and organisations on the demand side of the market, facilitating relations between end-users and the market, are common in many industries. Buying agents use their specialised knowledge of the market and of the needs of particular users or user groups. Large firms have their own teams of experts to match the specific needs of the firm with the best available supply possibilities. They typically negotiate with suppliers to modify their offerings in response to the specialised needs of the purchasing firm. Many SMEs hire specialised firms or consultants to do the job. For organisations of all sizes, and particularly individual end-users, there often needs to be a significant degree of experimentation and learning to discover beneficial applications of new services to find a match between demand and supply.

For services associated with new telecom network development, a diverse array of intermediaries have arisen attempting to facilitate this process. At the one extreme, they include local organisations with a clear demand, responding to the absence of adequate network capacity, e.g. rural co-operatives in the US. At the other, they include facilitators of innovation, experimentation and learning by end-users that is necessary for them to become aware of the potential opportunities, learn the potential benefits, and develop the interest and expression of demand. This is a fundamental issue for people in rural areas of developing countries.

The broken arrow linking regulation to intermediaries suggests this relationship is a new one for most regulators, and indeed for most intermediary organisations as well. Similarly, the broken arrow linking regulation to end user applications of services, e.g.

e-commerce, e-government, e-education, etc., has not been considered part of the responsibilities of regulators. Sometimes new services applications are developed by end-users directly, but often they involve intermediaries that facilitate the experimental and innovation stages that precede new applications, especially if they involve significant changes in organisational structure and/or individual behaviour.

The extent to which regulation can make it possible for intermediary organisations to play a more constructive role in demand development remains to be seen, but in the current depressed investment environment they could play a very significant role. More broadly, if regulation can foster an environment for widespread experimental applications by end-users and intermediaries, this would help stimulate the growth of effective demand. The white arrows on the demand/need side of Figure 1 illustrate that demand/need is expressed in the market environment sometimes through intermediaries and sometimes directly through end-users, and that significant new demand for growth must come from new applications of telecom/information services.

Figure 1 may provide a useful framework for examining the existing and potential roles for regulators that bear upon the conditions of supply and demand that will stimulate investment in network development. Some are familiar as they have been at the heart of regulatory activity since the beginning of the telecom reform process, e.g. regulation of incumbent facility networks. Others are new, e.g., stimulating activity by intermediaries to cultivate demand through experimental applications. If investment is to be stimulated, it will require that regulatory attention be directed towards all of these factors.

5. Domains for Assessing Regulatory Risk and Effectiveness

For regulators interested in stimulating investment in the sector, the most obvious place to begin is to examine existing barriers to investment. These could be in access to public resources, license conditions for constructing network facilities, network access to provide services, end user awareness and understanding of service options, restrictions on beneficial service applications, barriers to market experimentation, or in other areas of supply and demand activity illustrated in Figure 1. A useful exercise would be to identify and document all existing barriers to investment and reassess whether they are justified as essential in the present environment.

A second area for attention is regulatory risk and its implications for investment risk. Regulators are in a position to assess the extent to which the regulatory risk for investors is large or small, and what the causal factors are. Regulators can take specific steps to reduce regulatory risk that they create for investors. They can also take specific steps directed to reducing investment risk in the sector. But this will require that they take a proactive approach to addressing these important issues.

There are several specific domains that require examination in any programme to reduce barriers to investment and regulatory risk. These include the following five areas.

The Institutional Structure of Government in the Sector

When potential investors visit a telecom regulator for the first time, they have two important questions to ask. Is it empowered to implement policy in an objective and transparent manner, without political interference from the government? Does it have enough independence to resist the monopoly power of the incumbent operator? If the answers are 'yes', then political risk is low and investment opportunities are seriously assessed. If the answer is 'no', then political risk is high, and a decision must be made as to whether the investor wishes to play politics in that particular country. In the current environment, potential investors walk away.

When regulators are first established, there are inevitably strained relations between the regulator and the Ministry, which formerly performed the regulatory functions. The relations between the regulator and the incumbent are also strained, as the incumbent was not previously subjected to regulation. In addition, when appeals are made to the court, the court is often examining new issues arising from new legislation about the powers of a new type of government agency. There is a learning process involved for all parties.

An important element of regulatory risk is the clarity and transparency of these relations, not only with respect to the law and administrative procedures, but also with respect to how well this institutional structure actually functions in practice. These relations define the institutional parameters of the regulatory 'game', and heavily influence the cost and time required for potential investors and participants to play the game, and the degree of certainty of decisions made by the regulator.

The institutional environment for telecom regulation functions quite well in the Scandinavian countries, despite the absence of detailed rules for due process and the boundaries among the different roles of the parties. Decisions tend to get made openly, on the merits, in timely fashion, at relatively low cost, and are accepted by the parties. There is high degree of mutual trust in the system, and all the parties are more inclined to get on with their jobs than engage in litigious or political turf battles. In contrast, the US has the most detailed legislation and precise rules for the division and delegation of powers, administrative procedures and appeal processes of any country. But it has resulted in a highly expensive, time-consuming, uncertain litigious process that can provide a major barrier to entry for investment, especially for new or small firms.

At the other extreme, in a number of countries, key regulatory decisions are taken by the Minister, without transparency or accountability, thereby raising investment risks dramatically. All regulators can examine this basic institutional structure for regulation within their respective countries in terms of the results it is achieving and assess where barriers and risks to investment can be reduced.

Policy Directions for Regulation

Regulators must work within a policy framework that includes directions from government that bear directly upon investment risks. The dividing line between what issues are classified as policy and what are delegated to regulators vary from country to country. In some countries the regulator is no more than an administrative arm of the Ministry, and all decisions are subject to being overridden by the Minister. This is not independent regulation and introduces a high degree of regulatory and political risk. At the other end of the spectrum, some regulators have substantial powers over issues that some people would consider to be policy matters, e.g., whether or not to introduce competition by issuing new licenses. In this environment, there is either a high degree of trust and confidence in the regulator, a low degree of confidence in the capabilities of the Ministry, or both.

Between these two extremes, there is no optimum dividing line that separates policymaking from regulatory functions. What is important is that the allocation of functions be clearly defined and respected, and that it work effectively in getting the policies implemented. Regulators can assess how well the existing structure is working, and make recommendations for changes to improve effectiveness and reduce the regulatory risk for investment.

The Regulatory Process

The regulatory process can be a significant barrier to investment and create unnecessary investment risks in several ways. In some countries, costly, time-consuming regulatory filings by established operators and potential new investors must be made to do just about anything in telecom, e.g., become an internet service provider. In others, filings are not necessary even to become telecom operators. The requirements for filings, the transparency, clarity and cost of participation in the regulatory process, and the speed and certainty of regulatory decisions, all have a significant effect upon investment risk. In most countries, the regulatory process is considered to be a significant barrier to investment. The challenge for regulators is to look for ways to reduce that barrier, or even turn the process into one that supports and facilitates investment, thereby reducing investment risk.

Application of Substantive Regulatory Standards

Regulators apply a set of substantive regulatory standards to help them implement the policy objectives of government. These vary in application by different regulators, but the following standards are the most commonly used, 1) a rate of return on investment formula for calculating the overall level of prices for an incumbent operator with dominant monopoly power; 2) a price cap formula intended to set maximum prices for certain baskets of services and encourage productivity improvements, applied generally to incumbent operators; 3) a cost standard to provide a basis for

determining cost-based or cost-oriented prices for particular services, especially those involving interconnection and access to monopoly networks. These include a variety of interpretations of long run incremental cost (LRIC), fully distributed cost (FDC), and applications of other cost concepts (see Falch, this volume).

As telecom services markets have become more competitive in some countries, standards relating more directly to competition are being assessed, e.g., in the European Union. These include criteria for defining specific telecom services markets and the measurement of significant market power by the larger players in these markets. These indicators are intended to help determine whether specific markets are effectively competitive, and where significant market power exists that requires the application of the more traditional regulatory standards.

The effectiveness of the application of these regulatory standards depends not only on the appropriateness of the standards to achieve specified regulatory objectives, but also how, where and when they are applied. A theoretically good standard can be applied inappropriately and achieve negative results. For example, LRIC is an appropriate cost standard in theory, but incumbent operators claim that it provides no incentive for them to invest in improving their networks, and many have reduced their investment programmes, even during the boom period in the sector. This claim needs to be seriously examined with respect to, 1) the relevance of the LRIC concept and methods of measurement as a standard for stimulating investment; 2) the appropriateness of the particular applications of LRIC by regulators; and 3) the possibility that these incumbents are 'gaming' the regulator, i.e., blaming the regulator's application of the LRIC standard as an excuse for anti-competitive behaviour. But the important matter is that investment in network development is not taking place, so this matter must get priority attention.

Regulatory standards can also be applied imaginatively to solve unusual problems. For example, cost-based pricing has been applied to determine higher prices for terminating calls in high cost rural areas. This more precise application of cost-based pricing to determine asymmetric termination prices has made many rural areas financially viable and stimulated significant investment in network development in previously unserved areas, as demonstrated dramatically in Chile. In assessing the effects of different regulatory standards upon investment in the current environment, one must examine not only the standard itself, but also how, where and when it is being applied, as well as its effectiveness in achieving the desired results. It is now timely to reassess the implications of all the traditional regulatory standards with specific reference to their implications for investment in network development.

Steps to Stimulate Demand

Regulation has been focused almost entirely on supply side conditions, i.e., preventing the exercise of monopoly power by incumbent operators and establishing conditions for participation in the market by competitors. Certainly consumer benefits flow from these activities in terms of lower prices, service quality, new services, increased

consumer choice for some services, and universal access/service provisions. Some regulators publish information to help consumers make more informed choices, e.g. price and quality of service comparisons. But taking more specific steps to stimulate demand typically has not been viewed as part of a regulator's mandate.

Yet if the policy objective is to achieve full network development to make a variety of services available to everyone, attention to demand as well as supply issues would seem to be necessary, especially during a period of depressed investment in the roll-out of potentially beneficial new services. If one then considers the policy statements of most governments with respect to the development of their information infrastructures for future e-economies and information societies, regulatory attention to demand as well as supply would seem to be essential.

Just as there are barriers and risks on the supply side of the market that regulators can reduce, so there are barriers and risks to demand development that regulators can reduce. One important area relates to information. Telecom tariffs often defy comprehension by consumers. Yet an efficient market requires that consumers be fully informed about prices, service capabilities and potential applications. It could be argued that in theory a perfectly competitive market will supply this information. But at present telecom markets are far from perfectly competitive, and the supply of additional information to consumers can only help markets function more efficiently. Moreover, as information is part of the transparency that makes both markets and regulation function more effectively, regulators can improve their effectiveness by examining the specific areas where gathering and publishing information will support the development and implementation of consumer demand.

Regulators can often play a facilitating role to assist intermediary and end user organisations adapt their demands more efficiently to existing or newly designed services. A common story heard from banking and finance, education, health and other sectors is that available telecom services do not match their needs well and the pricing structure of the services makes them too expensive. Often the regulator is in the best position to facilitate the necessary adaptations in both demand and supply that enables new service applications associated with major organisational changes in the end-user organisations. Regulators can act as intermediaries themselves or facilitate the work of other organisations performing the intermediary function. This kind of facilitating activity fostered the creation of the SWIFT network in banking a generation ago, as well as educational television, telemedicine and other new applications.

Associated with this activity is the creation of a regulatory framework that encourages flexibility for experimentation and innovation in the development, application and marketing of new services. More typically, both regulatory rules and tariff restrictions prevent experimentation and add to the risks of innovation, particularly by intermediaries and end-users on the demand side of market development. The issue for examination here is how regulatory agencies can play a more proactive role facilitating the development of new services applications to underpin e-economies and information societies.

6. Expanding the Boundaries of Participation

Until recently, network development directed to achieve universal access has been associated only with the fixed network of incumbent operators. Yet in many countries mobile service coverage far exceeds the fixed networks for voice services. Prepaid mobile service is now the vehicle for achieving universal access.

For the future, access to internet services is becoming recognised as the new target for universal access. Mobile networks are not likely to be capable of satisfying this objective. Upgrading the fixed networks of telecom operators to broadband information infrastructures will take many years and enormous amounts of investment under the best of circumstances. In some countries, electricity, gas, pipeline, rail and road infrastructures are being used by new network operators to achieve economies and speed in network rollout. But enormous numbers of people still will be without any form of internet access for the indefinite future.

The most universal communication facility infrastructures by a long way are those providing radio and television services. Although ICT convergence now makes it technically possible to supply limited internet service over radio and TV communication networks, they have not been seriously examined as vehicles for providing at least some minimal internet access to people living beyond the limits of fixed telecom networks. If some kind of universal access to limited internet service is to be achieved for the great majority of people in developing countries within the foreseeable future, it will have to be provided over existing radio and TV transmission and distribution networks.

Experiments involving intermediary organisations using radio and TV to facilitate indirect access to internet services for 'off-net' peasants in rural areas have demonstrated that this can be done. The challenge for regulators is to reduce the barriers that now exist among the variety of existing and potential telecom facility and services networks. By establishing conditions that permit experiments by intermediaries to become catalysts for the extension of network services, regulators can help create demand and stimulate investment.

7. International Organisations and National Regulation

International organisations influence the telecom/ICT investment environment in most countries, as well as the roles and activities of national telecom regulators. They do this primarily in two ways, 1) harmonising and coordinating national telecom policies and regulations; and 2) investing in human capital in developing countries, by providing consulting advice to government and regulatory agencies, and training for people directly involved with telecom reform. The World Bank has provided funds for investment in network facilities in developing countries in the past, but with the initiation of telecom reforms, it has shifted its primary activities to facilitating reforms, including privatisation of incumbent operations. Its International Finance Corporation (IFC) a division engages in a limited amount of investment in new private (mostly mobile) operators.

The International Telecommunication Union (ITU) provides a world forum for agreement on technical standards and spectrum allocation rules, studying common policy and regulatory issues, publishing reports and statistical information, holding workshops, training programmes, exhibitions and conferences. It plays a significant role in harmonising and coordinating national telecom policies and regulations among its member countries. Most regions of the world have telecom regulatory associations that perform harmonising, coordinating and mutual support activities. The World Trade Organization (WTO) provides a forum for harmonising telecom liberalisation and trade policies and practices.

The World Bank, the ITU, the development aid agencies of a number of developed countries and other organisations invest in human capital to facilitate the telecom reform process and to train the staff of regulatory agencies in developing countries. This investment in human capital has influenced the telecom reform process in these countries to the point that the reforms have been driven more by foreign than domestic interests in some countries. Despite these investments in human capital, experience so far suggests that in most developing countries, the limiting factor on the capabilities and effectiveness of regulation is the shortage of essential skills.

It is important to consider how the activities of these international organisations, individually and collectively, are influencing the roles of national regulation, and opportunities for investment in both network facilities and human capital. In this respect there are marked differences between developed and developing countries. One important issue is whether these differences are narrowing or becoming wider.

8. The Competence and Credibility of Regulation

Both the credibility of regulation, and the scope of activities that a regulatory authority can undertake are directly related to the competence of the regulator. During a period of institutional change, when the roles of the regulator are being developed and shaped, new skills and competences must be obtained to address new issues. It is important that all parties affected by the telecom reform process understand its purposes and how they can participate most effectively. Competence about regulatory issues is essential for policymakers and operators as well as regulators, and desirable for trade unions, consumer groups and educators.

Investment in human capital about regulatory issues has been, and continues to be a key element determining the competence of all parties to the regulatory process, and the credibility and effectiveness of regulation. The most successful countries in implementing telecom reform have paid special attention to developing and updating regulatory skills. They invest continuously in human capital development. The roles for regulation in stimulating network development in any country will be constrained by the competence of its human capital and that of the participants in the regulatory process.

The technical skills needed by regulators generally fall into the categories of law, accounting/finance, engineering, economics, administration and management. In these areas the regulatory authority must compete with the operators, the Ministry and others to attract people, and it is often at a disadvantage in the skills markets. The problem is particularly acute in most developing countries where skill shortages are severe and affect all parties to the regulatory process, not just the regulators. Moreover established education and training institutions and labour markets typically have very limited capabilities to respond to the needs. Regulatory competence is the limiting resource in implementing effective telecom reforms.

A number of operators in developing countries consider the uncertainties associated with 'regulation by photocopy' – i.e., the uninformed application of regulatory rules and standards that have been faxed from somewhere else, usually the UK or the US – high on their list of regulatory risks. The Final Report of the WDR Dialogue 2002 on Next Generation Regulation (Melody et al. 2003) notes that the key factor leading many developing countries to consider establishing multisector utility regulators, rather than sector specific regulators, is the severe shortage of the skills necessary to regulate effectively. Investment in human capital is essential to reduce regulatory risk and prepare the ground for regulatory activity that will reduce the risk of investment in network development.

But technical skills alone are not likely to lead to significant institutional change. The key competence for driving institutional change is strategic management capacity, the capability to assess when and how to apply regulatory standards, tools and skills to achieve policy objectives in a dynamic technological and market environment. Strategic management capacity will be the key competence determining the capability of regulatory authorities to undertake activities to stimulate telecom reforms and network investment. Unfortunately, the regulatory authorities in relatively few developing countries will be capable of implementing a full agenda of activities for stimulating investment in network facilities development because of an insufficient capacity of human capital.

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3. Regulation and Electronic Commerce in Developing Countries

Robin Mansell[1]

1. Introduction

"IT empowers, benefits and links people the world over … access to the digital opportunities must, therefore, be open to all" (G-8 Communiqué 2000). This was a key message of the Group of Eight countries' Okinawa Charter on the Global Information Society in 2000. In 2003, the principle of inclusion in the benefits of information societies in local, regional and global contexts was endorsed again in the Declaration of Principles agreed at the World Summit on the Information Society. The Principles emphasise a "commitment to build a people-centred, inclusive and development-oriented Information Society" (WSIS 2003a).

Together with other services being developed for information societies, electronic commerce is expected to play a major role in generating new social and economic opportunities as a result of technological innovations in information and communication technologies (ICTs). In order to achieve "inclusive and development-oriented" information societies, however, it is necessary to ensure that countries have the appropriate technical and institutional infrastructure in place to support the new services. An important issue for all countries is the extent of their readiness to implement new forms of electronic services. However, for many developing countries, there is little systematic evidence about how the new technologies are being designed and implemented in their varying contexts of use.

Increasingly, it is being recognized that the diversity of these services and of information societies needs to be better understood. Information societies are evolving around the world by combining older and newer means of processing information and communicating for various purposes. These developments do not follow the homogeneous logic or model that is often presumed under labels such as 'global information society'. It is simply inappropriate to assume that there is a single model of electronic service development that will be responsive to the needs of all potential users in all countries.

The aim of this chapter is to highlight some of the key considerations for the regulation and governance of business-to-business (B2B) electronic commerce that are

raised when the diversity of applications and requirements is placed at the centre of analysis of developments in information societies and global markets. Electronic commerce can be defined as the application of ICTs to support global networks, a variety of business oriented software applications, and business processes involved in trading in goods and services. The main conclusion of the analysis is that the inclusion of developing countries in the potential benefits of new forms of electronic commerce will require measures that address country and sector specific characteristics of markets in which firms operate as well as measures that address the issues raised by the advent of ICT supported means of electronic trading.

The analysis is based on a review of the main features of the predominant vision of the way B2B electronic commerce is expected to develop. This is predicated on the expectation that widespread and equitable access to ICTs ultimately will be achieved in all countries. For firms to benefit from access to these technologies to support their international trading positions, governments must give the highest priority to putting the generic enabling conditions for B2B electronic commerce in place. Once widespread access is achieved, the expectation is that these technologies will be used as tools in support new forms of trading in many different industrial sectors. The adequacy of this policy emphasis on ICT access and on generic features of electronic commerce governance is considered in the light of empirical evidence of what B2B electronic commerce actually involves for goods producing firms in several developing countries.

In section 2, the main reasons for high expectations about the promise of electronic commerce for firms in developing countries are discussed together with the measures that are considered important in generic frameworks developed to promote B2B electronic commerce applications. Section 3 offers some observations about the importance of devising regulations and governance mechanisms that will foster developments to reduce a wide range of barriers or 'digital divides' to electronic commerce developments. In section 4 some of the results of a recent empirical study of B2B electronic commerce are presented to highlight the range of the priorities for regulation and electronic commerce governance. Section 5 presents the conclusions emphasising that generic frameworks for electronic commerce are inadequate insofar as the development goal is one of equitable inclusion in emerging information societies.[2]

2. The Promise of Electronic Commerce

Actions such as those included in the World Summit on the Information Society 'Plan of Action' (WSIS 2003b) are aimed at fostering the spread of global networks and applications, including electronic commerce. These actions are expected to provide new opportunities for empowering individuals, firms and the members of civil society. Electronic commerce seems to hold the promise of enhanced access to the global marketplace for firms in developing countries. This is expected to lead, in turn, to improved market governance and greater economic efficiency, thereby contributing to the economic development goals of developing countries. However, relatively little consideration generally is given to what electronic commerce actually means in practice for coun-

tries that have to contend with weak technological infrastructures and absent or nascent regulatory and governance institutions to support electronic commerce.

Estimates of the global value of electronic commerce continue to project rapid growth especially for the dominant B2B form of electronic commerce. To achieve expected growth rates in a way that is inclusive of firms in developing countries, there will need to be high levels of telecom network access, high levels of trust between electronic commerce trading partners, and new measures to govern electronic markets. It is often argued that if these issues are addressed, then electronic commerce will become central to economic growth, new job creation, the expansion of world trade and improved social conditions in all countries.

If the obstacles to electronic commerce development can be overcome in developing countries, B2B electronic commerce is expected to provide opportunities for firms in these countries to restructure their business processes through the reconfiguration or distribution of raw materials, components, products, services and human resources. Especially when electronic commerce is based on open internet platforms, the savings for firms in terms of reduced transaction costs involved in trading are projected to be substantial. However, although some costs of transacting may be dramatically reduced, it is difficult to assess the overall savings for firms in developing countries in the absence of systematic empirical evidence.

The potential savings for firms are difficult to assess because some costs may increase when electronic commerce is introduced, for example, the costs of ICT system development and maintenance, training, organisational change, etc. Costs also may increase due to the need to meet new quality, time-to-delivery, or other standards required by buyers or the need to implement proprietary technologies. It is possible that 'closed' business networks will be replicated in the internet environment with the implication that developing country firms will encounter new costs of participating in these networks, for example, the costs of implementing supply chain management systems.

Some intermediaries are supporting electronic commerce applications that aggregate the supply of information about goods or services from many suppliers and this may provide a neutral open marketplace for buyers and sellers. However, it is also possible that buyer-controlled electronic commerce applications will predominate in some sectors, which again suggests the maintenance of relatively 'closed' business networks and supply chains in global markets, and uncertainty about the cost implications of maintaining a presence in international markets (Goldstein and O'Connor 2000).

The next three sub-sections summarise prevailing views on key B2B electronic commerce regulatory and governance issues as they are set out in many academic papers and the reports produced by international institutions and development agencies. The focus is on enabling infrastructure access, trust in business relationships, and effective governance institutions for electronic commerce. These are key areas in generic frameworks for electronic commerce to ensure the readiness of developing countries to take advantage of the potential benefits of B2B (and other forms) of electronic commerce.

Network Infrastructure Access

If B2B electronic commerce is to spread globally and inclusively there is a need to invest substantially in communications infrastructure and the associated ICT hardware and software. The liberalisation of telecom markets and the implementation of competition are expected to stimulate new investment. Creating effective competition in telecom markets and encouraging the diffusion and use of computers and related electronic services are expected to stimulate the growth of electronic commerce. Potential users are expected to implement electronic commerce when it becomes more cost-effective than existing modes of conducting business. The availability of a high-speed telecom infrastructure is closely linked with migration to electronic commerce in the industrialised countries and this is also expected to be the case in developing countries. Advanced networks that provide the bandwidth necessary to support electronic commerce applications and facilitate access through interconnection and interoperability, can reduce network delays that create problems for trading firms. The appropriate infrastructure may be comprised of a mix of technologies such as fixed and mobile networks and, it is acknowledged in some cases, that low bandwidth services may be used to encourage online commercial transactions.

Even where a network infrastructure is in place, it often requires upgrading to the capacity and interactivity necessary for electronic commerce. The growth in data traffic generated by the internet often means that the technical configuration of networks must be adapted to accommodate changing demand structures and usage patterns. Digitalisation and the declining cost of convergent technologies mean that networks can support a wide range of new services, but a crucial issue for developing countries is the financing arrangements needed to extend access, reduce risk for investors, and strengthen demand for access.

High prices for national and local switched network access, for leased lines and for internet service provision often present barriers to electronic commerce development. Policies and regulations to promote competition are expected to encourage price reductions and efficient interconnection agreements between regional and national or local network operators. When competition is permitted and encouraged, new entrants are expected to build infrastructure facilities linking local and regional networks to support the internet. High-speed local networks and sophisticated electronic commerce applications are of little value to firms in developing countries if the access costs are too high, the technical capacity is insufficient, and prices for equipment are too high.

The liberalisation of trade rules and the rules governing inward investment is seen as playing an important role in facilitating access to the infrastructure for electronic commerce. Rapid technological innovation also provides opportunities for some developing countries to ‘leap frog’ earlier generation technologies. For instance, advances in fibre optic technologies are making it feasible to install cables to achieve major capacity increases at relatively low prices. The speed and capacity of the local telecom network play a crucial role in determining how fast electronic commerce is likely to develop.

In countries where resources for investment in the infrastructure are limited, community access to the internet is being achieved in some cases through private telecentres and cybercafes. Telecentres may provide access to a variety of applications including electronic commerce and they can also serve as a hub for training and capacity development. They often support the activities of small and medium-sized firms and micro-credit entrepreneurs.

Although the number of internet gateways is growing in developing countries, relatively little local or indigenous content is being generated in many cases. The importance of access to local knowledge has been emphasised to support economic growth and social development, and if electronic commerce is to succeed on a globally inclusive basis, there is a need to preserve and promote access to local knowledge. When language does not present a barrier to internet use, there may be other expertise barriers. For example, many south Asian websites make substantial use of graphics that are not optimised for rapid downloading using networks supporting limited capacity.

Network access is a precondition for participation in information societies, but improved access also requires organisational and educational initiatives. This applies to electronic commerce as well. Encouraging broad access requires legislation and regulation that encourage competition among firms and technologies, affordable prices, and the interoperability and interconnection of national and global networks. Access can be facilitated by regulatory authorities when they are independent and have the resources to make effective and timely interventions to promote fair competition. Measures to ensure affordable service delivery to both urban and rural areas often are needed as well.

In developing countries, regulators are often confronted with problems in establishing favourable conditions for the growth of electronic commerce. These problems may include a failure to establish an economically viable framework for telecoms pricing or from a failure to engage stakeholders in debates about universal access or moving from monopoly to competitive market structures. New policies, regulations and market structures in this area must, however, be regarded as a means to an end. The end depends on the structure of demand for electronic services in a given country. In the case of electronic commerce, demand depends on the way trusting business relationships are developed in different sectors of the economy and the way these relationships of norms and practices may be transferred into electronic commerce environments.

Trusting in Business Relationships

It is generally argued that confidence and trust in electronic commerce can be strengthened by ensuring that frameworks of policies, regulations and organisational practices are consistent with the needs of the global electronic trading environment. High levels of trust are associated with the success of all aspects of electronic commerce. Important issues for fostering trust include privacy protection, secure infrastructures,

and systems for authentication and certification of the identities of trading firms. Firms seeking to buy or sell electronically must be confident that they will get what they order and that there is an effective system of redress.

The availability of secure networks is thought to be essential for the growth of B2B electronic commerce. Increased dependence on open internet platforms to support electronic commerce means that considerable emphasis is being given to developing global and comprehensive approaches to the security of networks and electronic commerce applications. Developing countries are being urged to participate in the development of protocols and procedures for security techniques through international cooperation.

Authentication and certification mechanisms are expected to help to verify identities and provide other information about transactions and transacting parties in the open trading environments supported by the internet. Authentication and certification services are being developed by financial services firms, ICT producing firms, and government organisations such as national post-offices. In addition, payment settlement in electronic commerce depends on the banking sector and often on credit cards for small transactions. These are all considered to be important areas for government policy aimed at encouraging the application of electronic commerce in developing countries.

The importance of electronic commerce in the global economy is increasing as the value and quantity of data grow. These data are vulnerable to unauthorised access and use, misappropriation, alteration, and destruction – that is, to online fraud. This is creating challenges for governments to ensure that law enforcement agencies have the expertise to deal with electronic commerce fraud. Measures are also needed to clarify the applicability of legal instruments and to reduce problems created by differences between the laws in different countries. These issues generate the need for action by the public and private sectors in developing countries if electronic commerce is to be encouraged. Promoting electronic commerce also creates a need for the development of a legal infrastructure for trust and, in many countries, for the development of non credit card-based payments systems.

The generic policy recommendations for fostering developing country readiness for electronic commerce also include the introduction of changes in the ways that markets are governed. These are considered briefly in the next section.

Market Governance Issues

New approaches to government regulation, industry self-regulation, and new forms of 'co-regulation' are being developed as electronic commerce matures in the industrialised countries. Some of these developments are a reflection of general trends towards trade liberalisation while others reflect the need to govern markets that are increasingly dependent on global flows of information. The generic suggestions for policy are intended to increase the participation of all countries in international mar-

kets and to facilitate trade, but their specific impact on particular sectors in developing countries is often difficult to assess because of weaknesses in the empirical evidence base.

Trade liberalisation plays an important role in facilitating access to network infrastructures and to the goods and services that are necessary for electronic commerce. For signatories to the World Trade Organization's (WTO) Information Technology Agreement (ITA), this can ensure zero tariffs on a range of computer equipment relevant to electronic commerce. The General Agreement on Trade in Services (GATS) provides for binding liberalisation commitments on market access. This has particular significance for the services that underpin electronic commerce including telecoms, computer services, and financial, distribution, and delivery services.

Many of the standards for electronic commerce are developing through market mechanisms and proprietary solutions offered by firms, but there is also scope for the coordination of standards in areas such as information transport and software for product identification. Standards that support electronic commerce are also evolving as a result of open source software developments and the availability of operating systems such as Linux. These developments may help counter the high costs of proprietary software and services and reduce the costs associated with incompatible services, thus helping to promote the development of electronic commerce in developing countries.

The protection of intellectual property that is accessible via the internet is a major issue in the electronic commerce environment. Initiatives to implement digital copyright management systems seek to enforce efforts on the part of some information producers to extend copyright in digital environments. With the global spread of the internet, issues such as posting copyright material on public websites, the protection of technical designs and other materials, and licensing arrangements for the use of copyrighted information need to be addressed alongside efforts to secure a public domain for information creation and exchange. Electronic commerce adds a new set of issues for trade in products protected by copyright, patents and trademarks in terms of the scope of protection for software, databases and domain names and in terms of enforcement. The WTO's Trade Related Aspects of Intellectual Property (TRIPS) Agreement obliges mutually reciprocal intellectual property rights protection and developing countries are incurring costs to develop enforcement regimes.

While many developing countries are defining national frameworks for electronic commerce that address these issues, the growth of electronic commerce requires a degree of consistency and transparency in legislation, regulation, policies and practices internationally. The need for formal regulation, industry self-regulation, and co-regulatory measures by government and the private sector to support electronic commerce will differ depending on the effectiveness of existing systems of governance in each country.

Public taxation authorities also play an important role in realising the potential benefits of electronic commerce. The objectives in this area generally are to provide a fiscal environment within which electronic commerce can flourish while also ensuring that

electronic commerce does not undermine the ability of governments to raise revenues required for public services. Tax authorities must take account of different patterns of growth in electronic commerce growth. The challenge is how to adapt existing legislation, procedures and practices to overcome deficiencies that may occur once electronic commerce begins to support a significant share of international trade.

In developing countries, these governance issues raise particular problems not least because the priorities for addressing them have to be set in an environment where demand for changes in governance to support electronic commerce may be rather weak and financial resources for implementing actions in support of social and economic development objectives are likely to be scarce. Reducing digital divides is a goal that must compete with many other development priorities.

3. Electronic Commerce and Digital Divides

Developing countries are clearly in different states of readiness for electronic commerce developments and there are substantial differences in business practices, legislative frameworks, infrastructure deployment, and the general social and economic conditions within countries. The development of electronic commerce depends on the pre-existing strengths and weaknesses of each country's participation in the global economy and on the extent to which firms are able to compete globally on the basis of their design capabilities, production efficiency, logistics management systems, and marketing capabilities.

Simply investing in electronic commerce-related technologies is not sufficient to enhance a country's readiness to take advantage of the opportunities offered by electronic commerce. Without efforts to build new capabilities for using electronic commerce through formal and informal training and education, many of the potential benefits are unlikely to be achieved. The issues of network access, trust and market governance reviewed in the preceding section are key issues that must be addressed to stimulate the growth of B2B electronic commerce. Many international organisations are involved in initiatives to encourage developing countries to prepare for electronic commerce and many of these initiatives promote the generic framework prescriptions for the regulation measures and governance issues that are outlined above.

Overcoming digital divides between countries and within countries is essential if electronic commerce is to contribute to the social and economic aspirations of developing countries. Familiarity with the use of ICTs is important for supporting business developments. The more firms that use the internet to support electronic commerce, the more valuable it should become for all because network effects mean that the greater the collective economic use of the new technologies, the greater the potential benefits. The uneven use of ICTs across economic sectors in developing countries has important implications for efficiency and economic growth potential as well as for equity and distributional goals.

The opportunities to take advantage of electronic commerce are skewed in favour of the wealthy countries and large firms within developing countries. The number of internet hosts in the industrialised countries has increased very rapidly and despite rapid growth in communication infrastructure investment in recent years, many developing countries continue to lag behind the industrialised countries in terms of the penetration of components of the network infrastructure. This is frequently the main focus of discussions about the need to address digital divides to overcome barriers to the take-up of electronic commerce. However, there are also major divides in the capacity of developing countries to engage in the production of software and in the extent to which they can generate a sufficient volume of electronic commerce activity to justify investment in its development.

In addition, digital divides are not simply related to technology. Apart from technology-based initiatives in areas such as equipment pricing and improving access conditions, solutions to address digital divides need to involve stakeholders in organisational change, education, training and skill development initiatives, and in devising practices and policies for micro, small and medium-sized enterprises. This has major implications for developing countries where choices have to be made with respect to the skills base that most urgently needs to be built up. Once again, education and related initiatives to support the general take up of electronic commerce encounter competition for funding from sector-specific initiatives in both the public and private sectors.

Most studies indicate that the key preconditions for overcoming digital divides are building a modern network infrastructure, putting a high priority on education and awareness building, and fostering a sense of urgency on the part of the governments to address the issues that have been outlined above. However, achieving inclusive information societies also means that much greater attention needs to be given to country differences and industry sector characteristics within the framework of generic regulations and governance measures for electronic commerce and of priorities for economic and social development. If strategies aimed at stimulating electronic commerce are not responsive to a country's or sector's development priorities and stakeholder interests, initiatives to develop new means of trading on global markets stand a good chance of being resisted by their potential users.

The development of new uses of ICTs to meet development priorities must include a commitment to the principal of inclusion in emerging information societies. This often means acknowledging the need for new kinds of public-private partnerships and for governments to focus on enabling stakeholder participation in decision-making. Generic frameworks for electronic commerce are simply not suited to the specific conditions and characteristics of industrial sectors, which vary enormously in the types and complexity of products that are offered for sale in international markets and in the ways developing country producer firms are linked into global supply chains.

For electronic commerce, there is an ongoing tendency to put a much greater emphasis on technical knowledge and ICT-related regulation and policy than on the particular

characteristics of the economic sectors, firms and their governance within international markets. In the following section, the importance of examining the practical realities confronted by internationally trading firms in developing countries when they do begin to use B2B electronic commerce is highlighted by drawing on the results of an empirical study of firms' experiences in three countries – Bangladesh, Kenya and South Africa.

4. From Policy Frameworks to Practical Realities

Electronic commerce is generally understood to involve internet-based commerce in the predominant policy framework (OECD 2002). Although it is not always clear what type of B2B electronic commerce is being promoted by the generic regulatory and governance framework discussed above, there is a widespread expectation that when firms connect to global networks they will implement electronic commerce in ways that enable them to compete more effectively in global markets. B2B electronic commerce is widely believed to have major and beneficial implications for all the business processes that firms become involved in when they trade in international markets (OECD 2000; UNCTAD 2000, 2001, 2002).

B2B eElectronic commerce is expected to increase the efficiency of internal firm processes and to streamline inter-firm linkages. Firms of all sizes are expected to benefit as a result of reduced information asymmetries and from strengthened business relationships that lead to a stronger position in the international marketplace. In the mid to late 1990s there was considerable interest in the development of internet-based electronic marketplaces. The popularity of the World Wide Web created the potential to develop sites on the Web, open to many buyers and sellers. Electronic marketplaces were defined as "neutral internet-based intermediaries that focus on specific industry verticals or specific business processes, host electronic marketplaces, and use various market-making mechanisms to mediate any-to-any transactions among businesses" (Kaplan and Sawhney 1999). These new marketplaces were expected to add value to transactions between many different buyers and sellers partly because their use was hypothesised to lower transaction costs associated with trading on the open market (Benjamin and Wigand 1995).

As empirical evidence about the development of these electronic marketplaces has begun to accumulate, there are indications that these websites are not necessarily favoured by firms seeking to sell their products in the marketplace. Although these sites are designed to support B2B electronic commerce by aggregating a large number of buyers and sellers, Davenport et al. (2001) argue that "buyers generally use open markets for just 10 percent to 15 percent of their needs … they tend to choose sellers with whom they have already had personal experience."

Most research on B2B electronic commerce focuses on the experiences of firms and economic sectors in the industrialised countries. In addition, reports on the readiness of industrial sectors in developing countries to implement electronic commerce give little attention to the actual characteristics of applications that are being implement-

ed by firms in these countries. If the prevailing visions of the benefits of B2B electronic commerce are accurate, developing country firms should be able to use electronic marketplaces to reduce the costs of searching for information and to better coordinate with other firms that are up or downstream in their supply chains. By implementing B2B electronic commerce, all firms should be able to scale up the number of transactions they engage in on the international market. This is because of their improved access to the wide range of buyers that is expected to participate in these electronic marketplaces.

This is the basic argument underpinning widespread enthusiasm for B2B electronic commerce for developing country firms. Implementing electronic commerce is expected to offer high returns to firms in developing countries. As an UNCTAD (2001) report put it, "traditional marketing and export channels (for primary products) tend to be inefficient and dominated by multiple intermediaries … Developing countries, using existing local commodity exchanges and commodity export associations as a foundation, can use B2B on-line trading as a means of transforming existing commodity marketing systems to great advantage." And further, "e-commerce gives small and medium-sized enterprises the ability to access international markets that used to be difficult to enter due to high transaction costs and other market access barriers." These arguments are rarely examined based on a systematic review of the actual experiences of firms.

B2B Electronic Commerce Implementation in Practice

Empirical analysis of how B2B electronic commerce implementation is affecting firms in developing countries is relatively uncharted territory (see Maitland 2001; Moodley et al. 2001, 2002). A study undertaken between 2001 and 2003 for the UK Department for International Development – Globalisation and Poverty Programme by the author of this chapter in collaboration with the Institute of Development Studies, Sussex, critically assessed prevailing expectations about B2B electronic commerce (Humphrey et al. 2003).[3] This study of B2B electronic commerce, and specifically of developing country firms' use of internet-based open electronic marketplaces, examined two sectors – garments and horticulture. Both sectors are important for employment and export growth in developing countries. The garment sector is one of the most important export sectors in South and South East Asia. Fruits and vegetables are significant for sub-Saharan African countries (Dolan and Humphrey 2000). At the time the research was conducted numerous B2B electronic marketplaces supporting these two sectors were in operation (Paré 2003). Bangladesh (garments only), Kenya, and South Africa were selected for the study based on existing knowledge of their participation in international markets in the two sectors and pre-existing collaborations with researchers in these countries.[4]

The way firms were organising their relationships with international trading partners using B2B electronic commerce in various forms wasere investigated using a semi-structured interview protocol. This allowed the researchers to elicit information about the nature of the relationships between the firms in the sample and their cus-

tomers and suppliers and the barriers to electronic commerce that they were encountering. The overall aim of the study was to examine whether B2B electronic commerce was opening new and cheaper access to global markets for developing country firms. The results departed substantially from the predominant vision of B2B electronic commerce outlined in preceding sections of this chapter. Even when some of the expectations about the benefits of better access to information and reduced communication costs were met, business with new firms was being generated very rarely by using open electronic marketplaces. In this chapter the full results of the study cannot be presented; the aim here is to focus on the implications of the study for regulatory and governance initiatives in developing countries.

The research involved a total of 112 interviews with senior representatives of firms in the garments and horticulture sectors and key informant organisations (including industry experts, business association and chamber of commerce representatives) across the three sectors and countries.[5] The firms were selected because they were known by the researchers in the three countries to be involved in international trade and, therefore, the sample firms were expected to be involved in, or considering, some form of B2B electronic commerce.

Establishing Global Connectivity

If firms in developing countries are to avail themselves of the potential benefits of B2B electronic marketplaces that are accessible using the web, they need to have a means of accessing electronic networks. The 47 firms in the garment sector were using computers and had connections to the internet using either analogue modems (63%) or Integrated Service Digital Network (ISDN) connections (29%). Only four firms were using higher speed internet connections. In the horticulture sector, all 27 firms in the sample similarly were using computers and had connections to the internet using analogue modems (52%) or ISDN connections (33%). As in the garment sector, there was very little use of higher bandwidth access.

Despite the generally acknowledged weakness of the ICT infrastructure in Bangladesh, Kenya and South Africa, all the firms in the sample had some means of accessing the internet. Very few of the respondents suggested that they were being pressured by buyers to introduce more advanced technology. One respondent from the Kenyan horticulture sector noted, "traders are not very keen on using the internet. Even in the UK – it is very recent that customers use the email. People prefer the telephone. Even when emails are sent, one cannot trust the buyer to open them." Many respondents in Kenya commented on the high costs of telecoms. One company in the horticulture sector was using a leased line costing about USD 400 per month. The respondent from this company observed that, despite the use of a leased line link to the internet, if large files had to be exchanged network reliability would be a problem.

At the time of the interviews in early 2002, the Kenyan telecoms market was not liberalised. Service providers did not have direct satellite links and it was indicated by

an internet service provider (ISP) respondent that the government should license other satellite service providers so as to be able to use the technology without going through the government infrastructure. He also indicated that very small aperture terminal (VSAT) installations were very expensive and that the few Kenyan companies that were using this facility were multinationals. Purchasing the satellite dish was estimated to cost about USD 35,000. Overall, this respondent said the network infrastructure was unreliable – "half the time, the network is slow, has broken down, and is congested."

A representative of the Kenyan government agreed that infrastructure was a major problem including communications and other supporting services. He also observed that in January 2002 there were no electronic transaction laws. Another respondent from Kenya observed that the costs associated with connecting to the internet and the lack of within-firm ICT skills and knowledge were key factors in the limited use of the web and email. He suggested that the main challenge was the need for ICT training, "the people hired here are very good agronomists but they are not very good with computers."

Those in Kenya who were dependent upon local dial-up access indicated that, "the current lines can't handle bandwidth requirements. Sometimes the line works, sometimes it doesn't – it's a nightmare." One respondent was waiting to have a digital leased line installed and argued as a "core supplier to the 'first world' markets, communication is a big problem at the moment … Mobile telephony has really helped a lot, without communication we can't live, with a mobile we can 'trace' where the goods are within the country and that makes life much easier."

In the case of Bangladesh the emphasis on the absence of a robust infrastructure and a skills problem was similar to that reported in Kenya. A respondent from the Bangladesh garment sector indicated that a major constraint was the lack of sufficient numbers of skilled ICT staff. "The problem is that when people in Bangladesh have sufficient skills they are likely to leave the country." Another respondent suggested that the "Bangladeshi government definitely needs to get on with its plans to create a fibre optic network." A respondent from the Bangladesh garment sector indicated that there was a high level of inertia with respect to the use of B2B electronic commerce because there was a general lack of awareness about its potential benefits and a lack of access to adequate technologies. Rising telephone tariffs were said to be increasing the costs of using the internet. Other problems reported included slow connection speeds because access to the internet was still predominantly via copper telephone lines and via ISPs that tend to over-subscribe their services. One Bangladeshi respondent indicated that before beginning to use email, the company had been spending on average about USD 2000 per month on faxes. With email they were spending, on average, about USD 300 per month on communications costs, a clear benefit in terms of reduced costs of communication.

The unevenness of resources available to firms within a country was also highly visible. For example, a large textile company in Bangladesh indicated that "because we have our own network/communications infrastructure, video-conferencing is a real-

ity or us. The limitations associated with (the telephone company) are not an issue for us. We have invested greatly in developing our own ICT networks for our own purposes. We have our own fibre optic lines and bandwidth is not constraint. Therefore, Bangladesh regulatory policy doesn't impact on us. In terms of software, we develop most applications in-house although we do contract out occasionally." The problems for this large firm wereas mainly associated with lack of awareness and knowledge, and problems in the banking system.

Another Bangladeshi respondent representing an ISP observed, "firms that implement ICT solutions are unlikely to derive the full benefit of the ICT solutions because of existing policy/regulatory matters. For example, the telephone line infrastructure in Bangladesh is extremely limited (i.e. teledensity of 5 per 1000 people), but (the telephone company) does not have to compete with any other connectivity providers. Therefore, ISPs can offer access to lines for the transmission of data-bits but these lines cannot be used for such things as IP telephony, and video-conferencing. … BTTB (Bangladesh Telegraph and Telephone Board) is worried that if ISPs provide these kinds of services it will lead to revenue losses." Service providers were also facing additional problems. One respondent said that they had to lease their lines from BTTB, "but the service to these lines was inexplicably cut and the ISPs have not, and are not, being provided with any information as to why, or how to get these lines re-activated. Also, the bandwidth of the leased lines is limited."

Various additional communications policy-related problems surfaced in the interviews. For example, it was reported that in 2001 the Bangladesh Ministry of Telecommunications had granted renewable licenses to 61 companies to operate as ISPs. In early 2002, the companies that had won these licenses were facing a new problem. "The licenses expire at the end of March, but as of yet, they have not been provided with any information about how to renew their licenses – we have the money and we want to pay, but the Ministry says its not our responsibility and the regulatory board says its nothing to do with us."

Another respondent in Bangladesh noted, "if one looks at the progress that is being made, one sees that bandwidth has been increasing despite the constraints created by the government and the lack of an effective regulatory body to oversee the telecommunications monopoly … The private sector is not waiting for government to act. Rather, it is taking the lead." A private sector interviewee in Bangladesh observed that electronic commerce was not legally recognized. He said that "globalisation is like cycling, you have to keep moving. There is no scope for opting out of electronic commerce. Therefore, Bangladeshi law will have to change as well as some of the attitudes of firms." He claimed that the current infrastructure was not a problem, but that in time there would be a need to address this issue. Although the government had identified a need for, and decided to invest in, a fibre optic network, by March 2002 no progress had been made.

A representative of a Dhaka-based non-governmental organisation also indicated that the legal infrastructure for electronic commerce was missing, including the finan-

cial infrastructure. "There is a lack of understanding by key institutions. For example nobody in the Bangladesh Central Bank understands how the growth of electronic commerce could actually help to increase the flow of foreign currency. The chief executives are overly worried that the growth of electronic commerce might lead to an outflow of foreign currency from the country. … In order to avoid taxes, many entrepreneurs have opened accounts abroad." According to another trade association representative "when the fax was introduced the Bangladesh government initially restricted this technology on the grounds that it could perpetuate a flight of important information about the country." He suggested that policymakers were reacting in a similar way to the advent of electronic commerce.

In the case of South Africa, a major South African exporter of horticulture products accounting for some 70% of all exports of fresh fruit indicated that "in terms of the growers' use of email – about 80% of growers that we deal with are connected to the internet. A very small number of growers (~30-40 based in the Tranvaal region), however, are not connected. These guys use a special PC-based system we developed in-house to provide us with information." The same respondent reported that his company was sending email to growers including newsletters, other information, and general communications. They were telling the growers via email what they wanted them to have packed. But email was not the primary transaction mode – "For that, we rely on fax and the phone. This has nothing to do with infrastructure problems in South Africa. It's an issue of business practice."

This respondent also put the whole issue of electronic commerce and ICTs in a much wider context of market governance. These comments are reported at length here because they emphasise the importance of considering both the cost savings and new costs incurred as a result of using B2B electronic commerce.

"In terms of making greater use of ICT solutions there is also another element to consider… We're getting a lot of political nonsense from the European Union. On the one hand, they say that they are being 'wonderful' to developing countries because they are removing trade barriers and opening up their markets to them. On the other hand, they are increasing the information requirements associated with product traceability of food-stuffs. The legislature is saying that as an export agent (our company) must provide full traceability all the way back to the farm. This imposes new requirements on all parties in the chain to increase their record keeping. These particular costs can't be mitigated by ICT solutions, but we couldn't maintain and update the kinds of information they want without ICT. The company's employees were, and are, ready for this but it has required a significant level of investment. And, this doesn't only impact on export agents but all members of the chain. I'm confident that the South African ICT industry can definitely cope with these new demands – South Africa is leading the pack in terms of these kinds of projects. … I would say that implementing ICT saved us costs rather than creating more revenue. Fresh fruit is in a difficult stage at the moment – there's a world level over-production, and from a South African perspective, the returns are decreasing while costs are increasing. The entire industry focus is on reducing the cost of getting product to market … The bottom line is that this

company and many others wouldn't survive without ICT. … Lack of bandwidth and speed is still a major problem, particularly in South Africa. Connecting to international networks from South Africa can be a real hassle. Making sure that this gets worked out should be made a priority."

Yet another South African respondent indicated that internet connectivity within South Africa is a problem. Even those that are connected find that service is slow and expensive. A respondent from an exporter's association suggested that email is the primary communication tool used to stay in contact with exporters and some growers. Many growers were using mobile short messaging service (SMS) format, i.e., batch email that is sent from a personal computer to a cellular phone. However, many contacts remained primarily personal contacts. As this respondent put it, "in the age of ICT forgetting the importance of personalised contact is a problem … People still want to talk/meet with other people." This respondent was promoting the use of wireless technologies among growers especially in rural areas. "A big problem in South Africa is that telephone lines are being stolen to melt down for copper." The problem with wireless was seen as the cost of initial installation – 10,000 ZAR (about USD 1,527), and then the masts that cost another 15-20,000 ZAR (about USD 2,290 – 3,053). "Wireless is only financially viable for those with economies of scale – this is still not the case for individual growers."

These observations by respondents in the study sample highlight a large number of traditional regulatory issues for the telecom sector as well as wider issues of market governance, which in some cases take precedence over the problems of stimulating investment in the telecoms infrastructure and improving its accessibility. Before reviewing the implications of these results for regulatory and governance priorities in the electronic commerce field, the next sub-section examines the extent to which firms in the sample were using electronic marketplaces and whether they seemed to be benefiting in the ways that have been expected on the basis of theoretical accounts.

Using B2B Electronic Commerce

Despite the availability in both the garment and horticulture sectors of electronic marketplaces providing a range of services from trade leads to buyer/seller links, requests for quotes, online auctions, etc. (rarely online payment facilities), 77% or 57 firms in the research sample had never registered with an electronic marketplace. Ten firms (14%) had registered but no sales had materialised and another seven (9%) had registered and a few sales had occurred. Smaller firms were more likely to register at these sites than larger firms but the likelihood of reporting that products had been bought or sold using the internet was unrelated to size of the firm. There was some evidence of large buyers promoting restricted online trading as a means of facilitating the streamlining of their sourcing activities.

The availability of global connectivity was influencing the way that the firms were doing business, especially in the case of repeat transactions. Email was reported as the most

important internet application and it was being used to facilitate communication with the firms' existing customers and suppliers. A respondent in the garment sector stated that "email has substantially replaced the telephone for us – the result is miraculous for us in terms of cost." Another respondent in the same sector observed that "one of our main expenses has always been at the level of communication and email has been a blessing." In the horticulture sector, email was regularly being used for coordinating schedules and to exchange digital photographs of produce. As a respondent in the horticulture sector in Kenya said, "It is still a one-to-one business. You need to know the chap at the other end. It's a question of trust and reputation. Supermarkets would not want to buy off the net." This suggests that conventional business practices in sectors such as horticulture can serve as a barrier to the development of B2B electronic commerce.

The reality of B2B electronic commerce for the vast majority of firms in the sample involved a growing dependence on email. The more sophisticated applications of electronic commerce envisaged in some of the prevailing visions based on open internet platforms were barely visible. There was little evidence of the full deployment of the more sophisticated types of electronic commerce within this sample of internationally trading firms. However, there was some evidence of the growing use of supply chain management software and of the deepening of connections between firms in their supply chains through their development of closed trading platforms of various kinds.

Despite the advantages to buyers of opening up the supplier base through the use of open electronic marketplaces, there are factors involving long-term business relationships that favour single or repeat sourcing and trust (Quayle 2003), and as Mariotti and Sgobbi (2001) suggest, the use of ICTs should not necessarily be expected to promote anonymous arm's-length trading. The use of these technologies may be just as likely to lead to strong inter-firm networks and to more closely tied relationships in sector supply chains (Gereffi and Kaplinsky 2001). These networks are very complex, particularly in sectors where global buyers have created production and distribution systems to meet their requirements. In these cases, exclusive or restricted access B2B electronic commerce is likely to be more attractive to buyers and sellers within established supply chains. This is likely to influence the extent to which firms in developing countries make use of particular kinds of B2B electronic commerce applications.

In the light of this evidence, the next section considers the main priorities for regulation and governance to support the development of B2B electronic commerce in ways that are responsive to the needs of goods producing sectors in developing countries.

Priorities for Regulation and Electronic Commerce Governance

As indicated above, although all the firms in the sample had achieved access to the internet and were using email and, in some cases, the web, the respondents reported difficulties in a number of key areas associated with expanding on their use of B2B electronic commerce.

Not surprisingly, the costs of accessing the network infrastructure and its reliability were perceived as major issues in all three countries. But the reasons for the problems differed in each country, with each being characterised by particular explanations for inabilities to build an accessible and affordable telecom infrastructure. The evidence emphasises the importance of examining generic frameworks calling for independent regulation and market liberalisation in the particular contexts of emerging information societies.

The absence of legislation to legitimise electronic transactions was regarded as a barrier to the further development of B2B electronic commerce in Bangladesh and Kenya. However, in both cases, the reasons for slow movement in this area were attributed more to factors relating to the state of the economy and general fears about outward capital flows within the banking community if electronic commerce were to become more widespread, than to issues related to B2B electronic commerce *per se*.

The importance of addressing the full range of issues associated with digital divides was very much in evidence in this study. Some larger firms hads already invested in their own technological infrastructure and in substantial capabilities for developing B2B electronic commerce applications, particularly for supply chain management. These firms were not as concerned to apply pressure to public authorities to remedy problems with respect to the public telecom infrastructure that other firms must rely upon. There were mixed views about the importance of ICT skills and training. Some respondents argued that expenditures in this area fostered individual benefits for employees who would subsequently migrate to other countries. Other respondents viewed this as a crucial area for investment to support electronic commerce. Still others argued that it is not the ICT skills and training *per se* that are at issue; rather, the need to build comprehensive skills for understanding changes within sectoral supply chains and the demands placed upon producer firms by external buyers, was deemed to be the priority.

While measures to extend access to global networks and to reduce the costs of using open internet-based electronic commerce are needed, B2B electronic commerce seems most likely to develop in line with requirements for trusted and frequently, exclusive, business relationships. In this study, nearly all the respondents emphasised the importance of conventional sector-based business practices, the importance of face-to-face and telephone communication, even in the face of the tremendous growth in the use email. Electronic means of communication were not regarded as substituting traditional ways of maintaining business relationships. Although not reported in this chapter, the full results of the study of B2B electronic commerce suggested that producer firms were mainly engaged in repeat transactions with their buyers and did not regard it as being a high priority to use the open sites on the internet. The open sightes were not regarded as a major resource for finding information about buyers or downstream suppliers and the open electronic marketplaces were not seen as providing a means of reducing information asymmetries.

Where new technologies were playing an important role was in easing communication within countries particularly through the use of mobile communication and text

messaging and – for some firms in the sample – using more sophisticated software for supply chain management within restricted access intranet and extranet-based networks. This suggests that if policymakers in developing countries want to encourage B2B electronic commerce, they need to address regulatory issues in the telecom sector to encourage the spread of the network infrastructure and competition to reduce the costs of accessing the internet.

They also need to address a range of B2B electronic commerce issues, but these issues are not necessarily those that are given the highest priority by the predominant B2B electronic commerce policy framework. This is because that framework is based on assumptions about the way open B2B electronic commerce is developing and gives highest priority to facilitating ICTs as tools for open access internet-based trading using the electronic marketplaces and related resources considered in this study. However, these developments are likely to benefit a minority of international trading firms. The majority of developing country firms that can benefit from better terms of inclusion in emerging information societies are already integrated within sector supply chains, which are effectively, 'closed membership' networks. This means that the ICT solutions, regulations and governance arrangements for the international markets of these firms need to be better matched to the reality of trade in these sectors.

To develop effective regulation and B2B electronic commerce governance mechanisms, it will be necessary to take account of the business practices within the supply chains and to provide incentives for ICT developments that reflect actual trends and requirements, rather than those hypothesised by theoretical expositions of the impact of ICTs on the transaction costs incurred by internationally trading firms.

5. Conclusion

The results of the empirical study reported above indicate that, in contrast to the visions and generic frameworks for electronic commerce and the hopes expressed for the benefits of B2B open electronic marketplaces based on the internet, these do not appear to be the main issues for firms in developing countries when they are already trading in global markets. Restricted access B2B electronic commerce and new ways of integrating supply chain information to achieve better coordination are much more important developments for these firms. In addition, although electronic marketplaces were supporting business functions that were helping firms transact business online in a few cases, the majority of respondents reported that they were not likely to change their offline business practices unless they could see major benefits for their positioning in their global supply chains.

In this study, the limited use of B2B electronic commerce (mainly in the form of email) did not seem to be offering high returns to the firms in the three countries when the full costs entailed in trading on the international market are taken into account. In addition, many of these firms were relying on intermediaries and conventional trade channels, rather than taking advantage of the open sites for trading hosted on the internet

in their sectors. B2B electronic commerce was not helping smaller firms to enter global markets because such firms also incur high costs of branding, forming trusted relationships, and meeting quality and other standards of buyers in global supply chains.

Improved access to global markets for developing country producer firms is not likely to follow simply from the deployment of B2B electronic commerce, even when applications beyond email become more widespread and efforts to create electronic trust mechanisms are in place. Although the evidence in the study reported here was limited, the use of restricted access B2B electronic marketplaces did not seem to be changing the positions of firms within their global supply chains. When new market access possibilities become available to firms, this is more likely to be due to changes in their positions within supply chains than attributable directly to the use of new technology. The structure of these chains and the coordination requirements of buyers and sellers strongly influence the types of B2B electronic commerce that will develop in the future. These factors are at least as important as those associated with the regulation of infrastructure access, improving the skills base for using electronic commerce, and market governance arrangements to build more effective trust mechanisms in support of electronic commerce.

These observations suggest some clear messages for policymakers and practitioners. There are no magical B2B electronic commerce formulas that will launch developing country firms into new markets or help them to find new customers. The way these firms should use electronic commerce needs to be assessed from the standpoint of local stakeholders and the firms and agencies that influence their external markets. Investment decisions with respect to electronic commerce should be based on what is best for each sector and the firms in a given country – not on theoretical assessments of technological potential.

The same observations are likely to apply to generic measures taken by governments to introduce e-procurement as a means of encouraging new forms of electronic trading by firms. When governments begin to insist on new business practices involving new modes of transacting there will be both costs and benefits for the firms. Although it may appear at the level of generic policymaking that technical standards, forms and procedures should be harmonised to foster new means of trading electronically, empirical evidence shows that in many cases conventional relationships and modes of business practice will continue to be valued. The particular circumstances of industrial sectors and countries need to be taken into account. Empirical evidence on B2B electronic commerce suggests increasingly strongly, that for firms that are already involved in trading, a complete absorption of generic styles of electronic commerce leading to a complete transformation towards new forms of e-business is simply not what is happening on the ground. This observation applies as much to firms in developing countries as it does to firms in industrialised countries (Steinmueller 2002).

The lesson for policymakers is that sector-specific policies and applications should be the highest priority, rather than a generic emphasis on electronic commerce visions and high-level strategies. This approach requires investment in learning about the distinctive characteristics of sectors and countries, but it also provides a means of

avoiding costly top-down electronic commerce strategies that are simply rejected or resisted by firms that are already investing in ICTs in line with the requirements placed on them by upstream and downstream trading partners. While firms and governments do need to learn new practices and procedures for conducting B2B electronic commerce by gaining access to international trading experience they also need to learn and build upon the specific experiences of their sectors.

This chapter has identified the scope of the factors that limit the capacity of firms in developing countries to benefit from the potential offered by B2B electronic commerce. The inclusion of these firms on more favourable terms in international trade and in the benefits offered by emerging information societies is unlikely to happen until developing country policymakers and other stakeholders move to address problems on a wide range of fronts. The most effective way of promoting B2B electronic commerce is through sector specific strategies that take account of the ICT-related issues and the characteristics and positioning of developing country firms in their specific industrial sectors. The latter issues remain neglected in most generic frameworks for B2B electronic commerce that are promoted by many development agencies and initiatives sponsored by the champions of ICTs as a universal remedy for the problems facing developing countries in achieving inclusive information societies.

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[1] Robin Mansell holds the Dixons Chair in New Media and the Internet and convenes the Department of Media and Communications, London School of Economics and Political Science. An earlier version of part of this paper was prepared as an issues paper for the OECD 'Emerging Market Economy Forum on Electronic Commerce' in January 2001. The present paper benefits from the results of a joint project conducted by the author with Dr. Daniel Paré (now University of Ottawa) and Professors John Humphrey and Hubert Schmitz, Institute of Development Studies, Sussex. The views expressed in this paper are the sole responsibility of the author.

[2] This goal is also in line with UNDP Millennium Development Goals – develop an open trading and financial system; and in co-operation with the private sector, make available the benefits of new technologies, especially ICTs, see <www.undp.org/mdg/>.

[3] For the complete report and comprehensive references to relevant literature, see <www.gapresearch.org/production/Report.pdf>.

[4] Research collaborators included Zaid Bahkt, Bangladesh Institute for Development Studies; Mary Njeri Kinyanjui, Dorothy McCormick, and John Njoka, Institute of Development Studies, University of Nairobi; Mike Morris, Sagren Moodley and Myrian Velia, School of Development Studies, University of Natal, and Norma Tregurtha and Nick Vink, Department of Agricultural Economics, University of Stellenbosch. Working papers are available at <www.gapresearch.org/production/ecommerce.html>.

[5] A total of 112 interviews were conducted in 2002 (Garments – South Africa 28, Kenya 12, Bangladesh 7, total = 47; Horticulture – South Africa 28, Kenya 15, = 27). Key Informants, South Africa 16, Kenya 14, and Bangladesh 8. Dr. Daniel Paré, LSE, conducted interviews with researchers in each of these countries.

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4. Prepaid Mobile & Network Extension

Amy Mahan

1. Introduction

During the 1960s and '70s, there was much talk about and concern with 'appropriate technologies' to achieve development objectives and to attend to social responsibility agendas. The rationale for smaller-scale, more indigenously harmonisable technologies included recognition of the institutional aspects of development. Systems of technologies are intertwined with their institutional setting, and different kinds of technologies engender or require different kinds of institutional organisation.

However, if "Small is Beautiful", then Moore's Law must be loveliness incarnate. During the past decade, the geography of information and communication technologies has undergone exponential change, and concurrently has been a driving force of globalisation. At the beginning of this new millennium, smaller and smaller devices are connecting to larger and larger networks. For telecom, this has resulted in mobile cellular overtaking fixed line subscribers (ITU 2002: 6). In October 2001, African mobile subscribers surpassed their fixed-line counterparts; and world-wide, the same was achieved in 2002 (BuddeComm 2002; ITU 2002).[1] Because the telecom network is being pervasively deployed, this is commonly painted as a happy picture. In the words of the ITU, "The future is bright; the future is mobile" (ITU 1999: 96).[2]

The bright future, and indeed present opportunities for mobile network expansion, precisely because they are so positive in terms of teledensity, perhaps occludes a more hazy aspect of this picture – especially in terms of moving from a focus on mobile telephony, to telecom networks as drivers for the information society and economy. An understudied aspect of mobile has to do with the regulatory setting and more specifically the nexus of universal service and prepaid mobile, a key driver for network expansion to poor, underserved users and areas. The percentage of subscribers who choose or resort to prepaid has not been systematically documented – although this is changing. Nor is there a systematic availability of prepaid telephony indicators. Indeed, new categories and indicators need to be devised to depict the underlying changes to the telecom terrain.

Prepaid mobile is generally included in the happy picture of mobile. Initially offered as a niche market service, it has gradually made its way to the centre of the picture –

especially for developing country markets. The project of regulation concerns equity and efficiency in provision of public goods and services – achieving policy goals. To this end, part of the regulatory project must consist of identifying future obstacles or circles of exclusion to the logical extension of these services. Indeed, "telecom reform must anticipate information infrastructure development and subsequently the particularities of a network economy, otherwise telecom investment risks investment which is not optimised by actual usage" (Melody 2003). However, while extending the telecom network today, prepaid mobile may be contributing to a further entrenching of relationships that are counterproductive to development intentions. Or, in terms of telecom reform, universal service may be being achieved at the expense of future universal access.

While it is potentially hazardous to take something that ostensibly *ain't broke* and to offer solutions to fix it, this chapter will use the case of prepaid mobile to explore and prod at a few trajectories for regulation of future network development. This chapter then has two aims. The first is to examine prepaid in context of regulation, which ostensibly looks toward creating future information societies; the second concerns the reliance on prepaid in context of the nexus of telecom regulation and poverty eradication.

2. Privatisation and Other Mitigating Factors

The rollout of mobile is inseparable from the rollout of privatisation and introduction of competition in national telecom markets. Growth of competition for mobile markets has flourished, with by 2001, 78% of the world's mobile markets enjoying some degree of competition, compared with 43% for local telecom services (ITU 2002: 4).[3] Competition has been a decisive factor in mobile market development, and privatisation has attracted investment to markets with pent-up demand, and has been subsequently fulfilling demand. The ITU *Africa Telecommunication Indicators 2004* report notes that the only African countries for which mobile has not surpassed fixed line connections are those that either lack a mobile network or mobile competition.

The theory states that competitive markets will naturally occur except when there is market failure, obliging regulating for reasons including imperfect competition (such as monopolies), the allocation of public resources, externalities – such as networks, and where there is a tendency for information asymmetries. Regulatory environments world-wide differ in their national endowments, and hence in their ability to regulate markets and attract investment. Likewise, different national markets are at distinct stages of mobile market development – encompassing realities that warrant different regulatory consideration, for reasons of existing or potential market failure. These stages can be grouped as follows:

1. Alternative Stage: Fixed-line service is either unavailable or very limited. Many developing countries are experiencing this problem and are establishing mobile communications as a first source of telephony.

2. Complementary Stage: Developing mobile service complements a well-developed infrastructure, and the two services co-exist. Most developed countries are at this stage of development.

3. Substitution Stage: Mobile services begin to displace fixed-line services for voice communications due to low profitability in fixed-line subscriptions.

4. Convergence Stage: Mobile personal telecoms become mainstream and integrate data, voice, and video through various devices with many different interfaces, 3rd generation possibilities.[4]

Each stage will necessarily be characterised by different potential axes of regulation, and the stages are not necessarily sequential. Most mobile rollout initially occurred under conditions corresponding to the Complementary Stage. Mobile rollout in developing countries has been a tremendously successful solution, because of lack of fixed line infrastructure, indicative of the Alternative Stage. It is hoped that some regions of the world will make a technology leap from the Alternative to Convergence stage, as the possibility of offering new services over new technologies affords a bypass of fixed-line infrastructure.

The introduction of competition (with regulatory foci on interconnection and licences, and consumer benefits of lower pricing) may be receiving superfluous credit to the exclusion of other factors. These are elaborated by Harald Gruber and Frank Verboven in various studies which assess the impact of competition and entry of new mobile operators in contrast to technology standards, and in the context of existing networks and waiting lists. Their findings certainly confirm the centrality of competition, but also further assess the impact of simultaneous versus sequential entry, waiting lists, single standards and other mitigating factors. These findings are contextualised in the reality of existing technological environments. For example, digitalisation and increased spectrum for the EU, were found to have had more impact on speed of diffusion than increasing the number of competitors (Gruber & Verboven, 2001a: 577-588); as "capacity plays a major role in explaining the magnitude of the competition effects" (Gruber & Verboven, 2001b: 1189-1212). Conversely, for a study of Central and Eastern Europe, the scope of the existing network and size of the waiting list were found to be significant factors in addition to the introduction of competition – but found digitisation to be insignificant (Gruber, 2001: 1934). A key theme to this work is that while introduction of competition can initially stimulate diffusion, there are other significant factors, some of which will take longer to assess – such as the importance of imposing a single digital standard.

A study of competition and mobile market diffusion in Africa by Amare Gebreab (2002) draws upon Gruber and Verboven's work in assessing introduction of competition, and other extenuating factors such as digitisation, positive externalities of strong fixed line network, and existing market characteristics. While Gebreab finds a positive correlation for these latter elements, findings for the negative impact of establishing independent regulators (in triopoly markets) are especially noteworthy. "The

result is consistent with the numerous anecdotal evidence on the presence of a regulatory capture and the failure of many regulators to manage the increasing telecommunications competition in Africa partly because of organisational weaknesses" (Gebreab, 2002: 20).[5]

Different national markets will be predisposed to different rates of mobile diffusion and that these rates are varyingly contingent on the technical structure and regulatory framework of national telecom markets. The above classifications of mobile market development stages, in conjunction with analysis of regional and national standards and technological development (and other determining factors) should thus provide guidelines for regulatory intervention – at technical (e.g. standards) and competitive levels. Ovum more pragmatically notes that mobile communications is not a single market, there are at least four identifiable submarkets: retail subscriptions; retail calls; wholesale origination; and wholesale termination. For which "[t]he extent of competition in these sub-markets varies dramatically. Regulation should be restricted to those markets where competition is not yet effective, and should be the minimum required to achieve effective competition."[6]

Much anticipated convergence of new technologies (and hence services) is an underlying impulse for internationalisation of telecom markets. Increasingly large corporations are operating on a global scale – both geographically and across sectors, potentially entrenching alliances between telecoms and banking, content, media, security, etc., enterprises. Investors are motivated by speculation that there will be high levels of demand for new modes of service and delivery; as well as potential for diversification across different kinds of communication and media products. How these will be regulated will be of paramount importance – as different regulatory traditions (from separately regulated sectors) are fused or negotiated.

Beyond national frontiers, convergence means that first mover advantages need to be recognised and strategised, as digital divides not only point to lack of access to resources, but also imply being denied opportunities to shape and contribute to facets of the global information society – for example, as has occurred, and continues, with internet privatisation and agenda setting. Convergence on all levels foregrounds the issue of concentration, in that formerly discreet enterprises are now owned and operated across different industry sectors.

The cost of access and the availability of telecom networks determine the level of access to other information society resources. For Africa, the cost of connection for prepaid is dramatically lower than a fixed line (ITU 2004). Forestier et al., examine the relationship between income per capita and teledensity for which at a cross-country level there is a close link, but they note that "this is largely the result of the telephone (and the internet) acting as a consumption good – as people get richer, they want a telephone. Is there a causal relationship the other way – from telecoms to growth?" (Forestier & Kenny, 2002: 627). Unless there is corresponding growth in mobile internet access and services, it is unlikely. Further, even as new information access and mobile internet services are deployed, these tend require subscription – precluding participation by prepaid users.

The flip-side of convergence is what has become known as the 'digital divide' – both within and across countries and regions. Digital divide refers to a lack of access to information technologies and services – which are understood as crucial for development goals. The doctrine of universality, in context of information society objectives, is expanded to encompass universal access to information and the basic skills needed to access and process the information. Thus, the expectation of universality moves beyond the physical infrastructure and technology, to include a level of quality, content and human capabilities. For regions with less developed communications infrastructure, converging technology reinforces the problematic of defining who has access to communication and information, and under what kinds of conditions.

3. The Business of Prepaid

There are examples of successful regulatory initiatives that have benefited from *ex ante* consultations, evaluation, and participatory strategies.[7] Even more prevalent though, are the regulatory initiatives falling short of their mark, as evidenced by the huge disparities in access to telecom services – both within and across nations. In this section, the problem of prepaid is considered. The problem can be summarised as one of apparent success in achieving short-term regulatory benchmarks for telecom access, but at a cost which may impinge future network access and development; and which may be further exacerbating divides between rich and poor at a national level.

Prepaid mobile is increasingly used (explicitly or implicitly) in developing countries as a stand-in for fixed-line connections. For Africa, the percentage of mobile users who use prepaid is 85.3% – generally, the poorer the country, the higher the level of prepaid use (ITU 2004). Although increased connectivity is nothing to denigrate, there is nonetheless a clear contrast to countries with well-developed telecom infrastructure, where prepaid is a choice among various mobile, and indeed, overall telecoms services. As per the stages of mobile penetration noted above, it is the difference between alternative, complementary and substitute services. For the latter two categories, an effectively operating fixed line network is presumed. Where prepaid, or even mobile generally, is the only available point of network access then questions of quality of service become paramount, as users risk being trapped in a lower quality stand-in for fixed line access.

The point is not to argue that mobile should not be used to extend the network – but to argue that if mobile (or more specifically, prepaid mobile) is being used instead of fixed line networks, then attention to social regulation needs to be adjusted; and lessons from mobile market developments need to be considered as a more formal element of the intersection of regulation and development strategies.[8]

4. Complementary Stage

Regulation of the mobile sector often presumes Complementary Stage conditions, which as noted above is characterised by an adequately deployed and efficiently functioning fixed line network. Likewise, within the specific prepaid market segment, there is a regulatory presumption of choice between prepaid and subscriptions. For most developed countries where mobile was first deployed, this was in fact the case, with prepaid being a market niche choice before its very rapid and unexpected growth.

Thus, regulatory issues have tended to focus on creating sound, competitive markets for mobile. Spectrum use, licensing, and interconnection have been the regulatory concerns and cornerstones for establishing mobile markets. Consumer related issues have been scarce in this repertoire, with number portability being the most prominent. Prepaid has been free of any additional regulation outside of more generic mobile concerns. And, as evidenced by pricing, competition is working in bringing down initially exorbitant prices compared with post-paid subscription services. Pricing of mobile services, however, has not been systematically studied as a factor in diffusion.

The presumption of complementarity has underlined much of mobile regulation around the world. This is evidenced most simply by the high level of competition in the mobile sector compared with fixed line service. However, the degree of complementarity is becoming increasingly subject to question. "If mobile telephone subscribers are stripped away, then there has hardly been any growth in the telecommunications market in many countries" (ITU 2002: 7). Good regulatory practice in Europe, for example, will not be entirely relevant for other regions. The ITU cautions that "[u]niversal access has traditionally been financed from subsidies that are not easily implemented when the industry is operated by the private sector. In many developing countries, the absence of substantive universal access programmes has meant that those that cannot afford service have been left out of the huge increase in telecommunication access over the last decade" (ITU, 2002: 32).

5. Alternative Stage

Hernando de Soto in his work *The Mystery of Capital* (2001) explores the question of why capitalism, in spite of concerted efforts to develop markets, does not flourish in developing countries. In brief, his very extensively documented reasoning is that a vast amount of capital, because it is not formalised, cannot be mobilised as assets. Homeowners who do not have a title to their home cannot mobilise (mortgage) the worth of their asset; informal sector business owners are not eligible for loans to grow their business, and further fall prey to forms of informal and unpredictable taxation such as bribes and protection. De Soto's findings show that there is not so much an unwillingness to formalise and register asset ownership, nor to move business from the informal to formal sector, the problem rather lies in impossibly impenetrable levels of bureaucracy and poor existing documentation (for example of property lines).

Prepaid is very much the informal sector of telecom, it has been an elusive market segment, and difficult to document exactly how pervasive it is, beyond very much so. This lack of systematic data should be problematic for regulators in that there is no concrete picture as to actual penetration. Indeed, consistent indicators need to be devised for definitional categories, for example, who counts as a 'subscriber' – someone who owns a handset (or at very least a SIM card), but who perhaps has not had prepaid charged up for over a month, two months, six months? Thus, prepaid can be overestimated or adjusted depending on who is reporting for what reason (i.e. to indicate market share to potential investors, to demonstrate regulatory success in telecom access; or conversely to justify further industry investment, etc.).

As per de Soto's problematic of dead assets, prepaid in particular, but mobile telephony generally, in many respects reaffirms and entrenches relationships which do not fully promote the extension of information networks within developing countries. De Soto's premise is not that ownership of property or businesses is the ultimate goal – but rather to mobilise these resources to achieve other goals, in short to participate more fully in the economy. In the context of telecoms, we can transpose the argument to suggest that the end goal is not (or should not) be simply achieving universal service targets, but to providing access to networks as a tool for development both for individuals and at a national level.

6. Establishing Relationships

While access to the telecom network is crucial, with prepaid mobile there is no obligation for a relationship to be established with the provider for the purpose of a credit rating (for example for future migration to post-paid services). The point is often made that prepaid allows users to manage telecom spending.[9] To further the comparison with de Soto's argument, when an individual can mobilise assets, then relationships are also mobilised for which risk is shared. Insurance, mortgages, business development loans, taxation rather than coerced protection or bribes – all of these are examples of shifting the burden of risk from the individual to a shared institutional arrangement. For prepaid, the individual bears all risk and potential detriments of higher per call charges, up-front investment in future calls, damage to card which may invalidate its use, ownership and maintenance of handset, lower quality of service; and frees the service provider from investment in billing and collection.

Grameen Telecom[10] provides a showcase initiative for mediating the relationship between telephony and financial management, where risk is shared, and assets are mobilised. In this telecom business model, Grameen Telecom (through its parent company Grameen Bank) provides a micro loan to a participant – a village payphone operator – who purchases a mobile telephone as an investment. Local inhabitants benefit from access to the network and the payphone operator benefits from an income, part of which is used to repay the loan. Likewise, the Markle Foundation's recent report "What Works: Serving the Poor, Profitably" underlines this in terms of building business cases which strengthen local networks as a point of entry into larger markets (Prahalad

& Hammand, 2002).[11] These approaches also provide a similar argument to de Soto's, that in order to function in a market, there must be a foundation for participation.

At the social network level, as noted by Samarajiva, "The public interest is not identical to the consumers' interest" (2001: 8). There has been much work in the area of social capital and social capital investment that evidences a link between strong local civic communities and economic development. If the underlying philosophy of technology is that it is a system – engendering relationships, then the systems of infrastructures must also be understood in their intersection with systems of community, markets and governance. In a similar vein, Milton Mueller traces three stages of Universal Service policy; the first stage characterised by the intention of interconnection so that all subscribers (across different telephone systems) could talk to each other, the second was subsidy focussed in terms of providing essential service access at affordable rates. The emerging third-generation reality, Mueller argues, is moving away from telecom access as a "simple, homogenous thing. It is becoming increasingly specialized and heterogeneous" (1997).[12]

The key, according to Mueller is the need for a "new generation of policy that focuses on the account relationship" (1997).[13] Formalising a relationship with the provider is important – for current and future telecom access and services. In regions where prepaid complements both an extensive mobile and fixed line network, telephone anonymity is one option in the context of other points of intersection with the provider to establish a relationship (the most likely example being a prepaid mobile phone, in addition to a fixed home line, or a fixed cable connection). However, the obverse, forming a relationship with the user, is equally if not more important both for strategic and organisational reasons, "including:

- difficulties in retaining those customers with whom there is no direct or regular contact;
- problems in influencing user traffic volumes, which in some cases may be sporadic;
- obstacles to the introduction and marketing of new value-added and non-voice services; and generally
- problems for industry forecasting as the consumer base can only be estimated" (*PNEWire*, 1999).

Thus, consumer loyalty is a key factor in consumption of telecom services. Further, prepaid churn rates in Europe are currently estimated to be at 20% per year (AMS, 2001). In order to establish these relationships (getting otherwise anonymous prepaid users to register their name and personal contact information) incentives such as free minutes, free trials on new services, etc., are offered.

For advanced services – such as m-payments, mobile commerce, mobile internet access – prepaid mobile users will require more than a SIM card and handset. For the

information, networked economy, some form of membership is required. Users have to be part of a larger network in which they can be identified on some level. Originally it was claimed that the entire prepaid mobile market segment would be excluded from mobile internet access, while service providers are backtracking as quickly as possible on this as they can, there are nonetheless hurdles for providing anonymous access to more than a small range of services.

For subscribers who are not wedded to anonymity, but appreciate the phone expense management inherent in prepaid, solutions are being developed for prepaid services that are contingent on relationships, for example, with banking institutions. For these, m-payments can work on a prepaid or post-paid basis, as it relies on a financial institution's authentication of the relationship.[14] The mobile telecom user, in particular the prepaid user, can triangulate consumer relationships with an accrediting institutions – such as a bank for m-payments (see below), through such projects as Grameen Telecom, or through the service provider establishing (or continuing) a relationship at the request of the user – but not necessarily benefiting the user. Because of its very mobility, a given phone may have a number of different users leaving it unsuitable to serving as an authentication device for an individual.

To sum up, prepaid mobile is currently fulfilling a much needed extension of the telecom network. Connectivity is good starting point, but the quality and attributes associated with different modes of accessing the network must be assessed for current and future network use. The AITEC Africa report reminds us that, competition by itself will not deliver where there is an inability to pay for the services (Hamilton, 2002: 18). Likewise, the value of relationships that are taken for granted and catered to in developed consumer society, must be also valued and promoted in developing network economies. If network development and consumer relationships are relegated to the informal sector of prepaid mobile, they will not become effective, and further risk not fully maturing in an information society context.

7. New Indicators

Definitionally, *who* has access to the telecom network? The owner of a SIM card? Someone who has made a call in the past month? Someone who has received a call? Someone who has recently used their mobile phone to buy a can of Coke? Someone who can receive a call, but cannot afford to charge up their prepaid card? In light of new technologies and emerging services there is an ongoing need to assess access and reach of ICTs. The ITU Report on Mobile (1999) states that when you dial a mobile number, you call a person – not a place. This is important, and this is new. Accordingly, indicators need to reflect this kind of change. Forestier et al., note that "National teledensity is not the best variable for measuring the poor's access to telecommunications. It is a measure of the number of telephones per capita, not the level of access to telephones. … Data limitations make this a difficult problem to overcome – cross country information on telephone access by income groups is not available" (Kenny & Forestier 2002: 631-2).

The challenge is to devise indicators that help predict which conditions will result in the most effective and efficient network access configurations. For example, in 1999, the ITU reported that "[f]ixed networks have virtually stopped growing in some developed countries" (except for upgrades – 1999: 2) and perhaps contentiously proclaimed that "[a]s mobile cellular emerges as the preferred means of voice telephony, the regulatory obsession with using fixed lines to extend telecommunication access is open to question" (1999: 95). Most developing countries, and many countries at different stages of development are still grappling with extending the network to rural and difficult to reach areas. While mobile is doing much to increase teledensity, there is still evidence of high expectations that will not be met. Teledensity increases access to the network for some, but that network must be used in a productive way. When expectations (policy and regulatory) are tailored to technological possibilities in conjunction with actual need they will be more realistic. Qualitative studies of how people use their telephones (or the telephones they have access to) need to be emphasised especially for targeting modes of network rollout. Mueller, for example, sketches how card-based access reconfigures the economics of telecoms demand and in this vein stresses the need to move away from pursuing the more traditional line to the home route of telecom universal service delivery, instead having universal service being distributed via prepaid cards (Mueller 1997).

Similarly, for information society objectives, if the 'regulatory obsession' is with adequate access to information, there is a much broader range of policy imperatives than mere stringing of copper. The ITU notes that a "major question, which has not been intensively studied, is the capacity of developing nations to absorb ICTs beyond their level of economic development" (2002: 33). Pro-active licensing, support and use of more traditional technologies in conjunction with new technologies could be used to promote real and meaningful information access. Telecom network diffusion is underpinned by the belief that life with access to a telephone network is better than being without one; and that telecom development accords economic development. But, as with digital divide and other studies, it has also been shown that technological diffusion can exacerbate national poverty divides, with pick-up and teledensity increases benefiting already better off sectors of the population (Forestier & Kenny, 2002). Thus, regulation – supported by more precise indicators – must maintain overall poverty eradication intentions while working to achieve teledensity increases.[15]

8. Conclusions

Regulation determines how resources are equitably allocated – especially when market failure precludes this. Thus, for example, government policy prescribes that youth need to be educated, the sick need medical treatment, communities need access to various kinds of infrastructure – for economic development, and for general well-being. When devising these policies, the government does not necessarily expect that users will be able to pay for services – in fact, overt policies are made precisely because of peoples' inability to pay – which in no manner reduces the importance or imperative of the service. That indeed is a task of regulation: to determine the allocation of scarce resources.

Thus, in a move to telecoms prepaid, it is fair to expect users to pay their phone bill – and to offer a means to better manage their resources (i.e. not overspend) in the form of e.g. prepaid. This is hardly an ideal development model, and does not take a great leap of imagination to see other sectors finding this approach attractive… prepaid access to the energy grid, prepaid medical membership (rather than insurance), prepaid education and tutoring, prepaid information access. The problem is not the management of all of these cards and accounts – the problem is that individual is increasingly the centre of regulatory choice making – hierarchising which expenditures are warranted.

In context of different stages of mobile and telecom diffusion generally, we can formulate an understanding of the process of regulatory adoption at national level (or perhaps a spectrum of adoption). Introducing regulation (i.e. at a national level) consists of introducing conventions and practices where conventions and practices already exist. Plausibly there are two manners of introducing the new conventions: by superimposing them on established and existing practices (imposing a new order); or by building them in consideration and in conjunction with existing practices. For either scenario, a certain initial chaotic period is expected as there will be conflicts due both to misunderstanding as the new regulatory language may be unintelligible - or locally may have little legitimacy or currency. It is at this point that civil society interest will be most relevant (or indeed more relevant than consumer interest, which inevitably will follow).

Because of mobile's 'geographical liberation' from fixed line networks there is an ability to target groups of individual users rather than to extend the physical network to communities. This has implications for current and future regulation of telephone services, especially with migration to increasingly intelligent networks and services. In addition to differences in telephony attributes, this also situates the difference between consumer interest and civil society interest. The first is an individual consumer of goods and services, the second is a community of diverse interests and needs.

Being connected to the telecom network is an important aspect of creating conditions for economic development and poverty alleviation. However, the nature of that network will continue to grow, change and evolve. To maintain value for future services and technologies, the connection must be strong, and able to be used in an effective and equally evolving manner.

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[1] The ITU notes "The developing world's share of global mobile subscribers has risen from under 5 per cent in 1990 to more than 20 per cent now [1999]" (ITU, 2002: 6); and that, "Developing countries are experiencing some of the highest levels of mobile growth anywhere in the world" (ITU 1999: 59).

[2] Or, more recently, the ITU has proclaimed that "We've found the missing link: it's mobile communications" (2002: 13).

[3] Report note: these numbers refer to legal rather than actual status, which is lower.

[4] These four stages are adapted from the Mobile Wireless Project. The fourth stage in the original source is identified as "saturation stage" – which I have changed to "convergence stage". See, Mobile Wireless Project <www.ecrp.org/english/MWP/Worldwide%20developments/worldindex.htm>.

[5] The problem of oligopolies developing in markets with high levels of competition is well discussed in Hamilton (ed.) 2002.

[6] Rogerson, 2000 – Ovum presentation to ITU.

[7] Chilean electrification is one the best known examples of this, see for example, Jadresic, 2000; for a discussion of community informatics strategies see McIver, 2003.

[8] However, there are expectations for FDI, especially in the mobile sector, which need to be taken into consideration. Which is to say that while looking to regulate for the future, and perhaps to reconceive mobile regulation, it would also be dangerous to drastically alter the rules of the game.

[9] Competition in the sector has drastically brought down prepaid prices, which perhaps helps this management even more.

[10] <www.grameen-info.org/grameen/gtelecom/>

[11] Another version of this research was published as a Markle Foundation Report: "What works: Serving the Poor , Profitably. A Private Sector Strategy for Global Digital Opportunity" available at: <www.markle.org/news/What_works_Servingthepoorprofitably.pdf>.

[12] Online version accessed: "Telecommunications Access in the Age of Electronic Commerce: Toward a Third-Generation Universal Service Policy" <law.indiana.edu/fclj/pubs/v49/no3/mueller.html>.

[13] Ibid.

[14] See Rosenblum (2002), for a description of m-payment systems being conceived for mobile users in China.

[15] This could take the form of focussing on facilitation information access through more traditional technologies such as radio (e.g. through funding, programming initiatives, licensing strategies), see Girard 2003; McIver 2003.

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5. Internet, Radio & Network Extension[1]

Bruce Girard

1. Introduction

This chapter examines characteristics of two information and communication technologies – radio and the internet. We consider the imbalanced global expansion of the internet and some of the limitations that this imposes when applying North American or European models for its use in the less-industrialised regions, especially in rural areas. We will then turn to some of the characteristics that have enabled radio's success in the same regions.

The primary argument is that the combination of the internet and broadcast radio offers a new and potent range of possibilities for development communication projects. The second part of the chapter looks at some of these projects, grouping them into three broad and occasionally overlapping categories:

- Projects which create or support networks of broadcasters;
- Projects in which the radio station serves as a gateway or community intermediary, providing mediated but effective and meaningful access to the *knowledge and information potential* of the internet;
- Projects which use the radio/internet combination to facilitate communication with migrant communities, providing mediated but effective access to the *communication potential* of the internet.

Finally, there are some preliminary conclusions and suggestions for the way forward.

2. Internet for Development

The so-called 'digital divide' occupies an important place on the agenda of governments, international agencies, and civil society organisations around the world. Over the past few years there have been countless seminars, studies and statements about it and various related issues such as 'digital opportunities' and 'internet for development'. Governments have adopted national IT policies and liberalised the telecoms

sector to try to attract investment. Hundreds of new NGOs have sprung up in the last decade, first to affordably extend the network to civil society sectors in both industrialised and less-industrialised countries, and later to promote effective use of it. On the intergovernmental level many United Nations (UN) agencies, the G7 (later the G8) group of industrialised countries, the World Bank and several regional bodies have put ICTs and development high on their agenda. The World Summit on the Information Society (WSIS), hosted by the International Telecommunications Union (ITU) on behalf of the UN, is the latest and biggest international effort to focus international attention on the issue. Not surprisingly, the internet has provided the most active forum for discussion of it – typing "digital divide" in Google's search engine returns about 2,880,000 references.[2]

The debates around the digital divide and using the internet for development have focused on uncovering new areas of global inequality and imagining new opportunities for development. However, with an enthusiasm for the new, these often overlook lessons learned in earlier efforts to understand and change other social, economic and quality of life divides that separate rich countries from poor ones. One of the most important of these is that *the reason people in poor countries do not have wide access to the internet is because they are poor – the same reason they have inadequate water, education, healthcare, electricity, and transport*. And, while investment in extending their access to the internet could help improve their lives, so too would investment in water, education and healthcare.

A second similarity between the internet and development issues such as education and healthcare is that local participation is essential if projects are going to address local problems or be attuned to local capacities. As Alfonso Gumucio (2003) notes, the history of development aid is strewn with the carcasses of 'white elephants', massive projects that failed because they did not adequately consult with local communities. Telecoms projects are not immune to the white elephant syndrome. We have all heard stories of communities unable to tap into the telecom wires hanging over their heads because of some minor regulatory or technical oversight, and of hugely expensive telecentres that fall into disuse because of a lack of maintenance skills or that are inaccessible to women because they fail to adopt gender sensitive training or management policies.

During the past decade the international community has expended tremendous effort and expense in telecom development. Major initiatives have been undertaken to encourage the privatisation of state telephone monopolies, to invite foreign direct investment in the sector and to introduce competition. The results have been impressive in certain areas, notably prepaid mobile telephony, which has experienced rapid take-up wherever it has become available – primarily in urban centres. There has been much less progress in making the internet available in the least developed countries, especially in poor rural areas.

While the numbers vary according to who is counting, a quick look at data shows how little progress has been made in extending the internet to less-industrialised world. According to NUA, an Irish company that has been tracking internet use surveys

since 1995, there are 606 million people online in the world – about 10% of the world's population. Of these, 62% are in North America or Western Europe, home to 10% of the world's population. The Asia/Pacific region accounts for almost 31%,[3] almost two-thirds of them mostly concentrated in a few countries. Barely 5% are in Latin America. Sub-Saharan Africa, with roughly the same population as North America and Europe combined, has about 1% of the world's internet users.[4] Around 60% of US adults have internet access, while in Africa, around 1% of the population is online – half of them in South Africa and *virtually none in rural areas*. And let us not forget that one-third of the world's population has no access to electricity, billions have never made a telephone call, and there are nearly twice as many illiterate adults (98% of them in less-industrialised countries) than there are people online. Far from making progress in efforts to bridge the digital divide, the trends show growing inequality between the *info-rich* and the *info-poor*.

If the only way of harnessing the internet's development potential is to bridge the *digital divide* by providing rural residents of less-industrialised countries with whatever level of service is enjoyed in the developed world, then we should not expect to succeed in our lifetimes. Moreover, even if we were to succeed, it would not solve the problem. Connectivity is the tip of the iceberg and underlying it are many complex factors that impede the internet's take-up by the majority of the world's population. Among these are:

- Illiteracy – UNESCO estimates that there are one billion illiterate adults in the world, approximately 25% of the total adult population. Most web content, especially development-oriented content, is written;

- Language – If you can read, can you read English? While there are more than 6,000 languages in the world, the internet is dominated by English, with another dozen or so having significant presence. At least 20% of the world's population speaks languages that are almost entirely excluded from the web.

- Content – You can read English, but can you find local, relevant or contextualised content?

While technology is important, escaping from poverty requires knowledge. Knowledge does not come from technology but from experience and relevant and meaningful content – digital or not. Content that explains useful agricultural techniques or the workings of local markets can be transformed into knowledge and contribute to increased production and better prices. Content about locally available traditional medicine or about nutrition can lead to longer and better lives. Content about rights, responsibilities and options can be both a prerequisite and a catalyst for democracy.

It is also becoming clear that the distribution systems for knowledge are most effective when building on the local information systems currently in use. These local systems are not made of wire or glass fibre, but they are human communication systems. This means that in addition to infrastructure, successful uses of the internet will

incorporate what Richard Heeks refers to as 'community intermediaries', institutions and individuals that use the internet and serve as a bridge between it and the community members. Community intermediaries come from the community itself. They can be midwives, teachers, agricultural extension workers, experienced elders or others with a formal or informal role in the local information system. The characteristics that make a good community intermediary include "proximity, trust and knowledge (including the ability to combine 'techknowledge' about ICT with 'context knowledge' about the environment in which it is used)" (Heeks 1999).

Thus, while the internet is one route for accessing knowledge, direct access to its infrastructure is neither the only way nor, in most cases, the best way to use it for development. As community intermediaries, local radio broadcasters have shown strength in the past and, with the right strategies and policies, they can play an essential role in the future.

3. Radio

More than ninety years after the world's first station was founded, radio is still the most pervasive, accessible, affordable, and flexible mass medium available. In rural areas, it is often the *only* mass medium available.

Low production and distribution costs have made it possible for radio to interpret the world from local perspectives, and to respond to local needs for information. More than any other mass communication medium, radio speaks in the language and with the accent of its community. Its programming reflects local interests and it can make important contributions to both the heritage and the development of the cultures, economies and communities that surround it.

More than any other medium, radio is local. In Latin America, for example, while most radio is produced locally or nationally, only 30% of television programming comes from the region; with 62% produced in the United States (UNDP 1999: 34). Quechua, a language spoken by some ten million people in Bolivia, Ecuador and Peru, is all but absent from the region's television screens, but in Peru alone an estimated 180 radio stations regularly offer programmes in the language. The same is true in Africa, where local radio stations produce their own programmes and speak in the hundreds of languages of their communities.

Radio is also widely available. While there are only two telephone lines for every hundred people in Africa, there are twenty radio *receivers* per hundred – even in rural areas most households have access to a receiver. Radio *stations* are also common. Fifteen years ago there were only ten independent (non-state) radio stations in all of sub-Saharan Africa; now there are thousands, many of them located in small towns and serving rural communities. Rural residents, women, youth, ethnic and linguistic minorities and even children have benefited from the explosion of radio in Africa and can now see themselves reflected in the media for the first time. Latin America

never had the same state domination of the radio, but it also experienced a boom of local and independent radio stations during the 1980s and '90s.

Long before the internet popularised the notion of the convergence of media and telecoms, local radio stations were fulfilling the role of 'community telephone' with several hours per day reserved for broadcasting personal messages, birth and death announcements, invitations to parties, ordering food and supplies from the store in the next village, calling for emergency medical assistance and even for receiving personal medical advice from the local doctor. Many radio stations were working in multimedia before that term was popular, too – often serving as a community hub, with communication activities including publishing, video production, and even operating cinemas.

In many rural areas radio is the only source of information about market prices for crops, and thus the only defence against speculators. It is used in agricultural extension programmes, is a vehicle for both formal and informal education, and plays an important role in the preservation of local language and culture.

While in some parts of the world we take radio for granted, seeing it as little more than an accessory for an automobile, in others it fulfils a variety of roles: it is the only mass medium that most people have access to; it is a 'personal' communication medium fulfilling the function of a community telephone; and it is a school, the community's primary point of contact with the global knowledge infrastructure.

Radio has demonstrated tremendous potential to promote development. Relevant, interesting and interactive radio enables neglected communities to be heard and to participate in the democratic process. And simply having a say in decisions that shape their lives ultimately improves their living standards.

4. Next Generation Radio

Probably the four most important characteristics contributing to radio's success as a medium for development are: (1) its pervasiveness, (2) its local nature, (3) the fact that it is an oral medium, and (4) its ability to involve communities and individuals in an interactive social communication process.

While the first three are fairly straightforward, it is useful to clarify the concept of an *interactive social communication* in order to distinguish it from *interactivity.* The latter is usually applied to the internet and refers to individual users' ability to interact with a website or directly with another individual or a company via email. Radio also offers this possibility, via the use of telephone call in programmes, open microphone shows, letters, etc. However, radio excels at stimulating *interactive social communication* within a community. A local issues programme, for example, informs listeners about a community problem and thus stimulates interactive communication among members of the community as they go about their daily lives (now

unmediated by the radio), possibly leading to development of a common understanding of the problem and proposals for its resolution. As time goes on, these proposals can be fed back into the loop in the form of another radio programme, and further discussed, refined and acted on in the community.

The internet is characterised by interactivity, and, technically, its potential in this area is far greater than radio's. It is also a store of useful knowledge and among its millions of pages there is a tremendous amount of information relevant to development issues. However, the barriers we have already looked at – access, literacy, languages, appropriate content – present overwhelming obstacles that will have to be overcome before most of the world's population will be able to surf the net to find solutions to their poverty.

Over the past few years a number of experiments blending independent local radio and the internet have created new models and this new convergence has appeared on the agendas of organisations like the World Association of Community Broadcasters (AMARC), and the Association for Progressive Communications (APC), which have traditionally focused on one or the other of traditional or new communication technologies.[5] Civil society organisations participating in the World Summit on the Information Society also took up the issue, stating in their declaration: "Community-based media and communication centres should be encouraged and assisted to combine traditional media technologies, including radio and television, with access to new ICTs" (WSIS Civil Society Plenary 2003). Donors have become interested and development communication research has appeared highlighting the role of intermediaries, such as radio stations, in bringing knowledge to rural areas (James 2004).

In North America and Europe many if not most radio stations now 'stream' their programming over the internet, (including a growing number of internet-only stations). Radio-Locator,[6] a website that lists radio stations on the internet currently has links to more than 2,500 audio streams from stations world-wide. Many of these stations are merely extending their reach, using the internet to make their programmes available to geographically distant listeners, but some are using the interactive capabilities of the internet to provide value-added service to local listeners. More recently independent producers and radio stations have discovered podcasting, which enables people to listen to internet radio programmes on portable MP3 players. Primarily used for 'audio blogging', enabling almost anyone to produce and distribute their own radio programmes, the technology also gives internet radio the portability that until now was only available to over-the-air broadcasting – plug your increasingly ubiquitous MP3 player into a computer for a few minutes, and you can download hours of the programmes you select and listen at your leisure.[7]

Development projects experimenting with radio and the internet are emerging in very distinct environments and seeking to address very different sets of problems. In general these projects have taken the three main forms mentioned earlier in this chapter: projects to support radio networking and exchanges, gateway or community intermediary projects, and projects that link migrants to their home communities.

5. Networks

Radio networks for exchanging information and programming have been around almost as long as broadcast radio itself. In the US, where commercial radio is the norm, CBS and NBC built national networks in the 1920s and 1930s. In countries where radio first emerged as a public or state service, it was a networked monopoly almost from the beginning. Later, when independent and local stations emerged (at very different times in different parts of the world) they too saw the advantages of networking information and programmes. Networks not only offer an economic advantage, since spreading the cost of programme production across several radio stations reduces the cost to each station, but they also permit a better and more complete service for listeners, incorporating, for example, national and international news and providing a distribution channel for third party programmes. The problem was that, until very recently, the only infrastructure within the grasp of independent radio stations in less-industrialised countries was the postal system, slow and notoriously unreliable, especially outside major cities.

Despite distribution problems, many networks did exist in less-developed countries, especially in Latin America, where independent alternative radio was invented more than fifty years ago. Initiated by Chasqui-Huasi in Chile and then taken over by the Asociación Latinoamericana de Educación Radiofónica (ALER – the Latin American Association for Radio Education), *Informativo Tercer Mundo* (ITM) was a weekly news programme distributed by mail on cassette tapes and based primarily on news from Inter Press Service, a global news service with a distinctly Southern perspective. Even though it was common for three to four weeks to pass between the time the news occurred and time the tape was finally aired, ITM was a fresh change to the normal international news carried by the stations, which usually consisted of reading news stories from newspapers bussed in from the capital (and often at least a few days old), or by retransmitting the news from the international short-wave services from Europe or the US.

On a more global scale than ITM, the Developing Countries Farm Radio Network (DCFRN) has been operating a distribution network since 1979. In its earlier years DCFRN produced radio programmes and mailed the cassette tapes to stations in Africa, Asia and Latin America. Later the cassettes were replaced by scripts, which broadcasters could more easily adapt to suit local needs, languages and programme formats.

Long before the internet was widely available a few small radio projects were using computers and modems to network radio stations. As early as 1987 a project based in Central America was sending a weekly radio news bulletin from the Salvadorean guerrilla station, Radio Farabundo Martí, to campus and community stations in Canada using a 2400 bps modem connection over an international telephone line. Once the bulletin reached Canada it was redistributed to stations via fax and a pre-internet commercial email system.

By the mid-1990s the internet started to become more widely available and the Agencia Informativa Púlsar began serving Latin American stations out of Quito,

Ecuador. The first major initiative to link independent radio stations via the internet, Púlsar began operating in 1996, sending a daily text-only "rip and read" news bulletin to forty-eight subscribers. Introduced at a time when internet connectivity was still difficult in the region, donors, existing networks and associations, and even the agency's few subscribers were sceptical. By the time it ceased operations five years later it was offering a variety of services, including 15 to 20 news items every day and full audio for stations that had the capacity to use it, to more than 2,500 subscribers in fifty countries. Scaleability was one of the most important characteristics of the Púlsar experiment – stations with poor connectivity could receive the daily text bulletin by email, while those with better access and equipment could choose to receive audio clips or to download the full audio news bulletin from the website.

Internet news exchange projects also emerged on the national and global levels. Kantor Berita Radio 68H is an Indonesian radio news agency established in 1999, not long after the end of the authoritarian Suharto regime. Suharto had banned independent news programmes and obliged the country's thousands of radio stations to carry an official newscast. Suddenly able to broadcast news, radio stations were unprepared. The only network was the government's, as were the only trained radio journalists. The 68H news agency stepped in to support and broaden the country's fragile democracy. Like Púlsar, 68H began modestly, with fourteen member stations exchanging several one-minute audio programmes each day via the internet. However, Indonesia's internet infrastructure is not up to the challenges of its geography, with 200 million people scattered across an archipelago of 17,000 islands and 68H now uses a low-cost satellite channel to distribute its programmes from the capital, with the internet primarily used for receiving programmes from member stations. By the time 68H celebrated its second anniversary, it was already Indonesia's preferred news source, reaching 20 million listeners all over the country.

Initiated in 2000 as a joint project of Panos (London) and One World, *InterWorld Radio* commissions journalists to file reports on economics, the environment, science and technology, human rights and social change and makes them available via email or on the web. Its services include both daily summaries of news stories and regular features. InterWorld Radio's programmes are intended to be equally suitable for radio stations in the North and South, although its claim to be a "global" service is a qualified one, since its services are only offered in English.

Technically, InterWorld Radio tries to provide something for everyone. If you have a bad internet connection, you can get daily text summaries of its programmes by email. If you have a highspeed connection, you can download broadcast quality versions in either MP3 or RealAudio format, and if you just want to listen online, lower quality *streaming* audio is available, also in either MP3 or RealAudio format. With digital technology, offering a variety of formats takes very little time and effort and helps ensure a wider distribution of the programmes.

6. Gateways

Making a streaming audio signal available on the internet is a way of extending a radio station's reach; gateway projects do the reverse, using the radio to extend the reach of the internet. In the same way that a single cybercafé or telecentre with a few computers can be an efficient way of increasing the number of people connected, providing access for dozens of people with only a few computers, a radio station with thousands of listeners that makes active use of the internet can address the problem of access to the internet's wealth of information with a tactic of *digital multiplication*, multiplying the impact of its internet connection.

The UNESCO-supported *Kothmale Internet Project* in Sri Lanka is one of the best-known examples of a radio station adopting the role of a gateway or community intermediary between its listeners and the internet. Located within Kothmale Community Radio, a semi-autonomous radio station located in an agricultural region, the Internet Project has two main components: a community telecentre, with a dedicated line; and *Radio Browsing*, a daily two-hour radio programme in which broadcasters take the internet to the community by surfing the web in search of answers to listener queries. Sifting through the internet's terabytes of data, *Radio Browsing* finds information that is useful to the communities and then interprets it – making *useful* information *meaningful*. It plays a role that is part search-engine, part librarian, part journalist and part translator (English is the language of the internet, but not of most Sri Lankans).

Kothmale's *Radio Browsing* model puts the technology on centre stage, raising its status from back office research tool to virtual studio guest. At times this can seem needlessly distracting – reading URLs on the air or listening to the sound of webpages downloading is not engaging radio. However the decision to make the technology feature almost as prominently as the content is related to one of the *Radio Browsing* model's primary objectives to promote the use of the internet. In addition to listening about the internet, listeners are also encouraged to visit the station to access it directly via the public access computers located there. While Kothmale is best-known for its model of blending the internet with radio, preliminary evaluations indicate that it has been more successful at promoting internet use. As one observer remarked, "the reality of the place is considerably more impressive than the hype!"

Throughout the less-industrialised world there are hundreds of lower profile examples of stations taking on a gateway function. Some of these do little more than download news from CNN and other international sites, but a growing number are discovering the potential of the internet and actively searching for and repackaging information to match local development needs. In Latin America, for example, it is common for magazine-format programmes to receive questions from listeners, research them, and then provide advice on the air. Research resources are whatever is available – a fifteen year old encyclopaedia set, a local agricultural extension worker, a health clinic – now the internet is replacing the outdated encyclopaedia and supplementing local expertise.

Of course, while the possibilities are increasing, many problems will have to be overcome before radio will be able to realise its full potential as a gateway. Access to infrastructure, cost of equipment and use, language and lack of appropriate and meaningful content are among the familiar factors that complicate efforts to incorporate the internet into programming, but there are others, many of them more complex and more deeply rooted in culture and society. These include social hierarchies, inflexible administrative structures of the radio stations themselves, and cultural differences that make it more difficult to use the internet. For example, the icons on a webpage that make it intuitive to one user, may be a code that has to be broken by a another user with a different background and set of cultural symbols.

On the positive side, the barriers faced by a radio station are much easier to overcome than those by individual users simply because the reward is greater. While individual users might find it difficult to get training and impossible to have content produced to serve his/her particular needs, training, support and even customised content is more readily available to radio broadcasters. Additionally, donors have demonstrated interest in supporting connectivity, paying for the installation of VSATs in rural radio stations in Africa.

7. Communication with Migrants

While the above initiatives build on expanding the reach of the internet through traditional and geographically defined communities, the configuration and location of communities is also changing, creating new needs and opportunities. Radio and the internet are playing a role here, as well.

With an estimated 75 million short and medium term international migrant workers and their dependants in the world today, international migration is both a consequence and a driving force of globalisation. Most of these workers retain, or would like to retain close ties with families and communities in their countries of origin.[8] These ties, enhanced and supported by the use of ICTs, make a significant contribution to development in a number of important ways.

On the one hand, migration has an important economic impact. Twelve years ago migrant workers sent a total of USD 65 billion home – USD 20 billion more than the total amount of official development aid at the time. In many countries money sent home amounts to one of the largest single sources of foreign currency, often *the* largest.

Perhaps of even greater value than their financial contribution, migrant communities also contribute their knowledge and expertise to the development of their communities, often using the internet. Quipunet[9] and the Lanka Academic Network[10] (Lacnet) are two internet-based projects that were pioneers in making the Diaspora's resources available to support educational and development projects in Peru and Sri Lanka respectively.

Radio stations often play a role linking migrant communities with their homes and cultures. Stations in the home country will broadcast news from migrant communities, even to the point of maintaining correspondents in important migration destinations. In some cases migrant communities secure a few hours a week on community or multi-lingual stations in their new host country and broadcast programmes with news and cultural content from "home" mixed with content related to the new environment. New information and communication technologies are expanding the possibilities.

Fifteen years ago, predating the internet's appearance in the country, emigrants from the Kayes region of Mali living in France maintained regular contact with Kayes Rural Radio as a way of getting news from home. When the station faced a sudden financial crisis brought on, in part, by the sudden loss of donor assistance from Italy, the support group quickly went to work printing leaflets and raising money to keep the station going. Working together with the station, the group also came up with a novel idea for making money – a fax machine was installed in the station and the residents in France were able to pay a fee and have their faxed messages read out over the radio station (Berqué 1992). A similar experience is found in Mexico where radio stations located in rural areas without telephone service have always provided a messaging service, dedicating up to several hours per day to broadcast personal messages to and from people who may live many hours or even days from each other (Ramos and Díez 2003). The addition of the internet to this 'airwave mail' service extends its reach and its usefulness for linking migrants and communities.

Webcasting is becoming increasingly common, with thousands of radio stations worldwide making their programming available over the internet. While there are few webcast listeners in developing countries, an increasing number of stations are making their programmes available. The unprecedented numbers of migrants from developing to developed countries make for substantial audiences for streaming signals from home. The Ecuador/Spain project, *Callo y Guatitas* uses radio stations in the two countries, the internet and a satellite to facilitate a weekly interactive programme to sustain personal, cultural, and economic links between Ecuadorian migrants in Spain and their home communities. Podcasting, discussed earlier in this chapter, has the potential to give internet radio the simplicity and portability of broadcast radio.

8. The Way Forward

The 21st century challenge is to strategise the best formulation for ensuring the benefits of the internet reach the digital deserts, where affordable access to the technology is not available and where effective use faces a series of cultural, linguistic and content-related challenges. Knowledge for development research has highlighted the imperative of spreading access to information resources. Building and improving ICT infrastructure will be an important element of a strategy aimed at making information *available*, but a successful strategy must also focus on ensuring that information is *meaningful* within an existing knowledge infrastructure. Radio broadcasters throughout the world are becoming aware of the role they can play in this.

9. Technology is Not Necessarily the Barrier

Access to new ICTs need not be understood to be *the* significant barrier to participating in an information society or even to using the internet for development. There is no need to wait until access to the internet is universal before capitalising on the development opportunities it offers.

We should not underestimate what can be done when limited technology is combined with determination and imagination (nor should we underestimate the levels of determination and imagination available). ICTs are adaptable and if basic tools and knowledge are available, people will find a way to make the technology serve their communication needs. Adaptability and decentralisation are the fundamental characteristics that have made radio so enduring and effective because they have allowed for different approaches to its use in terms of range, interactivity and content, enabling it to integrate so effectively with existing social communication networks and practices.

Rather than convenient one-size-fits-all type solutions, radio ICT projects should emphasise adaptability and decentralisation, choosing, for example, technological solutions that are scaleable – allowing users (both radio stations and listeners) to define and refine levels of sophistication and interactivity depending on communication needs, practices and the level of access that is available to them.

10. Technology is Not a Panacea

Technology can play an ambiguous role in the pursuit of goals such as pluralism, decentralisation and democratic development. The initiatives discussed here all aim at promoting these goals, but it is easy to identify uses for the technology that could efficiently deprive local communities of their autonomy and limit pluralism. In the US, for example, the introduction of digital satellite technology that enabled relatively low-cost radio networks was accompanied by a frenzy of purchases that has seen thousands of independent stations absorbed by a handful of networks. Formerly independent stations have replaced local programming with network programming in a move that has limited the diversity of the nation's radio. The same is happening in Argentina, Brazil, Peru and many other South American countries.

Fifteen years ago rural radio in Africa was not local. It was a model of state paternalism in which programmes were produced by experts in the cities and beamed to 'ignorant' peasants in the countryside on the state radio frequencies. This has changed and rural radio is now local and participatory. However, it will be sadly ironic if the introduction of network technologies results in the emergence of a new commercial paternalism. Similarly, while emerging models of community multimedia centres offer the promise of democratic development, it is a promise that can easily be corrupted if adequate policies and practices designed to keep them responsive to community needs are not in place.

11. Harnessing Knowledge for Democratic Development

The injection of the internet's digital DNA is changing the nature of radio and will undoubtedly mean that the radio's next generation will be a new species, with a different sound and a different way of relating to its community. A variety of projects worldwide offer some insight into what that might be like in the developing world, but they represent only the first few steps in the transformation of the two media. There are tremendous opportunities for broadcasters but in order to take advantage of them they will have to experiment and to develop visions that respond to the distinct needs and desires of their communities. Unfortunately, in many countries rigid policy and regulatory frameworks do not provide a favourable environment to experimentation and alternative visions. All too often universal access programmes seem designed to serve national operators rather than rural communities, local entities are unable to get permission to use radio broadcast frequencies, and resources are unavailable to support innovative rural communication initiatives (Gómez 2004).

It has been said that the internet is a window to the world – offering an view that encompasses a wealth of knowledge and information. Local radio is a mirror that reflects a community's own knowledge and experience back at it. The convergence of the two just might offer us the most effective avenue we have yet known to combine research and reflection in order to harness knowledge for democratic and sustainable development.

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[1] An earlier version of this chapter was published in *The One to Watch: Radio, New ICTs and Interactivity*, published by the Communication for Development Group of the Food and Agriculture Organization of the United Nations (FAO), Rome. Individual chapters and the entire book can be downloaded from the Internet at: <http://comunica.org/1-2-watch>.

[2] In contrast, "social divide" turns up 23,500 pages and "economic inequality" 173,000 (April 2005).

[3] 70 percent of these are concentrated in three countries – Japan with 56 million users, China with 50 million and South Korea with 26 million.

[4] NUA Internet Surveys, September 2002 <www.nua.ie/surveys/how_many_online/>. Estimates of the number of people with access to the Internet vary widely depending on methodology and definitions used. NUA's figures, based on a compilation of many individual surveys, attempt to measure the number of people who accessed the Internet at least once in the previous three months, regardless of whether they have their own computer or Internet account. NUA's methodology is described at <www.nua.ie/surveys/how_many_online/methodology.html>.

[5] Many of the earlier experiments were presented and discussed at a pair of seminars supported by the Friedrich Ebert Foundation, one examining Asian experiences and the other focusing on Latin America and the Caribbean. See Converging Responsibility: Broadcasting and the Internet in Developing Countries, <www.comunica.org/kl/> and Mixed Media / Medios Enteros: Broadcasting and the Internet in Latin America and the Caribbean, <www.comunica.org/tampa/>.

[6] <www.radio-locator.com>

[7] For more information see the Wikipedia entry on podcasting at http://en.wikipedia.org/wiki/Podcasting.

[8] Those who stay behind also want to communicate and one of the main reasons people in developing countries start using ICTs is to communicate with family members who have migrated.

[9] <www.quipunet.org>

[10] <www.lacnet.org>

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6. Benchmarking African NRA Websites

Amy Mahan

1. Introduction

E- governance is an increasingly important theme for development and information society initiatives. Within this framework, websites and web portals constitute an important vehicle for information dissemination, communication and transparency. National Regulatory Authorities (NRAs) as information society drivers and facilitators have a key role in providing an example of using new technologies, and in facilitating access to regulations, standards, and best practices for information and communication technology (ICT) adoption and development.

Migrating regulatory information processes to an online website, and subsequent ongoing maintenance requires commitment of financial and human capital resources – both of which are likely to be in short supply for developing economies. Further NRAs in developing regions serve populations that for the majority do not have PCs, internet access or even telephones. Thus, website development must be assessed in terms of NRA priorities, benefits ands costs. Such assessments will be better informed by an awareness of what other NRAs are doing.

The importance of a NRA website should not be underestimated. It serves as an information gateway to the general public, consumers, operators, investors and other stakeholders and interested parties. In addition to serving as an instrument for transparency and accountability objectives, a well-designed and informative website can demonstrate the extent and facility with which the NRA uses the technologies and services it regulates. A well-maintained website increases confidence in the regulator's skills and capacities. Moreover, an effectively run website with useful, up-to-date information and functionality can be an effective communication tool that not only speeds up communication, but decreases time and costs incurred for regulatory compliance.

This study tests and introduces a new indicator for ranking NRA websites. This measurement is an attempt to capture the incidence of different aspects that are important for NRA web presence. It is recognised that a web presence indicator for NRAs cannot capture overall effectiveness, efficiency or transparency of the regulator. Indeed, while one of the criteria for being included in the study is whether or not the NRA is independent, this goes to mandate, and the indicator cannot measure the degree

to which the NRA is actually independent. What this benchmarking process does attempt to do, however, is to clarify categories of information and their respective users, and to indicate responsiveness in providing information. Some sites go beyond information provision and provide interactive services. This aspect is also measured.

The chapter is organised as follows. Section 2 discusses the importance of NRA internet presence and website development as an important area of activity. Next, an overview of the study presents the different categories of information collected, and the method for determining the web presence indicator developed during the study. Observations based on the different examples of web presence are presented, followed by some conclusions and recommendations.

2. Why NRA Websites are Important

Most NRA websites do not state why they are they are there, who they intend to serve, or why the NRA has embarked on this initiative. But clearly, at some level, there was a policy decision to undertake the site's construction. This section of the chapter posits some reasons for why it is good to develop an NRA website. First and foremost, the need for regulation is increasing with implementation of liberalisation and privatisation – which are largely driven by aspirations to benefit from open economies, or conversely is exerted by the imperatives of a globalising economy. Governments in general can be seen as brokers of their nation's business environment. And regulators, as arm's length arbiters of the particular infrastructure terrain, define the conditions for the various infrastructure stakeholders. Ideally, the regulatory agency will indicate its willingness to be accountable, examined, available and reported upon. Further, via its website, it can make the same information and policies available to all players (corporate, investors, researchers, consumer groups, etc.).

Website as a Metaphor for the Business Environment

The attributes of a particular website may in fact give the first impression or snapshot of the regulatory environment to investors, funders or donors. In this respect, questions of accessibility and breadth of information, navigability of the site, organisation and overall appearance all point to the level of transparency and accountability of the sector represented.

For example, websites with scant information will not convey a positive message that international standards (e.g. such as for accounting, law, equipment certification) are well-developed and routinely applied. This will likely indicate an unsure environment for investment. Conversely, there are many poorly designed sites which do offer good information – but which do not make it available in an effective or organised manner. In some instances, technical faults, such as broken links or congestion at a site can impede navigation within a site as well. This was the case for a few of the African regulatory sites, which often froze-up, were slow or unavailable.

Quality of presentation does not necessarily correlate with quality of information. A well designed and easy to navigate website – with all the bells and whistles – is a good start, however, websites with little relevant content will soon be revealed as merely window dressing. In addition to providing access to necessary and important information, the website indicates the facility of business transactions, and overall efficiency of functioning within the sector. Are there clear instructions and available forms? Is there up-to-date information? Are the key contacts within the regulatory agency identified and accessible via email?

Setting Standards for other Government Agencies

While the regulatory agency is most effective when structured to work at arm's length from government, the nation's infrastructure functions in an overarching environment which includes laws and norms and practices. Conditions for these aspects are also of paramount importance for the functioning of the infrastructure sector – and to the business environment overall. Thus, it is in the interest of the regulator to create new benchmarks and standards for effective functioning, including access to information and facilitating best business practices in response to stakeholder needs. Once standards are raised, pressure can be brought to bear on other actors within the sector to follow suit.

In the same vein, national regulators can influence neighbouring countries to establish best practices, and websites will be instrumental in modelling practices and transparency. This is especially important for developing countries in terms of creating a cluster of markets, which may create benefits across a particular region.

Attention to Consumer Concerns

The regulatory website can empower consumers by providing information on rights and complaint making procedures (if they exist, or by underscoring their lack, if they don't). These procedures can further be facilitated by online forms and access to relevant members of staff, which are relevant in places with high levels of access; or for where consumers are represented not by themselves, but by their organisations (consumer organisations, unions, etc.) a comprehensive links page to sites with consumer information and advocacy can be highlighted.

In a developing infrastructure environment, this kind of effort reduces the scope for petty corruption and bribery for access to services. In more mature infrastructure environments, clear information makes consumer choices more transparent. Further, by providing clear statistical information and raw data, the NRA can create synergy with researchers and consumer groups who use this information to effect critical research in support of the public sector.

In most under-developed infrastructure markets, a high level of pent-up demand can be observed. Will potential investors in the sector be able to reach this market and

offer competitive services? Demonstrated concern with consumer issues and outreach indicates commitment to creating a level playing field for access to infrastructure markets and sub-markets; and to creating conditions for creating markets for new and emerging services.

Best Practices

Websites can help reduce operating costs for all stakeholders, while increasing service to consumers, operators and the general public. In a *best practice* scenario, by using a website to provide both access to actual regulation and further information about regulatory processes, the NRA:

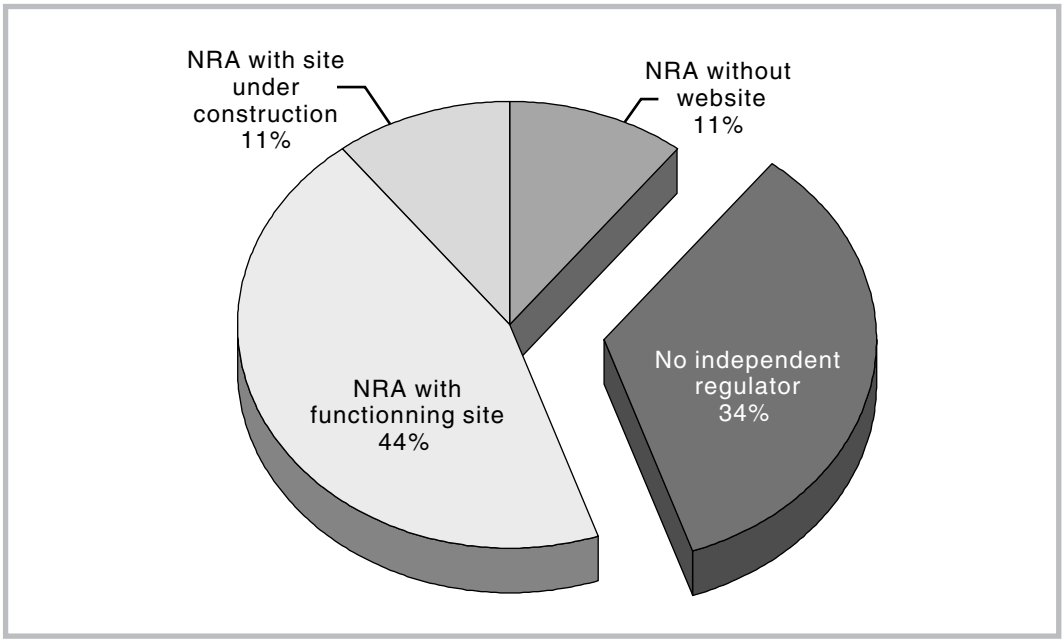
(1) creates a reliable, comprehensive and up- to- date repository of regulatory information. This reduces the burden of stakeholders having to search for new regulatory information from different sources, and makes reliable national level information accessible to potential investors and stakeholders;

(2) helps users and stakeholders to understand regulations, rules and regulatory processes; raises awareness about regulatory compliance, rights and responsibilities – not only through mere posting of regulatory acts and laws, but also in providing additional information which explains the regulatory instruments, such as responses to frequently asked questions (FAQs); provides access to information about further means of assistance and intervention such as public hearings, contact information, regulatory structure and process information;

(3) makes forms for different regulatory processes accessible, helps channel official communication to the proper departments or recipients, and overall facilitates the anticipated (and desired!) compliance and reporting on the part of different stakeholders.

In a *best practice* scenario, the NRA website brokers information and communication access points to users and stakeholders. If certain reporting is required, then this requirement will be both documented and explained, and the reporting function facilitated. If an important mandate is to ensure quality of service, then information will be made accessible to users about their rights, and abuses will be easily reported via the website or contact information provided on the site. Likewise, in a *best practice* scenario, websites will support the work of journalists and researchers by making information accessible so that they can to further broaden the sphere of regulatory participation.

Figure 1 – **Country selection for African NRA webstudy**



Websites can play a role in each of these respects, from sending signals, to the provision of services and information. The following sections assess NRA websites in Africa. As most NRAs do have a website or are in the process of establishing one (see Figure 1) it is clear that this is viewed as an important or necessary activity. While there exists a plethora of e-governance studies, and exponentially more for e-commerce, NRA e-efforts have received little attention or speculation as to what constitutes effective components. The following attempts to contribute some analysis and benchmarks for this.

3. Overview of the NRA Website Study

This study grew out of a collection of regional preliminary surveys examining the extent to which NRAs were using websites to inform and communicate with the public – including citizens, businesses and other governmental and non-governmental organisations. The original benchmark studies were prepared for courses for regulators and were intended to provide a general and comparative indication of how NRAs are using IT technologies and services in implementing their policies and regulations. More specifically, the surveys provided a broad overview of the kinds of information available on NRA websites and their user friendliness. From this evidence, some general comparisons were made which provided grounds for group discussion.

This current survey, carried out during March – April 2004, focuses on African NRAs. In addition to the qualitative survey of the different website elements, the NRA websites have been ranked by an indicator developed during the study.

Country Selection

A country's inclusion in the assessment was contingent on the country having an independent regulatory authority and the authority having a functioning website. Table 1 in the Annex shows the 47 African countries considered and their corresponding websites. The Telecommunications Regulators Association of Southern Africa (TRASA) website had been included in a previous study, and was kept here as it should aspire to many of the same standards as NRAs.

Assessment Criteria

For the study, NRAs were expected to offer, via their websites, information across a range of areas to meet the needs of different stakeholders, investors and donors. Although some sites were more aesthetically pleasing than others, subjective impressions on appearance were not included in the assessment.

Information was collected and noted in tables corresponding to different potential users of the site.

Factual Information reports on key regulatory information that should be readily available, such as the Telecommunications Act, and statistical indicators.

Consumer and Citizen Information looks for information of interest to end- users or prospective end- users about consumer information, universal service, consumer rights (and reporting abuses) and tariffs. In addition to actual legislation and formal guidelines, we looked for digested information such as clear explanations (for example of complaint procedures), and FAQs (frequently asked questions).

Business Information relates to information needed by current and prospective operators and investors such as licencing procedures, technical requirements, interconnection agreements, online forms for certification, authorisation, and so forth. Here we looked for information which also explained and described procedures and requirements, rather than mere provision of access to formal documentation and legislation.

News and other features to further disseminate information reports on the availability of information about the NRA (in contrast to regulatory information). This final category ensures accessibility of information, regulatory news and developments to researchers and journalists who can further disseminate regulatory information nationally and internationally. Often this the features addressed in this table contextualise the site information and make it more intelligible.

Ranking the NRA Websites

In order to value and weight the different information categories, this work was both informed and inspired by the 2001 UN "Benchmarking E-government" report which identifies five stages of e-Government: emerging, enhanced, interactive, transactional and seamless. These categories were used to assess the different aspects of the NRA sites to achieve a consistent ranking system for the various information categories and features offered at the surveyed websites. The qualitative requirements for the five stages were slightly amended for this study to reflect the particular nature of NRA websites. The final category from the UN study "*Seamless* – total integration of e-functions and services across administrative and departmental boundaries" was excluded as unrealistic for the subjects of this study – and indeed was not obtained by any country in their own world-wide study. Thus, the stages were identified as follows:

(1) **Emerging**: Only basic and largely static information is available.

(2) **Enhanced**: Content and information is updated regularly, and information is available not only in its original format (such as acts and legislation) but is also explained and digested.

(3) **Interactive**: Users can download forms, contact officials and make requests. Available information has further value-added, such as being hyper-linked to relevant legislation.

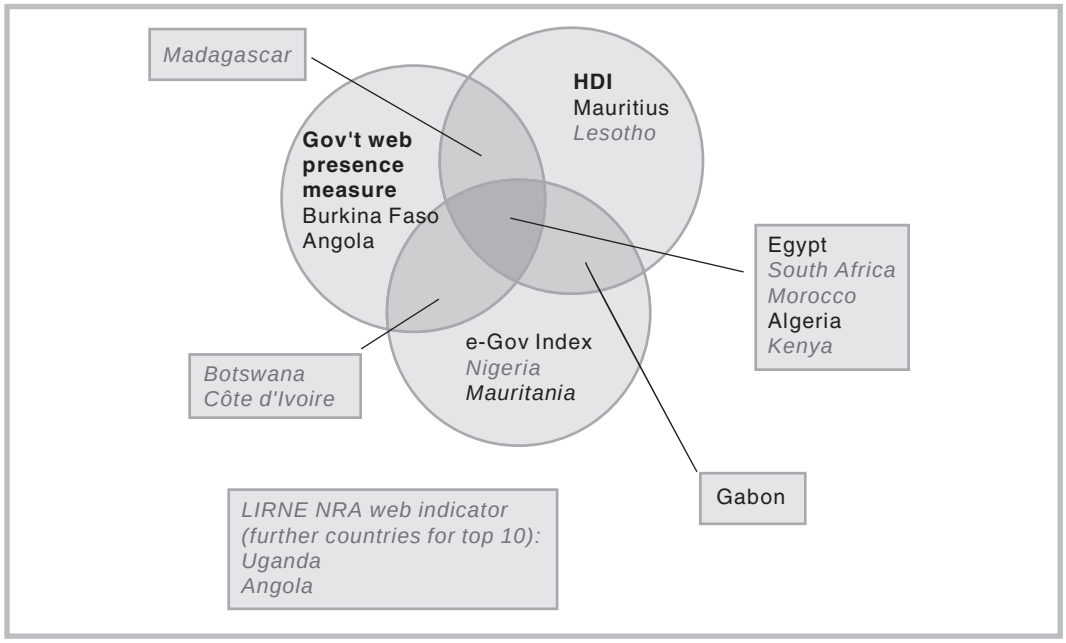
(4) **Transactional**: Users can submit forms online – for example to request information, or to submit a request for licence form.

Each sub-category was ranked, providing a value for each category, with each of the four categories contributing to a final value. In this manner, information for different categories of users was ranked equally. The ranking was based on qualitative evidence, but subjectivity was reduced by using defined categories rather than relying on merely perceptions.

In order to test the ranking, the results of this study were compared with the results of the UN study. The assumption was that countries with strong e-governance initiatives would also evidence initiatives in other public sector agencies. Also, because ICT initiatives are to a large extent contingent on socio-economic factors – such as human capital and access to technology, the UNDP Human Development Index (HDI) was also used to compare results.

The country ranking across these different indicators is available in Table 2 (in the Annex). Figure 2 shows the top ten countries for each indicator. While there are some surprises (discussed below), there is also a strong correlation across the three indicators. The underlined countries in Figure 1 scored in the top ten for the LIRNE indicator, only two countries do not overlap with the top ten of the other three indicators – which is consistent for the other three indicators.

Figure 2 – **Top ten countries across the different indicators**



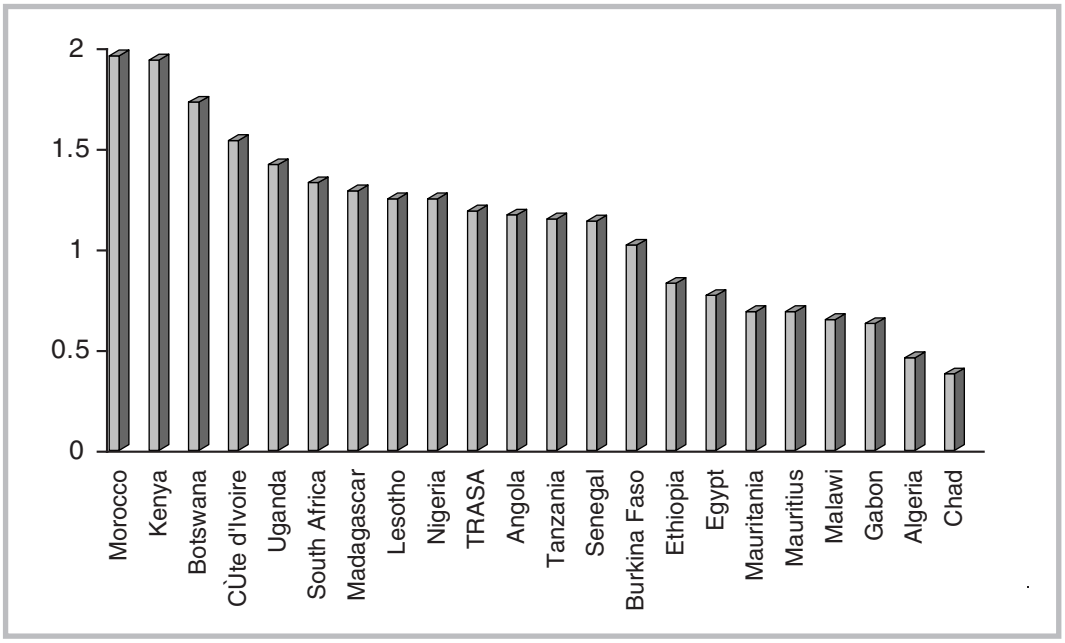
The intent of devising this indicator was not to obtain one that correlated with the UN study, and it must be stressed that it does not do this. The information this indicator does report on is the extent to which the NRA provides a balanced and useful website to different stakeholders.

4. Observations

The qualitative judgements made are the author's, and may not be the same as others' reaction in assessing the different aspects. However, the overall findings are clearly supported by the evidence, in particular with reference to the assessment categories. A full collection of tables detailing the different aspects of assessment are available (see Mahan 2004).

One of the most challenging aspects of this study was getting started. Who are the African regulators? Are they independent? Do they have websites? In this day and age of Google, it is often presumed that information that is posted on the web is available on the web. This is not the case. Hargittai (2000) and others have conducted studies which assess the ranking systems for search engines which favour commercial sites, and which rely on webmaster savvy to feed keywords into search engines so that their sites will be polled and will show up in the list of results. Many of the African NRA websites were difficult to find. Further, while much attention has been paid to posting information about the African ICT sector online, many of these initiatives are not sustained over time, and seemingly current and reliable information needs to be constantly checked and verified.

Figure 3 – **LIRNE.NET ranking of African NRA Websites**

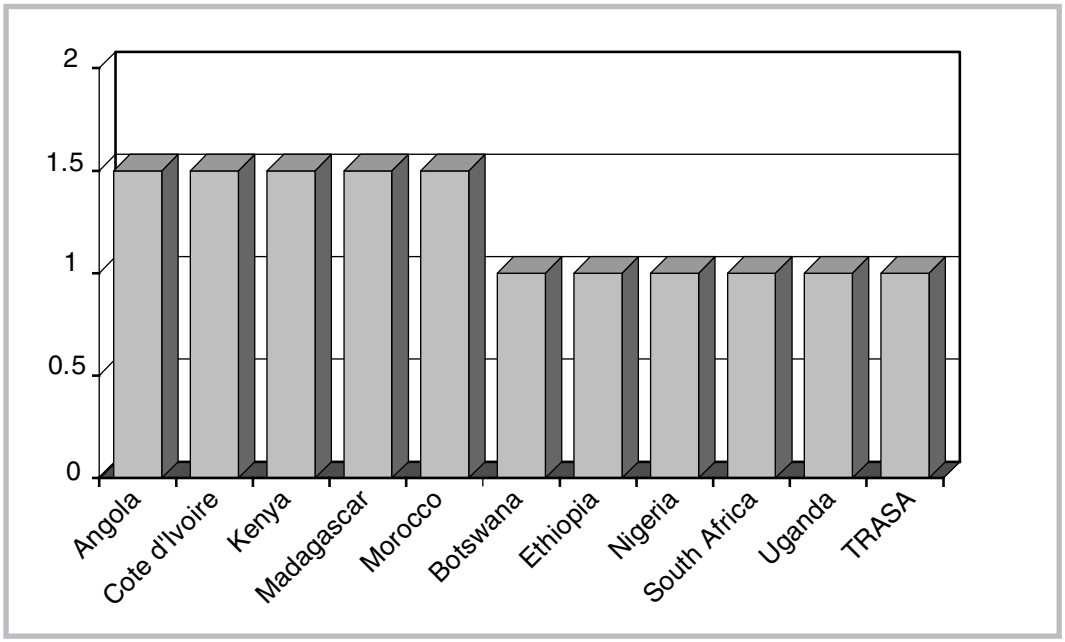


The survey evidences significant differences among the NRA websites in terms of information provision, usability and functionality. The websites assessed as being the must functional, well-designed and with the best range of user-friendly information were Morocco, Kenya, Botswana, Côte d'Ivoire, and Uganda (see Figure 3).

Of the countries that scored in the top ten of all three of the comparative indicators, Algeria and Egypt are missing from the LIRNE.NET top ten. The performance for both was generally poor across most categories. The Egyptian site had glossy brochures available for download – but failed to deliver information on the site. The appropriateness of the Algerian site sporting a Microsoft Explorer logo was questioned.

At the low end of the assessment, Algeria, Chad, Gabon, Malawi and Mauritius simply did not provide much information other than a basic introduction for the NRA, and very little digested or descriptive information. Algeria and Gabon provided additional resources in the business category, and interestingly, despite being minimalist sites, all except Chad had forms available for download.

Figure 4 – **Factual information**



Factual Information

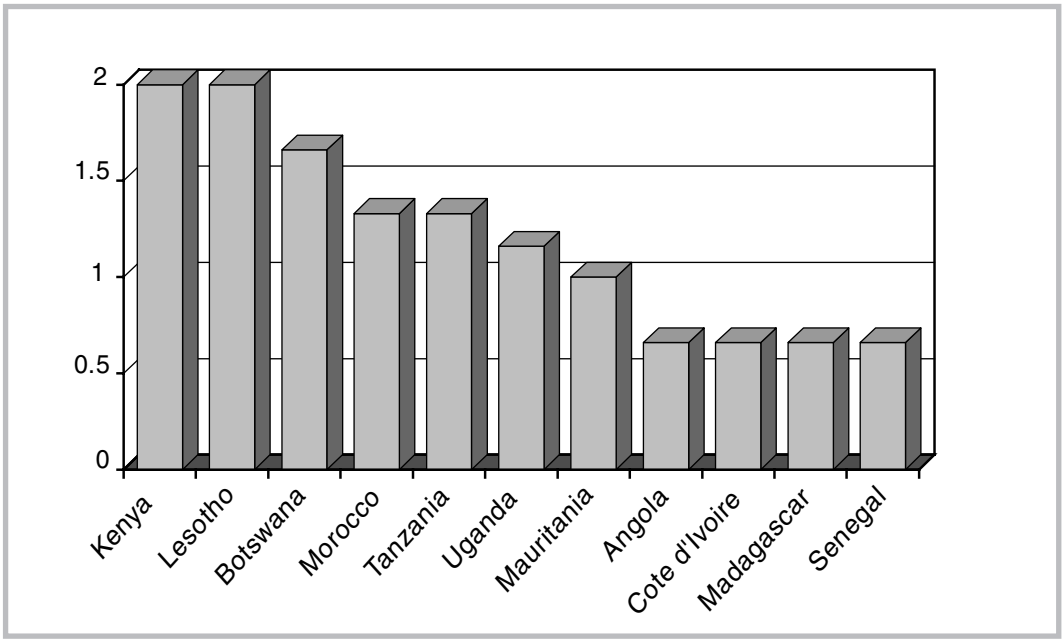
A common denominator for the compared NRAs is the provision of the main legislative background information. This is a basic category of information which is already available, and easily mounted onto websites. This is the first category of assessment for the study because it is a fundamental step in providing online access to basic information. Only one NRA, Egypt, failed to post *any* regulatory information.

In addition to this basic documentation, some NRAs also provide a list of their decisions. Exceptionally, a few countries provide relevant information regarding the legislative framework for investment and for related legal fields (such as guidelines for personal data protection). The strongest sites in terms of providing regulatory information were those who explained some of the key regulatory points and hyper-linked this text to the formal versions, or to other points on the site.

The category of Statistics was included in the study because statistical indicators are an integral part of overall regulatory benchmarking. This category however was one of the most neglected of the survey. Of the top five sites, three had good indicators available. Of the top five – only one country, Uganda – had no statistics available. For previous studies, this was also a consistently neglected area.

Legislation is the strongest category, with only one country, Egypt, not providing information in this regard. There is no other category that is as consistently fulfilled by the surveyed NRAs.

Figure 5 – **Consumer and citizen information**

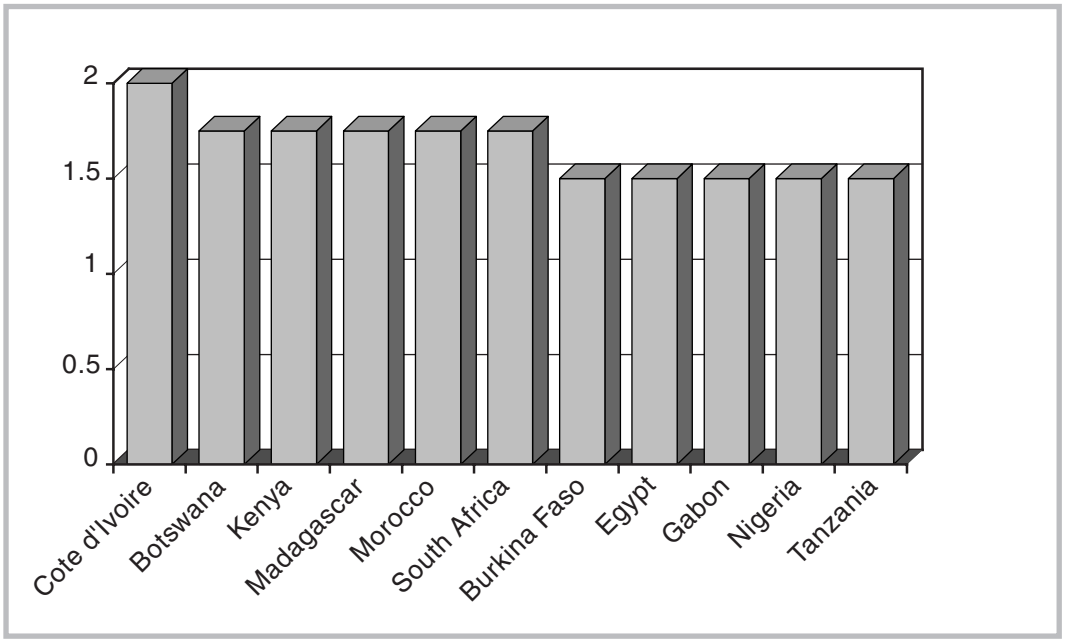


Consumer and Citizen Information

This aspect of information provision is an extension of the basic information sought in the previous category, but requires added specificity with regards to actual programmes, contact and regulatory details. Three different categories of consumer and citizen information were sought in order to ascertain the national level outreach of the site.

There were three basic categories for treatment of consumer and citizen information: websites which provided good, clear information on the site in an accessible format (Botswana, Kenya and Lesotho); sites in which information is available but must actively sought by the user, and often downloaded in its original legislative format; and the rest which simply did not provide information in this regard. Apparently many NRAs do not view their website as an important vehicle in this regard, and there are undoubtedly good reasons for this including the fact that internet access is an unlikely means for citizen participation and access. That said, as for basic information in the previous category, this information about universal service, tariffs and consumer rights should already exist in some format, and thus be migratable to the website, thus making it available to other agents of dissemination such as consumer groups, the media and researchers. The TRASA site has an extensive section dedicated to these issues, which is currently under construction. A one-stop reference point for information across these categories will be very useful for NRAs comparing and assessing their policy and progress.

Figure 6 – **Business information**



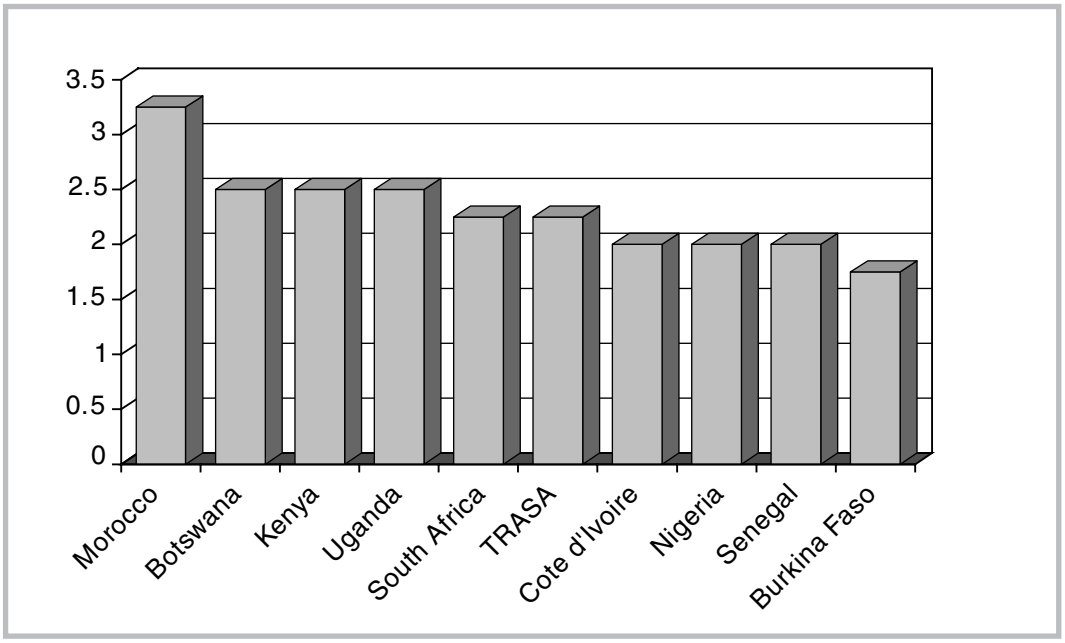
Business Information

Even the countries at the bottom of the ranking paid attention to the category of business information and forms for different applications processes. The availability of forms was a very strong category across all sites – with only four sites not having these (an additional two sites did not have forms, one because it was clearly stated that forms were not required, and the other TRASA for which this was an irrelevant category). Burkina Faso not only offered forms online, to be printed and submitted, but also had an *inscription en ligne* option in which an online version of the form could be filled-in and submitted directly. Botswana and Morocco also had particularly accessible forms and procedural information, the latter including a diagram of the different steps for the application procedure.

News, Research and Additional Features

Most websites were generous in providing information about the regulator and the regulatory agency. This category looks for information about processes, news, events, contacts and the day-to-day functioning of the NRA. Newsrooms in particular are an important feature for broader information dissemination. In a similar vein, if there is a current issue such as a new numbering plan, or the introduction of a new service, a list of frequently asked questions (and answers!) can be posted to respond to routine queries in an efficient manner. Other elements which increased the accessibility and value-added of the site such as search engines, site maps, a good links page, and so forth, were noted in this category.

Figure 7 – **News and research information**



Some of the surveyed websites include easy-to-understand graphs illustrating the NRA decision-making process and the appeal procedures against those NRA decisions. Many also provide organisational diagrams – these are very useful.

5. Recommendations

On the basis of the findings of this preliminary survey, some measures are suggested which should be relatively easy to implement for all NRAs. For other improvements, financial and human resources of a NRA must be taken into account in assessing benefits and costs. The availability of resources and necessary skills, as well as the potential positive effects of certain improvements, must be taken into account when assessing possible improvements.

Specific examples of improvements which do not require significant time or financial investment include aspects such as: posting interconnection agreements (if allowed); (registration) forms; easy-to-read guides relating to authentication procedures and consumer rights e. g. how to make a complaint, answers to FAQs. Additionally, market operators and potential investors highlight the importance of access to clear information on regulatory decision-making processes.

While it is desirable to attract a range of users to the site, NRAs should be aware that a valuable amount of traffic will be from researchers and journalists who further broker information to the general public. Thus, a Newsroom feature and

maintenance of current regulatory information and statistics is important for facilitating information dissemination via these users.

As noted at the beginning of the Observations section, a surprisingly prevalent issue raised during this study was that in many cases, the NRA websites were difficult to locate. Some sites were new, others had been moved from previous locations, and in some instances it was the regulatory entity itself which was newly formed or had for different reasons assumed a new name. To assist searchers in finding the site, NRAs should:

- verify that their contact information is correct in for example, TRASA's country reports or in directories such as the ITU's *Who's Who*. In many instances, this ITU directory information was either incomplete or not up- to-date.

- ensure that search engines such as Google in particular, turn up their webpage. For example, a Google search on Namibia and "telecommunications authority" should find the regulator, even if the actual regulatory agency is designated as the "Communications Authority". Webmasters can assist with this task in making sure relevant words and phrases are made available to search engines.

- 'redirect' users from old sites. When new names or server changes result in a new website address, the old address should remain functional for a reasonable amount of time (at least a year) posting a link to the new address, or providing further contact information if relevant.

Future Studies

Language of the site was not taken into consideration – or the different languages that the site functioned in. Some sites offered information in their indigenous language as well as English or French, some sites attempted bilingualism. As for the other aspects examined, this goes to who is perceived as the potential audience for the site.

These original studies have simply focused on availability of information across different categories. As website expertise develops, there will be cause for more nuance in assessing the amount of information – which is to say the extent to which the site is a repository of resources.

In the same vein, it would be useful to initiate an investigation as to how integrated the online facilities are with regards to their use at a national level and within the regulatory offices. A few of the sites surveyed had an entry point for their NRA intranet. This suggests that these NRAs are integrating online use into their functioning in addition to external online information provision. Notably, during the course of these surveys, there was cause to email the NRA contact persons – to request further information, to alert the webmaster to a virus in a document on their site, and simply to test some of the online forms that were offered. Usually there was no response, and often there was a reply that the user's mailbox was either full or no longer available.

Finally, this study was careful to focus on first, the information available and whether it was in an accessible format, and second the organisation of information. The study disregarded the presence or absence of bells and whistles. That said, some sites were much more pleasing than others to surf. While design features can be used as window dressing for sites with little content, that is not necessarily the case. Of the five highest ranked sites, Kenya and Botswana had very visually attractive sites, the presentation of the Uganda site was also extremely effective. Whereas the top ranked site, Morocco, is a monolith of text, and the Cote d'Ivoire presentation was well-organised but uninspired.

Conclusions

NRA websites are rapidly becoming the major vehicle of communication and information sharing with operators, consumers and the general public. Because there is low internet connectivity in most developing countries, it is logical to posit that the level of *enhanced* information provision should be a priority, rather than the development of *interactive* sites. Transparent and accessible information will provide a necessary foundation for subsequent services and features.

Websites are increasingly a key element in *de facto* evaluations of NRA performance. For the future, website maintenance and development will be a progressively important factor for assessing regulatory effectiveness, transparency and accountability. Finally, NRAs can compare and share their experiences, as we attempt to do here, and work toward developing common objectives and best practices for effective NRA websites.

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Annex

Table 1 – **Overview information**

Country	Regulator / independent ?		Website
Algeria	Autorité de Régulation de la Poste et des Télécommunications (ARPT)	y	http://www.arpt.dz/
Angola	Angolan Institute of Communications (INACOM)	y	http://www.inacom.og.ao/
Benin	Office des postes et des telecommunications (OPT)	n	http://www.opt.bj/
Botswana	Botswana Telecommunications Authority (BTA)	y	http://www.bta.org.bw/
Burkina Faso	Autorité Nationale de Régulation des Télécommunications (ARTEL)	y	http://www.artel.bf/
Burundi	Agence de Régulation et de Contrôle des télécommunications (ARCT)	y	-
Cameroon	Agence de Régulation des Télécommunications (ART)	y	-
Cape Verde	Direcção Geral das Comunicações	n	-
Central African Republic	Ministère des Postes et des Telecommunications	n	-
Chad	Office Tchadien de Régulation des télécommunications (OTRT)	y	http://www.otrt.td/
Comoros	Société Nationale des Postes et Télécommunications (SNPT)	n	http://www.snpt.km/
Côte d'Ivoire	Agence des Télécommunications de Côte d'Ivoire (ATCI)	y	http://www.atci.ci/
Dem. Rep. of Congo	Administration Centrale des Postes et Télécommunications (D.G.A.C.P.T)	n	-
Egypt	Telecommunications Regulatory Authority (TRA)	y	http://www.tra.gov.eg/
Equatorial Guinea	Dirección General de Correos y Telecomunicaciones	n	-
Eritrea	Ministry of Transport and Communications, Communications Department	n	-
Ethiopia	Ethiopian Telecommunications Agency (ETA)	y	http://www.telecom.net.et/~eta
Gabon	Agence de Régulation des télécommunications (ARTEL)	y	http://www.artel.ga/
Gambia	Gamtel	n	http://www.gamtel.gm
Ghana	National Communications Authority	y	site in construction
Kenya	Communications Commission of Kenya	y	http://www.cck.go.ke/
Lesotho	Lesotho Telecommunications Authority	y	Http://www.lta.org.ls/
Liberia	Ministry of Posts and Telecommunications	n	-
Libya	Telecommunication and Post Bureau (General Directorate of Communications and Telecommunications)	n	-

Country	Regulator / independent ?		Website
Madagascar	Office Malagasy d'Etudes et de Régulation des Télécommunications (OMERT)	y	http://www.omert.mg/
Malawi	Malawi Communications Regulatory Authority (MACRA)	y	http://www.macra.org.mw/
Mali	Société des Télécommunications du Mali (SOTELMA)	n	http://www.sotelma.net/ (inaccessible)
Mauritania	Autorité de Régulation	y	http://www.are.mr
Mauritius	Information and Communications Technology Authority (ICTA)	y	http://www.icta.mu
Morocco	Agence Nationale de Réglementation des Télécommunications (ANRT)	y	http://www.anrt.net.ma/
Mozambique	Instituto Nacional das Comunicaçaes de Moçambique (INCM)	y	http://www.incm.gov.mz/ (under construction)
Namibia	Namibian Communications Commission (NCC)	y	http://www.ncc.org.na/ (under construction)
Niger	Ministère des Transports et de la Communication, Direction de la Réglementation des Postes et Télécommunications	n	-
Nigeria	Nigerian Communications Commission	y	http://www.ncc.gov.ng/
Rwanda	Agence Rwandaise de Régulation des Services d'Utilité Publique	y	-
Senegal	Agence de Régulation des télécommunications (ART)	y	http://www.art-telecom-senegal.org/
Seychelles	Ministry of Information Technology and Communication, Telecommunication Division	n	-
Somalia	Somali Telecom Association (STA) – future regulatory authority	-	-
South Africa	Independent Communications Authority of South Africa (ICASA)	y	http://www.icasa.org.za/
Sudan	National Telecommunication Council (NTC)	y	-
Swaziland	Swaziland Posts and Telecommunications Corporation (SPTC)	n	http://www.swazi.net/
Tanzania	Tanzania Communications Commission	y	http://www.tcc.go.tz
Togo	Autorité de Réglementation des Secteurs des Postes et des Télécommunications	n	-
Tunisia	Instance Nationale des Télécommunications de Tunisie (INT)	y	-
Uganda	Uganda Communications Commission	y	http://www.ucc.co.ug/
Zambia	Communications Authority	y	http://www.caz.gov.zm/ (inaccessible)
Zimbabwe	Postal and Telecommunications Regulatory Authority of Zimbabwe (POTRAZ)	y	http://www.potraz.gov.zw (inaccessible)
TRASA	Telecommunications Regulators	y	http://www.trasa.org.bw

Table 2 – **Rankings**

	Gov't web presence measure (2001)	E-gov. index (2001)	Human Development Index (2000)	NRA web presence (LIRNE.net, 2004)
Algeria	2.00	1.27	0.697	.46
Angola	1.50	.85	0.403	1.17
Botswana	1.50	1.01	0.572	1.73
Burkina Faso	1.75	.75	0.325	1.02
Chad	1	.55	0.365	.38
Côte d'Ivoire	1.75	1.05	0.428	1.54
Egypt	3.75	1.73	0.642	.77
Ethiopia	1.25	.57	0.327	.83
Gabon	1.00	1.17	0.637	.63
Kenya	1.75	.90	0.513	1.94
Lesotho	-	-	0.535	1.25
Madagascar	1.50	.75	0.469	1.29
Malawi	1.25	.64	0.400	.65
Mauritania	1.00	.91	0.438	.69
Mauritius	1.00	.84	0.772	.69
Morocco	2.75	1.47	0.602	1.96
Nigeria	1.00	1.02	0.462	1.25
Senegal	1.00	.80	0.431	1.14
South Africa	3.00	1.56	0.695	1.27
Tanzania	1.00	.83	0.440	1.15
Uganda	1.00	.46	0.444	1.42
TRASA	-	-	-	1.19

Sources: UNDP, Human Development Report 2002; UN-DPEPA 2001; LIRNE.NET.

7. Cost-based Interconnection Charges, Competition and Investment[1]

Morten Falch

1. Introduction

Interconnection charges are crucial for both competition and the return of investments in telecom facilities, and are often seen as the most important issue in regulation of telecom markets. The terms for interconnection a new entrant can obtain are crucial for its ability to compete with the incumbent operator. In this respect, although not the only parameter, price setting is an important one.

High interconnection charges allow high returns on investments in telecom facilities. In particular, this benefits incumbent operators as they have invested most in telecom facilities and receive substantial net payments from allowing other operators to make use of these facilities.

High returns on investments will usually stimulate further investment. However, this is not necessarily the case for markets with a monopoly or limited competition. A telecom operator may invest in new facilities only if investments either reduce costs or generate more income e.g. by stimulating demand through creation of new services. If competition is limited, investment in better quality of service will probably not be attractive. For instance, investments in better internet connections for end-users (this could be an upgrade of bandwidth for ADSL customers or introduction of cable modem access) will not be attractive if the average household is only willing to allocate a certain share of its income to internet connection charges.

In a highly competitive market, investment in quality is necessary to stay competitive, and more competition may thus lead to more investment. First, the incumbent will need to invest in upgrades in service levels in order to stay competitive, and second, more operators may lead to some duplication of network infrastructure. While upgrades in service levels are a benefit to the society, duplication of network infrastructures represents a loss. Such a loss may however be necessary in order to obtain real competition.

Competition can also lead to a reduction in investment if it is followed by price reductions and, as a consequence of this, a lower return on investments.

The purpose of regulating of interconnection prices is to promote services-based competition, by ensuring new entrants' access to existing network facilities under conditions that enable them to compete with existing operators. On the other hand, interconnection rates must not be so low that they discourage investment in new network facilities and delay facilities-based competition. In order to maintain this delicate balance, concepts like Long Run Average Incremental Cost (LRAIC) and Total Element Long Run Incremental Cost (TELRIC) based interconnection charges have been developed.

Following the US Supreme Court decision supporting the use of TELRIC for setting interconnection charges, it is now a fact that interconnection charges will be cost-based in both Europe and US and that forward looking costs principles will be used for cost determination. The question is whether such concepts can be used to induce competition and stimulate investment in developed as well as developing countries.

It is still too early for an empirical study on how use of forward looking costs will affect the levels of competition and investment, but the question can be separated into three other questions, for which some empirical research is possible. These are:

1. How does implementation of a regime with price setting according to forward looking costs (LRAIC or TELRIC) affect the level of interconnection charges?

2. How are levels of competition affected by interconnection charges in the short and long run?

3. How do the level of interconnection charges and the level of competition affect investment?

European experience of LRAIC is somewhat mixed, and interconnection rates vary significantly between countries. One reason for this is that the current definition of LRAIC is open to interpretation. Furthermore, calculation of cost-based tariffs is not an exact science; even calculations following the same detailed guidelines can give quite different results. There are also examples in which interconnection charges claimed to be cost-based by national authorities are actually higher than end-user prices, which of course makes it impossible for new entrants to compete.

Preliminary results indicate that implementation of cost-based interconnection prices is not only a question of finding the right prescription, but also a question of having a strong independent regulator committed to the task of promoting real competition.

Competition has certainly increased in many European Union (EU) countries, particularly in countries where interconnection rates have been among the lowest. But competition has not materialised equally for all segments. It seems especially difficult to introduce competition in the market for fixed local loop services. This could indicate that regulation of interconnection charges is not sufficient to ensure competition in all segments of the telecom market.

Investments in telecom facilities have generally increased since the liberalisation process was initiated in the early 1990s. But is this a result of competition? Competition has been much slower to develop than the growth in investment.

This chapter addresses these three questions, first through an analysis of the EU experiences in general and second through a more detailed analysis of experiences from the Danish market. Denmark was among the first countries within the EU to liberalise its telecom market and is one the most competitive of the European telecom markets. Furthermore, Danish interconnection rates are among the lowest in Europe.

We begin with a discussion of LRAIC, upon which the EU regulation of cost-based interconnection charges is based, and compare it with Fully Distributed Costs (FDC) and TELRIC. We then describe the EU experience via an analysis of how LRAIC has affected the level of interconnection rates and how interconnection rates have affected competition, and how interconnection rates and competition have affected the investment levels. These issues are then discussed in context of the Danish experience.

2. LRAIC vs. FDC

The European Commission recommends that EU member countries introduce cost-based interconnection charges based on LRAIC (CEC 1997; CEC 1998). At present, all EU countries as well as most Eastern European countries with the ambition to become full members of the EU are in the process of introducing cost-based interconnection rates. But not all countries use LRAIC, FDC is also widely used.

FDC is usually based on the accounting of historical costs. After allocation of direct costs between activities, joint and common costs are allocated on the basis of relative use or relative revenue. Thus, this method ensures that all costs are allocated to a particular activity.

The purpose of using the LRAIC approach is to base interconnection charges on what the cost of an interconnection product would be if provided by the most efficient network operator, rather than on the current cost of production as for FDC. This enables new entrant operators to use existing network facilities without paying for possible inefficiencies of the incumbent operator in management, sub-optimal investments, etc. In addition, new entrant operators should be stimulated to invest in alternative networks as soon as their businesses can support it. Finally the aim is to improve consensus among telecom-operators by including them in the process.

Thus LRAIC is defined as the forward looking long run average costs of adding one increment to the network. The long run implies the inclusion of costs of all types of input related to a certain increment, including capital equipment costs – not only the costs of adding one additional increment. Hence the concept of LRAIC is broader than Long Run Incremental Cost (LRIC). LRIC is defined as the marginal costs of adding or removing a certain increment of traffic. Therefore, facilities for which the costs do

not depend on the level of traffic cannot be included in LRIC. Moreover the definition of LRAIC, used for instance in Denmark, operates with very large increments such as 'all services in the access network' or 'all services in the core network'. All fixed costs related to either the core or the access networks are thus included in the costs of one of these two increments; only costs shared by the access and core networks are excluded (NTA 2002: 3). For instance, the costs of ducts used both by access lines and by the core network are excluded, as these costs cannot be allocated to a single increment.

Like TELRIC, LRAIC assumes the use of optimum technology given the existing location of wire-centres (the scorched node approach). The difference between TELRIC and LRAIC is that the latter does not include costs shared by more increments. However, the definition of very large increments limits the impact of this difference as most costs can be allocated either to the access – or the core network.[2]

3. Principles for Calculating Interconnection and Unbundling Charges in the EU

The EU Commission recommends the use of LRAIC for calculating interconnection and unbundling charges. However, the EU member states have adopted quite different approaches for their cost calculations. The Eighth Implementation report summarizes the various approaches as depicted in Table 1. Although every country has taken its own approach, it follows from the table that most countries use a version of either fully distributed costs (FDC) or LRAIC. Spain uses independent consultants to carry out costs analyses and the Netherlands is the only country to use embedded direct costs (EDC). Denmark uses a combination of best practise and LRAIC, but will gradually move towards a pure LRAIC regime.

4. Impact of Calculation Principles on Pricing within the EU

In order to analyse how the choice of calculation principle affects the level of interconnection rates, rates are compared for two groups of countries: those using FDC and those using LRAIC or LRIC. The analysis is based on two different cost indicators: costs of call termination on fixed networks at the local level (in 1999-2002) and costs of Unbundled Local Loop (ULL, during 2002).

With regards to costs of call termination on fixed networks at the local level, the countries are grouped as follows:

- Those using FDC: Belgium, Italy, Luxembourg, Austria, Portugal, Finland and Sweden;
- Those using LRAIC: Denmark, Germany, Greece, France, Ireland, Netherlands and the UK.

With regards to costs of Unbundled Local Loop, the countries are grouped as follows:

- Those using FDC: Belgium, Ireland, Italy, Austria, Finland and Sweden;
- Those using LRAIC: Denmark, Germany, Greece, France and the UK.

The UK is considered as an LRAIC country in both cases, as determination of price ceilings on interconnection charges are based on LRAIC (OFTEL 2001). It is important to note that within these two groups there are important variations in the different countries' approaches to price calculations. This reservation must be kept in mind before firm conclusions derived from a price comparison are made. Moreover there are variations in the timing of implementation of the various pricing regimes.

Termination charges for the two country groups are calculated as an unweighted average of termination charges for each country. Charges are calculated for all LRAIC countries as well as for the LRAIC countries excluding Denmark. Denmark introduced LRAIC in 2003, therefore LRAIC has not affected the charges depicted in Table 2.

It follows from the table that the group of LRAIC-countries on average have substantial lower termination charges than the FDC-countries in all years. The price trends indicate that the largest reductions from 1999 to 2002 have taken place in FDC-countries. The only reason for this is, however, a substantial reduction of 20% in 1999-2000. Price reductions in 2000-02 have been largest in the LRAIC-countries.

Table 1 – **Current and planned cost methodologies for calculating interconnection and unbundling charges**

	Cost accounting system actually in place for interconnection by SMP operators		**Cost accounting system actually in place for unbundling by SMP operators**		**Deadline for implementation of a system based on current costs**
Country	**Cost base**	**Cost standard**	**Cost base**	**Cost standard**	
Belgium	Historic/ current	FDC	Historic	Retail minus for full unbundling	Implemented for network assets
Denmark	Forward-looking costs	LRAIC	Forward-looking and best practice	LRAIC	Implemented 01.01.2003
Germany	Forward-looking costs	LRAIC	Forward-looking costs	LRAIC	Implemented
Greece	Current	LRAIC	Current LRAIC		Ongoing implementation
Spain	Multi-standard	Multi-standard			Implemented

	Cost accounting system actually in place for interconnection by SMP operators		Cost accounting system actually in place for unbundling by SMP operators		Deadline for implementation of a system based on current costs
Country	**Cost base**	**Cost standard**	**Cost base**	**Cost standard**	
France	Current	LRIC + mark-up for common costs + specific costs	Current	LRIC + mark-up for common costs + specific costs	Work on LRIC completed; official decision to move to LRIC to be taken for the 2003 offer
Ireland	LRAIC	LRIC	Historic FDC		LRIC planned for 1.4.03
Italy	Current	FDC	Historic FDC		Implemented
Luxembourg	Historic	FDC			LRIC in principle for the RIO 2001 and 2002
Netherlands	Current	EDC for originating interconnection Bottom-up LRIC for terminating i/c	Current	EDC	Implemented
Austria	Current	FDC	Current	FDC	Implemented
Portugal	Historic, forward-looking and current	FDC			No deadline fixed
Finland	Historic/ current	Company specific	Historic/ current	Company specific	Ongoing implementation
Sweden	Historic	FDC	Historic FDC		Planned for January 2004
United Kingdom	BT: Forward looking/ current Concert: Forward looking/ Current Kingston Communications: Forward looking/ current	BT: LRIC + FDC Concert: LRIC + FDC Kingston Communications: CCA (Current Cost Accounting) + FDC	BT: Forward looking/ current Concert: N/A Kingston Communications: Forward looking/ current	BT: LRIC + FDC Concert: N/A Kingston Communications: CCA + FDC	BT: Implemented Concert: Implemented Kingston Communications: Implemented for interconnection. For unbundling, to be implemented within the next 18 months

Source: Adapted from European Commission: *Telecommunications Regulatory Package – VIII Implementation Report Annex II (2002).*

Table 2 – **Interconnection charges for call termination on fixed networks by country group (€ cent per min.)**

Country group	1999	2000	2001	2002	Reduction 1999-2002	Reduction 2000-2002
FDC	1.30	1.04	0.85	0.82	37%	22%
LRAIC	0.83	0.89	0.74	0.61	27%	32%
LRAIC – DK	0.81	0.92	0.75	0.65	20%	30%
Un-weighted EU average	1.11	1.04	0.87	0.78	30%	25%

Source: Annex 1/own calculations

Table 3 – **Monthly average total cost per full unbundled loop 2002 (€)**

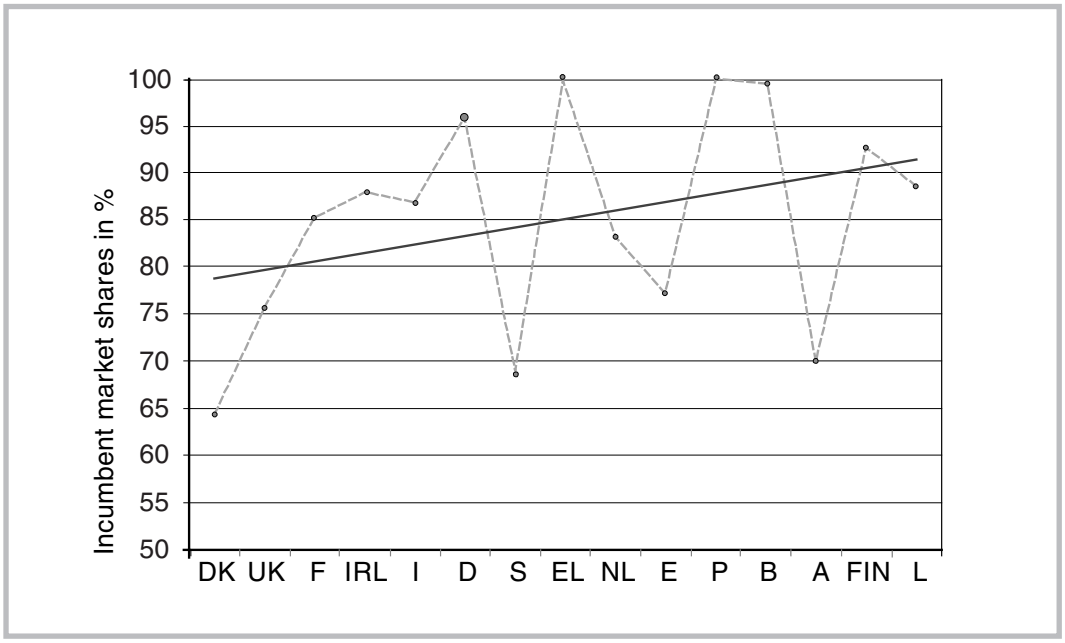
FDC countries		LRAIC countries	
Austria	15.40	Denmark	12.10
Belgium	19.90	Germany	18.10
Finland	32.70	France	17.10
Ireland	26.90	Greece	21.80
Italy	18.70	UK	27.90
Sweden	25.00		
FDC Average	23.10	LRAIC Average	19.40
		LRAIC Average – Denmark	21.23
Average total			21.42

Note: Estimates are based on the total costs for the loop for the first year.

Source: Commission of the European Communities: Telecommunications Regulatory Package – VIII Implementation Report Annex I – Corrigendum March 2003.

Most of the LRAIC countries introduced LRAIC after 1999. The impact of LRAIC should therefore be measured by the price reductions achieved rather than by the absolute level of charges. Here results are ambiguous, as the result depends on the time period chosen. It cannot be concluded that introduction of LRAIC has generally led to additional reductions in prices.

Figure 1 – **Incumbent market shares in local traffic by country**



Source: Annex 1.

Note: Countries ranked by level of local termination charge (lowest first).

The LRAIC figures have the lowest interconnection charges, but the figures also indicate that this was the situation before LRAIC was implemented. LRAIC has been chosen in countries where interconnection charges already were low. This points towards the conclusion that LRAIC has been chosen in countries with a strong commitment from regulators to obtain low interconnection charges, and that this is the real reason for the difference between the two country groups.

It follows from Table 3 that LRAIC countries on average offer cheaper unbundled local loops than the FDC countries. Most of the difference can however be attributed to exceptionally low charges in Denmark. If Denmark is excluded, the difference is just below 9%. As Danish prices in 2002 also for ULL were set according to best practise and not by use of LRAIC it is fair to exclude Denmark. In fact use of the Danish LRAIC model for ULL would have led to an increase in prices on ULL of 24%.

5. The Impact on Competition within the EU

How is the level of competition affected by the level of interconnection charges? Although the empirical foundation is weak, it is possible to shed some light on this question via a comparison between interconnect charges and the level of competition in the EU countries. Here the market share of the incumbent within various markets can be used as an indicator for the level of competition.

Table A.2 in the Annex to this chapter depicts incumbent market shares for local, long-distance and international calls as well as for xDSL. Figure 1 depicts the market share of incumbent operators for local calls for each country. Countries are ranked according to their local termination charges (the country with the lowest charge is ranked as number 1). It follows from the figure that there is a trend towards higher incumbent markets shares (and therefore less competition) in countries with the highest termination charges. A statistical analysis indicates that one-third of the variation in market shares between countries could be explained by variations in termination charges (r=0.35). Although termination charges may have an impact, there must be other factors that are at least as important for the level of competition.

A similar analysis of market share for long-distance and international calling results in a substantially weaker relationship (r=0.20).

Comparison between market share for xDSL services and prices for raw copper does not indicate any relationship at all (r= -0.04). One reason may be that the total costs for setting up an xDSL line includes many other types of costs, e.g. collocation charges, which all have to be paid to the incumbent operator. Another reason is that the market for xDSL service is new, and will take some years for competition to develop.

6. Impact on Investment within the EU

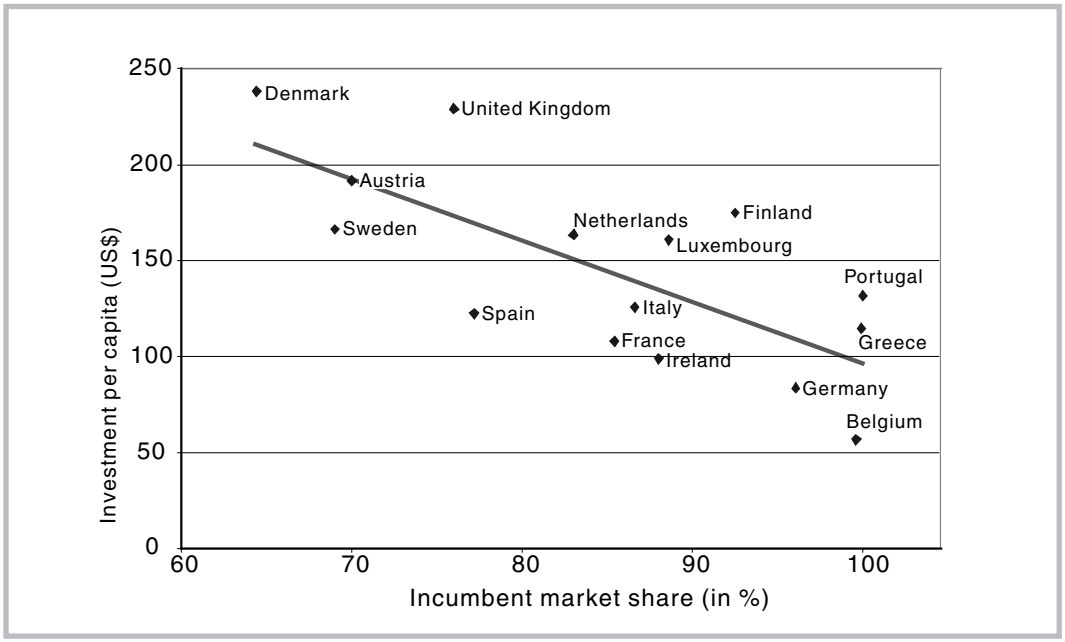
To analyse the impact of interconnection and competition on the level of investment, investment is compared with these two parameters for all of the EU countries. A comparison is made for two different investment indicators: an investment index showing how investment has developed from 1992-2001, and the absolute level of investment per capita in each country. Both indicators are depicted in Table A.3 in the Annex to this chapter.

The first indicator shows how the level of investments in each country has been affected by liberalisation, with the investment level before the markets were liberalised is compared with the situation today. Investment has developed very differently across countries, and for most has grown. For both Denmark and UK investment has almost tripled. Germany, at the other extreme, has experienced reduced investment to less than the half of the 1992 level. The question is whether such differences can be attributed to variations in developments in interconnection charges and competition.

The second indicator shows the present level of investments. We find that this indicator is highly related to the first one. One of the exceptions is Greece, which even after substantial growth within the past decade still has a fairly low level of investment.

According to economic theory, a decrease in return on investment should lead to a reduction to investment. Thus low interconnection charges should be followed by low levels network infrastructure investment. Additionally, new entrants will tend to lease existing telecom facilities rather than invest in their own if interconnection charges

Figure 2 – **Investment as a function of incumbent market shares in local traffic**



Source: Annex I.

are low. However the impact from this may be nullified by a possible positive impact on the level of competition. A statistical analysis of the correlation between interconnection charges and investment indicates that this relationship is very weak (r values range from -0.09 to 0.20). It should however be noted that infrastructure investments are long-term. Therefore investments depends more on the level of returns that can be expected in the future, than on the present situation.

More competition will lead to more investments for two reasons. First, operators may be forced to invest more in order to stay competitive. Second a certain duplication of telecom investments may be necessary. However, competition may also have a negative impact, if price competition is so fierce that returns on investments are becoming too low or the operators are unable to finance new investments.

A comparison of the level of investment and the level of competition, expressed as the market share of the incumbent operator, indicates a strong positive relation on the market for local access (r=-0.51 and r=-0.71) and a weak relation on the market for ULL (r=-0.23 and r=0.21).[3] The relationship between investment and incumbent market shares for local interconnections are depicted in Figure 2.

Figure 2 indicates that more competition in local traffic goes hand in hand with more investment. For the ULL market the relationship is less clear. Here we find important exceptions to this rule, for instance Portugal, where the incumbent has a far lower market share than in the rest of the EU without having a particularly high level of investment.

One reason could be that the ADSL market for services, which is the primary application for ULL, in fact is two different markets: the business market and the residential market. The business market may be easier than the residential market for new entrants to penetrate, as the profit margin is higher. As ADSL become more widespread, the residential market will dominate in terms of number of connections and this may lead to a higher market share for the incumbent operator.

7. Principles for Determining Interconnection Charges within the Danish Telecom Market

The present goal for the Danish telecom policy, formulated in 1995, was the ambition to be 'best and cheapest through real competition'. Competition within the Danish market was to be promoted through an early liberalisation combined with rather strict competition regulation. The idea was for Denmark to be among the first countries in Europe to liberalise its telecom market, and thereby attract foreign investment in that market. A key issue was to ensure low interconnection charges in order to enable new entrants to compete with the incumbent operator TDC.

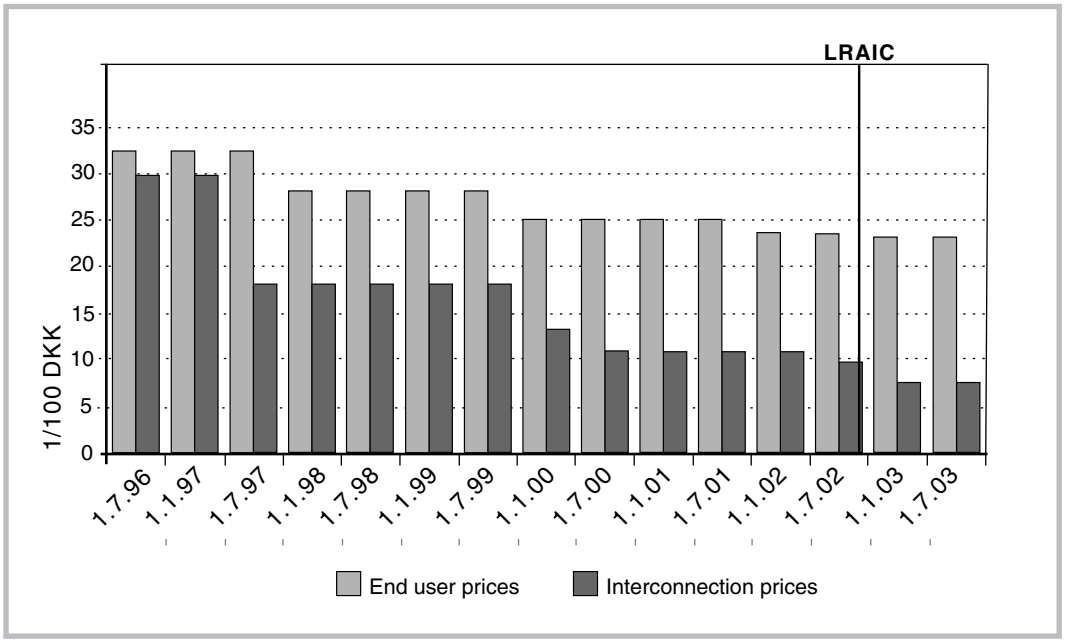
With the adoption of new telecom legislation in July 2000, it was decided that interconnection rates for the future should be based on LRAIC. The National IT and Telecom Agency (NITA) initiated the construction of a cost model for the Danish telecom network building on the LRAIC concept.

The principles for determining interconnection charges used up to 2002 were introduced in 1996, and were based on historical costs. The principle was to allow inclusion of the total extra costs related to provision of the service plus a reasonable margin. Five different elements were included in the costs: (1) direct extra operating costs, (2) a proportion of the costs of new investments needed due to delivery of the interconnect service, (3) a proportion of depreciation and payment of interest for network facilities used for the service, (4) a proportion of the operating cost for these facilities and (5) an overhead of 12% of the total costs of (1)-(4).

The proportions of the costs in (2)-(4) were calculated on basis of the proportion of the traffic delivered through interconnection. However, if the dominant operator (i.e. TDC, the incumbent carrier) had a market share of more than 80%, only 30% of the proportion of the operating costs should be included. This implied that the incumbent operator should bear a part of the interconnection costs until the new entrants had obtained a reasonable market share. In this way the monopolist was required to subsidise its competitors until some of them have established themselves within the Danish market.

The historical cost approach was supplemented in 1998 by a best practice clause, enabling the national telecom regulator to reduce interconnection charges to the international level for best practice, even if TDC was able to document that the actual costs were higher. Best practice, redefined following several debates between

Figure 3 – **Developments in interconnection and end user prices, 1996-2003**



Source: Danish IT and Telecom Agency (2003).

the telecom agency, TDC and the new entrants, is the average of the interconnection rates in the three countries with the lowest interconnection rates. It was also possible for NITA to reduce rates if they were lower in just one country, but in this case corrections for country specific conditions should be made beforehand. Although both the historical costs approach and the best practice clause are included in the legislation as ways for setting interconnection rates, it is the best practice clause that has been used to reduce the interconnection charges five times since July 1996 (see Figure 3). This clause has ensured that Danish interconnection charges are always among the lowest in Europe.

8. The LRAIC Modelling Process in Denmark

It was decided that both incumbent and new entrant operators should participate in price setting, and LRAIC models should be developed through co-operation between three parties: the National IT and Telecom Agency; operators with a strong market position obliged to deliver interconnect services at cost-based prices (i.e. TDC); and operators who need to buy these services to complement their own network facilities (the new entrants).

The new entrants have formed a common working group (the Bottom-up Working Group), which participates in the modelling work. This group includes among others Sonofon, Orange, Telia and Tele2. Although these companies can all be characterised as new entrants

as well as net buyers of interconnect services, they also differ significantly with respect to their interests and strategies. Sonofon and Orange are first of all mobile operators, while Tele2 provides mainly fixed services. Telia is a new entrant in Denmark but an incumbent operator in Sweden, and the most ambitious in building its own physical infrastructure.

The process of determining interconnection charges based on LRAIC is long and complicated. NTA commissioned a consortium headed by Andersen Management International (AMI), with the participation of European Economists and Center for Tele-Information to facilitate the process, which resembles what followed in other EU countries like the UK and Austria (Freund & Ruhle 2002). The process comprises five stages: setting the rules, modelling, comparison, hybrid modelling and, finally, price determination.

The rules were set according to three model reference papers prepared by the AMI consortium and revised, following the comments from the three parties. This work was completed in late 2000. Thereafter TDC was responsible for preparing a top-down model based on the existing network, while the Bottom-up Working Group was responsible for the preparation of a bottom-up model of a network building on the current physical network structure, but optimised with respect to technology and configuration (the scorched node approach). This work was completed in late 2001, and the two models have been compared, so a hybrid model based on results from the top-down and bottom-up models could be made.

The exact figures derived from the two cost models are not publicly available, but the reconciliation report indicates that the top-down model ends up with networking costs that are about twice the costs that are derived from the bottom-up model. The two models are quite different in their network architecture, but it seems that the main differences originate from different assumptions in following areas:

1. annualisation rates – mainly due to different assumptions in price trends and costs of capital;

2. indirect costs, operating costs and overheads;

3. trench lengths and trench sharing with other utilities;

4. routing tables and network dimensioning, including dimensioning of exchanges;

5. utilization rates.

The impact of each set of assumptions was analysed by including the assumptions from the top-down model in the bottom-up model. Having analysed the impact of the various assumptions, NITA has assessed the appropriateness of these and decided on the assumptions that should be made in the subsequent hybrid modelling. The outcome of the hybrid modelling was announced late 2002 and interconnection charges set on

basis of the LRAIC model took effect from 1 January 2003. Ordinary interconnect charges were reduced by 17-36%, but the LRAIC price calculated for raw copper was 24% above the current price. It was decided to implement the price increase on raw copper over a period of seven years.

9. The Impact on Competition and Investment on the Danish Market

Early liberalisation and low interconnection rates seem to have attracted foreign telecom operators to the Danish market. Although the incumbent operator TDC still dominates, some competition has developed since the telecom market was fully liberalised in 1997. TDC is by far the major provider of infrastructure, in particular, in the access network. Some infrastructure competition has developed at the inter-exchange and international markets (NITA 2001). Regulation is still considered to be necessary to ensure network access to new operators and promote competition in the telecom service market.

Competition is most visible in the market for mobile communications. Four operators with their own networks compete in a market with 5.2 million inhabitants. The incumbent operator still dominates with a market share of 37%, the three other operators, Sonofon, Orange and Telia hold market shares of 25, 13 and 10% respectively, while a number of service providers share the remaining 16%. Hutchinson won one of the four UMTS licenses auctioned in 2001. Regulation of interconnection charges is crucial for competition in the market for mobile services. Although the dominating mobile operators have built their own network facilities, payment of interconnection charges for the new entrants constitutes as much as 30% or more of the total costs.

For the market in fixed services there is some competition on traffic – in particular international traffic, while TDC still dominates the access markets for both telephony and ADSL.

The figures indicate that six years after the Danish telecom market was liberalised and cost-based interconnection rates introduced, some competition has developed in most markets. On the other hand, there is no indication of a slow down in investment caused by low rates for interconnection services. For the same period of time, there has been considerable growth in telecom investments not only by the new entrants but also by TDC.

The exception is fixed local loop services. Although TDC has been forced to provide unbundled local loop services, TDC still holds 87% of the fixed line subscription and also provides 81% of the ADSL lines. It may be too early to evaluate how the regulation of unbundling will impact the market. TDC has lost a market share of 13% of the fixed lines subscriptions in three years. But the market for ADSL shows the opposite trend. Here TDC was able to increase its market share from 37 to 81% from 2000 to 2002. This could indicate that current legislation is insufficient to ensure real competition on this market.

10. Conclusion

Determination of interconnection charges is both a political and a technical issue. It is not possible to define completely objective criteria that can be used to set the 'correct' charges. The immediate purpose of regulation of interconnection prices is to promote services-based competition by ensuring new entrants' access to existing network facilities under conditions that enable them to compete with existing operators. On the other hand interconnection rates must not be so low that they discourage investments in new network facilities and delay facilities-based competition. The concept of LRAIC was developed to address this delicate balance. The question is whether use of LRAIC will induce competition, and what the impact on investments will be.

Interconnection charges within EU countries have been reduced considerably during the past four years. There is however no clear indication whether this development can be attributed to introduction of LRAIC, as similar reductions have taken place in those countries using FDC.

A comparison of data for the level of interconnection charges and competition levels indicates that a reduction in interconnection charges promotes competition, but many other factors have also played a role. The data also indicate that competition thus far has stimulated investment and there are no signs pointing towards destructive price competition with detrimental impacts on investments.

Experience from the Danish market indicates that low interconnection rates induce competition in most segments. But the local loop is an important exception. One reason for this may be that the history of local loop unbundling is relatively short, but the development in the market for ADSL indicates that there might be other reasons as well. In Denmark low interconnection charges were not ensured by use of TELRIC or LRAIC. Initially interconnection charges were based on historical cost accounting. When it appeared that the outcome of this method resulted in prices that were considered to be too high to promote real competition and to ensure Denmark a place among the countries with the lowest interconnection charges, this method was supplemented with a best practice clause. Use of the best practice principle has insured Denmark a position among the countries offering the lowest interconnect rates in Europe. The LRAIC approach does not include such a guarantee, and it will be difficult to justify use of the best practice principle for more than a temporary solution – in particular if use of an LRAIC model can document costs that are either above or below the level given by best practice.

The recent outcome of charges determined by use of LRAIC has in Denmark resulted in prices lower than the historic costs, but for raw copper the charges are higher than the current charges. This was not the only possible outcome of a process for which a hybrid model was constructed on basis of two different models providing very different results. It can therefore be argued that the subsequent reduction in interconnection rates is the result of a dedicated regulator rather than of the LRAIC approach as

such. Even though LRAIC modelling is a technically complicated process, there is still a substantial discretionary element in the price setting.

Low interconnection prices will in theory induce competition. But it is too early to conclude whether LRAIC always will result in prices that are low enough to fulfil this objective. This depends on how LRAIC is implemented. There are examples of interconnect prices determined by the use of LRAIC which were higher than the actual end user prices. In Denmark the costs derived from the bottom-up model were only half of those derived from the top-down model. Therefore much depends on how the reconciliation is implemented.

It is still too early to draw firm conclusions on the market for local loop services, but the experiences from Denmark indicate that it may be necessary to take additional measures in order to establish real competition.

The LRAIC model provides a framework for rate-setting, in which it is possible to involve all operators, who can both prepare their own models and comment on decisions taken in each phase of the process. Although it is difficult to imagine that operators will agree on all decisions taken, the modelling will contribute to consensus on interconnection charges, both in terms of methodologies used and the level of charges. Thus LRAIC will define a level playing field accepted by all parties. However, this can only be achieved if the process is managed by a strong regulator with sufficient technical and administrative expertise who is able to stay independent of the huge political and economic interests related to this field.

This chapter has studied the impact of interconnection charges on competition and investments within the EU. Here unbundling of existing local loop facilities is a key issue for promoting competition and stimulating investment. In countries where universal service coverage still is to be achieved, extending local loop facilities to all parts of the country is a much more important issue than unbundling. If investment in entirely new network facilities including local loop facilities is to be stimulated, interconnection charges for switched interconnection at the transit level are the most important issue.

It may be possible to determine a fair level of charges for switched interconnection charges alone, without going through a complicated LRAIC process involving a detailed cost analysis of all parts of the network. The Danish experience shows that charges based on best practise can be at least as effective in this respect – and best practise charges are far simpler to implement. It can even be argued that the charge for switched interconnection should be set to a level below the incremental costs, as new entrants typically will be allowed to serve the least profitable areas, which still are outside the reach of the incumbent operator's network. Although data do not allow too strong conclusions to be made on the impact on investments, it seems that low interconnection charges and strong competition go in hand with a growth in investment. Therefore protection of the incumbent operator, e.g. through a delay in a reduction in interconnection charges, seems not to be a good strategy for promoting investments either in developed or developing countries.

[1] Parts of this paper were presented at ITU World Telecom, Geneva 2003.

[2] The differences between LRAIC, TELRIC, FDC and other cost definitions are explained in detail in Intven (2000).

[3] r values are negative as competition is high for low values of incumbent market shares.

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Annex

Table A.1 – **Interconnection charge for call termination on fixed network – Local level (€ cents)**

	1999	2000	2001	2002
Austria	1.82	1.02	0.91	0.91
Belgium	1.07	0.92	0.77	0.84
Denmark	0.93	0.75	0.67	0.44
Finland	1.43	1.43	0.96	0.96
France	0.61	0.63	0.58	0.54
Germany	1.01	0.88	0.83	0.65
Greece	-	1.18	0.88	0.71
Ireland	1.00	0.84	0.64	0.64
Italy	1.00	0.75	0.72	0.65
Luxembourg	2.25	1.69	1.27	1.16
Netherlands	1.00	1.09	0.79	0.74
Portugal	0.99	0.99	0.9	0.82
Spain	0.99	0.9	0.9	0.76
Sweden	0.86	0.91	0.67	0.66
UK	0.62	0.62	0.63	0.49

Sources: Commission of the European Communities: Telecommunications Regulatory Package – Implementation Reports 5-8 1999-2002.

Table A.2 **– Estimates of incumbent operators' market share – outgoing minutes (%)**

	local	long- distance	international	ULL
Austria	70.0	50.0	40.0	81.43
Belgium	99.6	84.7	51.5	84.20
Denmark	64.4	64.4	52.7	80.82
Finland	92.5	32.0	54.0	85.17
France	85.4	61.6	63.2	77.46
Germany	96.0	63.0	48.0	78.87
Greece	100.0	99.1	96.9	
Ireland	88.0	59.0	66.0	90.35
Italy	86.6	64.0	74.9	76.30
Luxembourg	88.6	88.6	72.0	
Netherlands	83.0	76.0	62.0	88.39
Portugal	100.0	89.9	70.5	47.70
Spain	77.2	84.2	81.5	77.70
Sweden	69.0	69.0	43.0	76.30
UK	76.0	48.3	30.0	58.10

Note: Market shares for Sweden are on basis of retail revenues.

Source: Commission of the European Communities: Telecommunications Regulatory Package – VIII Implementation Report – Annex I – Corrigendum March 2003.

Table A.3 – **Telecoms investment index and telecoms investments per capita**

	Investment index 2001 (1992 = 100)	**Investment per cap. (USD)**
Belgium	75.9	57.4
Denmark	290.4	238.3
Germany	37.7	83.5
Spain	119.6	122.3
Greece	170.9	114.6
France	110.7	107.9
Ireland	137.4	98.0
Italy	81.9	125.6
Luxembourg	87.4	160.7
Netherlands	162.2	163.5
Austria	106.0	191.7
Portugal	136.7	131.4
Finland	173.5	174.6
Sweden	164.1	166.3
United Kingdom	283.0	229.2
Correlation with incumbent. ULL market share	-0.23	-0.21
Correlation with incumbent local market share	-0.51	-0.73
Correlation with ULL charge	0.20	0.05
Correlation with local IC charge	-0.09	0.00

Note: Investment figures for Finland and Ireland are from 2000.

Source: *ITU: World Telecommunication Indicators 2002 & 2003.*

Section II

Country Case Studies

8. Introduction to Country Case Studies

A recent World Bank paper by Pritchett and Woolcock (2003) heralds the ideal of 'Denmark'. The authors clarify, "By 'Denmark' we do not, of course, mean Denmark. Rather, we mean the common core of the structure of the workings of the public sector in countries usually called 'developed' …" (Pritchett & Woolcock 2003: 6). The paper, entitled, *Solutions When* the *Solution is the Problem: Arraying the Disarray in Development*, grapples with the contradictory and differing approaches to development policies. The authors conclude that the quest for "a" solution occludes the necessary tension between solutions that are 'technocratically correct' and 'locally responsive'. In this vein, there are many different starting points for roads to Denmark, and as shown by the following case studies, there are different regulatory models, approaches to network investment – and different network investment needs.

The first three case studies in this section are from Southeast Asia: Sri Lanka, India and Bangladesh. Rohan Samarajiva developed a detailed methodology to assess the Telecom Regulatory Environment (TRE) across five dimensions of regulatory risk (market entry, access to scarce resources, interconnection, tariff regulation, regulation of anti-competitive practices) for the fixed and mobile sectors. The investment patterns in the sector, over three time periods (1993-96; 1997-99; 2000-02), are analytically examined with respect to the corresponding assessments of the regulatory environment. The summary assessment for each dimension is expressed on a five-point scale as poor, unsatisfactory, neutral, satisfactory and excellent. This analysis was applied to the Sri Lanka case and refined during the second WDR research cycle. Subsequently, the researchers for the India and Bangladesh studies also applied this methodology.

Sri Lanka initially embarked on telecom reforms in 1980 with the bifurcation of posts and telecom service provision by the government. In 1991, the creation of a regulatory authority and the conversion of the Department of Telecommunications into a corporation further developed this process. Since 1991 numerous operators have been licensed including three fixed operators, four mobile operators, over five facilities based data operators, over 20 non facilities based data operators and over 30 external gateway operators; an excess of USD 1300 million has been invested in the sector with fixed teledensity increasing from below 1 to almost 5; mobile teledensity has increased from below 0.1 to over 5 and today the telecom sector is one of the highest growth sectors in the economy.

In the fixed sector, despite some evidence of exogenous government determination of investment by the incumbent after privatisation, the regulatory environment appeared to have some impact on investment decisions in the sector. For instance an initial boost in investment growth coincided with the replacement of the first, not-fully-independent regulator with the Telecommunications Regulatory Commission (TRCSL) in 1996, vested with better resources and greater autonomy and the licensing of two fixed access operators. Whilst the regulatory environment was not perfect, the hope of good regulation created by the 1996 legislative amendment and the early actions of the TRCSL were seen as justifying investment. Consequently, incremental investments in the fixed sector were highest around this time. However, the subsequent deterioration of the interconnection regime, the actions as well as inactions on the part of various government entities, contributed to fixed sector investment slowing in 2000 and by 2002 the extraordinary growth of the fixed network were overtaken by the mobile sector, despite the existence of massive unmet demand.

In contrast, the mobile sector during the period of investigation experienced an overall growth in investment mostly attributable to a relatively good regulatory environment – due to a better interconnection regime with the TRCSL issuing and implementing a fixed-mobile interconnection determination and related tariff decisions in 1999. Technological changes also warranted further investment. However, it may be surmised that had the intended Calling Party Pays regime been implemented, along with the remaining elements of the interconnection regime and the 1800 MHz frequencies cleared and allocated on schedule, investment in the sub-sector might have been even higher.

The **India** case study describes a textbook version of liberalisation – reigning in the monopoly elements and opening up the sector to private participation. The growth of the Indian telecom sector following deregulation has been appreciable, with a rapid growth in the subscriber base. However, policy uncertainty and a complex regulatory framework have introduced regulatory risks that have been key in determining operators' investment strategies.

Network development, generally, has not been strategised or effected in an integrated manner. Internet services and broadband access are lagging, as is rural teledensity. Evidence suggests that sector growth in the case of internet service providers (ISPs), for example, might simply be bolstered by simplification of administrative procedures and regulations, as well as policies aimed at ensuring a level playing field. Disparities between rural and urban teledensity are endemic to developing countries. For India, rural and urban teledensities are 1.49 and 15.16 respectively, making this a key policy concern.

The wireless in the local loop (WLL) stand-off between the basic and cellular operators provides an example of regulatory turbulence. Subsequent introduction of unified licences has resolved this issue to some extent, but on the other, unified licensing presents an increased challenge for regulating market power. With larger market size, the scope for anti-competitive subsidy by the integrated players, especially the incumbent, increases significantly. India's telecom market structure is already high-

ly skewed in favour of the incumbent which has a national licence to provide all services in contrast to competitors who have circle and service specific licences. The regulator's attempt to regulate the incumbent asymmetrically, which is not only sound economics, but also best practice, has already come unstuck.

The case study from **Bangladesh** also assesses the relationship between the regulatory environment and telecom investment over the past decade. Fixed sector investments have been highly inadequate and infrastructure development of the virtual state monopoly continues to be dictated by the availability of government funds. The Bangladesh mobile sector, conversely, is renowned for the GrameenPhone business model and the corresponding investments. However, when data is standardised for comparison across the region (despite having to rely on imperfect data) it is found that investment flows are probably more influenced by the attractiveness of the region rather than any particular appeal of Bangladesh. Circumstantial evidence suggests that improvements in the TRE would result in significantly increased benefits from the regional investment flows into the sector.

The study finds the TRE in Bangladesh to be wanting in all assessed aspects, with interconnection being the worst of the five components. A parallel mobile only network is being created due to regulatory ineffectiveness in a context in which almost 90% of mobile users do not have access to a fixed line.

South Africa was hailed as one of the early starters of telecom reform on the continent in the mid-1990s. However, investment arising from this process has focused on maximisation of state assets at the expense of broader sector development and provisioning of affordable access. State policies to induce investment in the sector through privatisation appear to have been short-sighted and attempts to induce investment in greenfield licences marred by a lack of transparent and contradictory licensing processes. Further, the strategy for privatisation of the incumbent through the extension of the monopoly on the public switched telecoms services has not delivered on national objectives – primarily the dual priorities of network extension to provide affordable services to unserviced citizens and the acceleration of the development of the network to provide enhanced services required in a network economy. In fact, by the end of the five-year exclusivity period two million subscribers had been disconnected, largely due to high price of services and the critical value-added network services (VANS) segment of the market in an e-economy, excluding the incumbent's VANS portion, had shrunk.

Operating with minimal state or regulatory intervention the mobile sector, particularly the initial duopoly operators have invested heavily in network development in South Africa, with sufficient success to enable them to be among the major investors in telecoms throughout the continent. There is significant evidence that demand for communications services can innovatively met through market forces and gaps in market cost-effectively filled by enabling alternative operators to enter areas regarded as unprofitable by the incumbents. However, their success in every instance in developing countries is dependent on strategic policy and effective market regulation

that includes reduced regulatory risk to induce local and foreign investment. While difficult to quantify, evidence for South Africa suggests that adopting a more open market structure, with an effective competition regulatory regime that exposed the incumbent to competition both in provision of services but particularly in the provision of facilities to competitors – would have yielded greater benefits to this critical sector of the network economy and better fulfilled national policy objectives of accelerated network development and affordable access.

The *African Telecommunications Indicators 2004* observes that, "Almost every African country has had a mobile interconnection dispute" (ITU 2004:18). **Ghana** and **Somaliland** are not exceptions to this – although their respective interconnection issues are quite different. While Ghana's average investment percentage (investments divided by total income) is on par with Europe, there are latent network expansion problems such as inability to sustain quality of service for a large and increasing numbers of subscribers, especially in rural areas – where mobile in particular could cover much terrain. However, while Ghana is doing relatively well in fixed telephony, the mobile sector suffers, largely due to an unclear regulatory situation for interconnection. Within Somaliland's telecom sector, bereft of regulatory guidance, interconnection is achieved by consumers owning multiple phones. Otherwise there simply is no interconnection between the market participants of the negotiated competition.

Somaliland is a particularly intriguing case study, simply because of the elements working against an otherwise nascent economy. In terms of its region and history, it has many commonalities with the Central Eurasian and Eastern European regions recently claiming independence, breaking from imposed and externally defined borders, and recovering from the devastation of war. However, unlike the countries of e.g. the post-Soviet Union, Somaliland is not yet recognised as a country – except by commerce and markets such as telecom which establish their operations within this specific geographic area. Within Africa, there is historical resistance to redefining borders based along more traditional, ethnic or other noncolonial logic, and Somaliland confronts ongoing resistance in this regard. This has been particularly problematic for attracting investment as there is no recourse to international arbitration. For donor assistance, until recently, development aid was disbursed unofficially.

Because of Somaliland's geographical location on the Gulf (and hence its quasi recognition from land-locked Ethiopia) trade, financial services, port services and port infrastructure are all key areas that would benefit from ICT upgrading and investment. The ICT sector is currently self-regulated by an arrangement of negotiated competition.

> The absence of a central government, together with much of the infrastructure taken for granted in other countries (such as an official banking, telephone and postal systems), has led to innovation. An example of this is the deregulated satellite-based telecommunications sector. In Somaliland, there are now five telecommunications companies operating out of Hargeysa and this competition has led to the lowest international telephone charges in Africa – US 80 cents per minute, some four to five times lower than

> neighbouring countries. Internet links are expected to be established during 1999 (SomaliaWatch 1999).

As for many developing countries, especially war-torn ones with a large Diaspora, a significant amount of hard currency is obtained via remittances. Somtel (a telecom subsidiary of SNM, and Somaliland's largest private employer with 1000 employees) was established to provide a secure network to facilitate remittances. In Ghana as well, funding for small-scale investment, such as for local telecentres springing up throughout the country, is largely derived via the expatriate community.

And, finally, we arrive at and conclude with **Denmark** – the nation rather than the ideal. As has been well documented, Denmark is a relative success story compared not only with most developing countries but also with other economically developed countries. A proactive telecom policy and regulation has been conducted and lately a policy of facilitation and ICT promotion has been high on the agenda of the national IT and telecom regulatory agency. The case study analyses the relationship between market developments and performance, and the policy and regulatory initiatives taken and discusses the general lessons with respect to initiatives fostering or limiting investment, innovation, and performance.

A particular issue raised in the study is this lack of public/private partnership for broadband investment in Denmark was raised in the WDR forum. The author of the Denmark case study, Anders Henten elaborated:

> Thus, the Danish state does not want to get involved in the building out of networks but focuses on content and service development. The information society policies of the Danish government give high priority to participating in public/private cooperation with respect to service and content development. There are numerous initiatives in these fields. The rationale underlying this policy is not that 'something is missing' on the network side of things – rather it focuses on the content side. What is it that people should and would like to use increasing network capacities for?
>
> […] Conversely, the Swedish state has played a more active role in the build-out of broadband network facilities. In the Danish discussions this role sometimes takes on gigantic proportions of a state initiative to promote broadband in Sweden. However, Swedish state involvement is mainly in terms of support for initiatives in local areas that may, for different reasons, be under-supplied. It is important to differentiate between a strategies for the full-blown establishing of national access broadband and a those directed toward filling out the gaps unserviced by the market.
>
> In Denmark, however, none of these policies have a substantial following among political decision-makers. And still, Denmark has one of Europe's highest penetration rates for broadband access (mainly based on a high penetration of ADSL and, to some extent, cable modems). Danish policy provides for demand-side led growth in broadband access, gives priority to the usage of known technologies, and has incurred incremental rather than radical developments. This may have advantages in terms of limiting investments

in technologies that fail to be taken-up or otherwise result in dead-end developments. It may, however, also preclude possibilities for a head-start on new information society developments. It is, indeed, a difficult choice. (See the full WDR dialogue reply at <http://regulateonline.org/dialogue/index.htm>.)

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9. Regulation and Investment: Sri Lanka Case Study

Rohan Samarajiva & Anupama Dokeniya
with Sabina Fernando, Shan Manikkalingam & Amal Sanderatne[1]

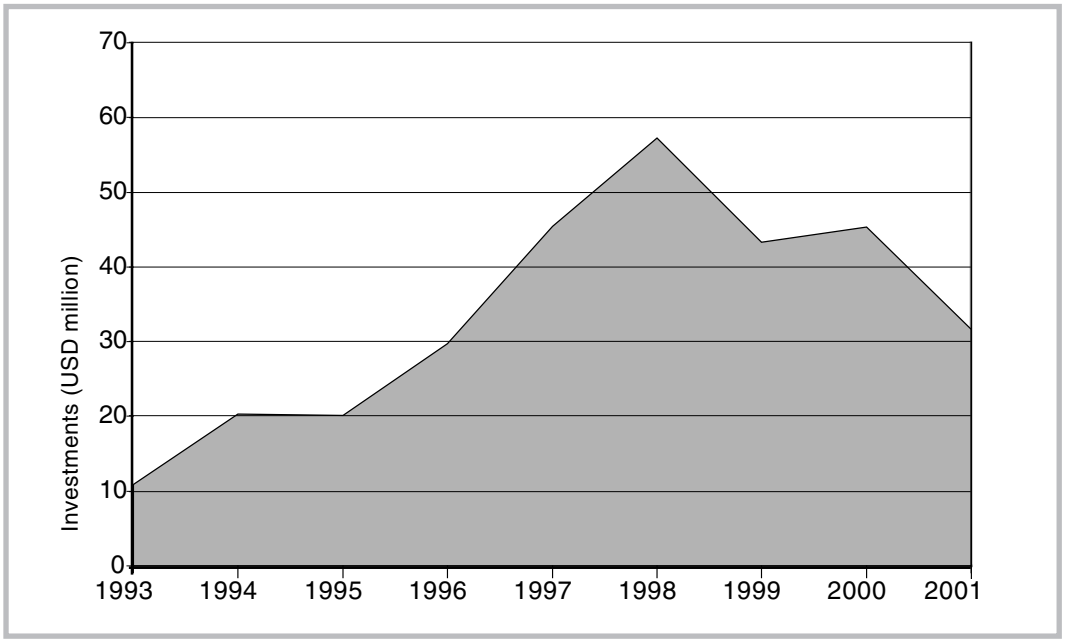
1. Introduction

The collapse of the information and communication technology bubble in 2000 and the consequent malaise poses significant challenges to developing countries, most of which are in the midst of reforming their telecoms sectors to increase private, including foreign, investment. In most developing counties, pro-competitive regulation in the telecoms sector is still at a nascent stage. Even as regulators are establishing competition-oriented regulatory mechanisms and grappling with issues of regulatory autonomy and competence, private investment in the telecom sector is declining from its high point in 1998 (see Figure 1).

Sri Lanka embarked upon telecom reform in 1980 with the bifurcation of posts and telecom service provision by the government. The first private operator entered the market in 1989, when Celltel, a mobile operator, was licensed. In 1991, a new law created a regulatory agency and converted the Department of Telecommunications into a corporation, Sri Lanka Telecom (SLT). Since 1991, numerous operators have been licensed including three fixed operators, four mobile operators, over five facilities-based data operators, over 20 non-facilities-based data operators and over 30 external gateway operators. In 1996, an amendment to the 1991 law strengthened the autonomy of the regulatory agency, two fixed operators were licensed by a transparent process to compete nationally with SLT, albeit limited to wireless in the local loop (WLL). In 1997, the incumbent, now a company known as Sri Lanka Telecom Limited (SLTL), was partially privatised by the sale of 35% of equity to NTT of Japan, which was also contracted to manage the company for five years. Since the 1991 legislative reforms, over USD 1300 million has been invested in the telecom sector; fixed teledensity has increased from below 1 to almost 5; mobile teledensity has increased from below 0.1 to over 5. The telecom sector is today one of the highest growth sectors in the economy.

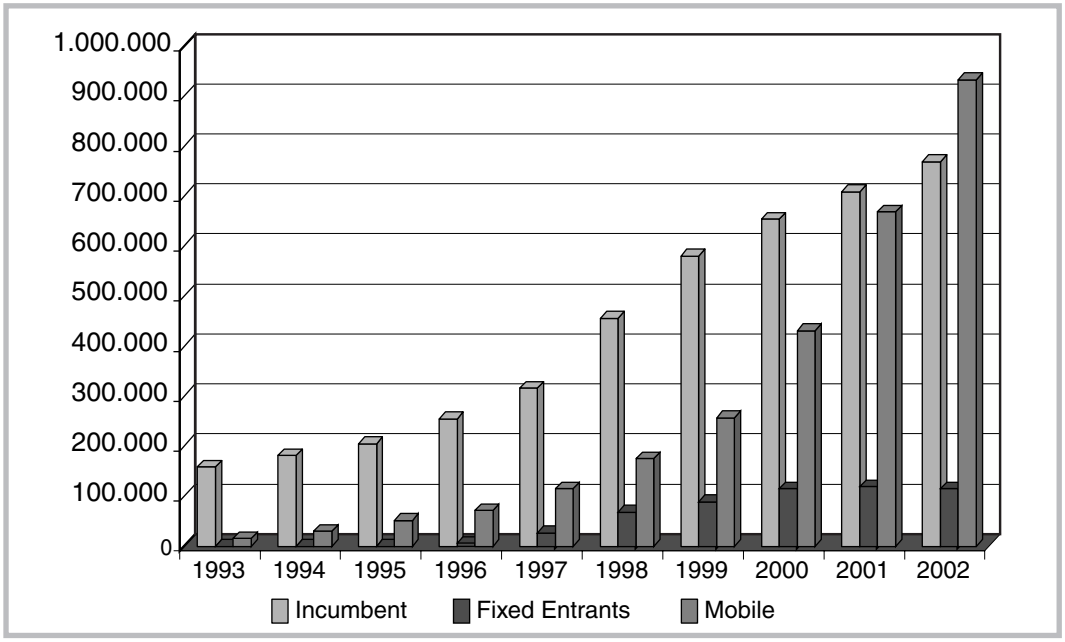
Given the Sri Lanka's long experience in telecom reform, relative to most developing countries, a detailed analysis of the telecom regulatory environment and the pattern of investment is likely to yield useful insights on the World Dialogue on Regulation theme – *stimulating investment in network development: roles for regulators*.

Figure 1 - **Trends in telecom investment in developing countries, 1993-2001**



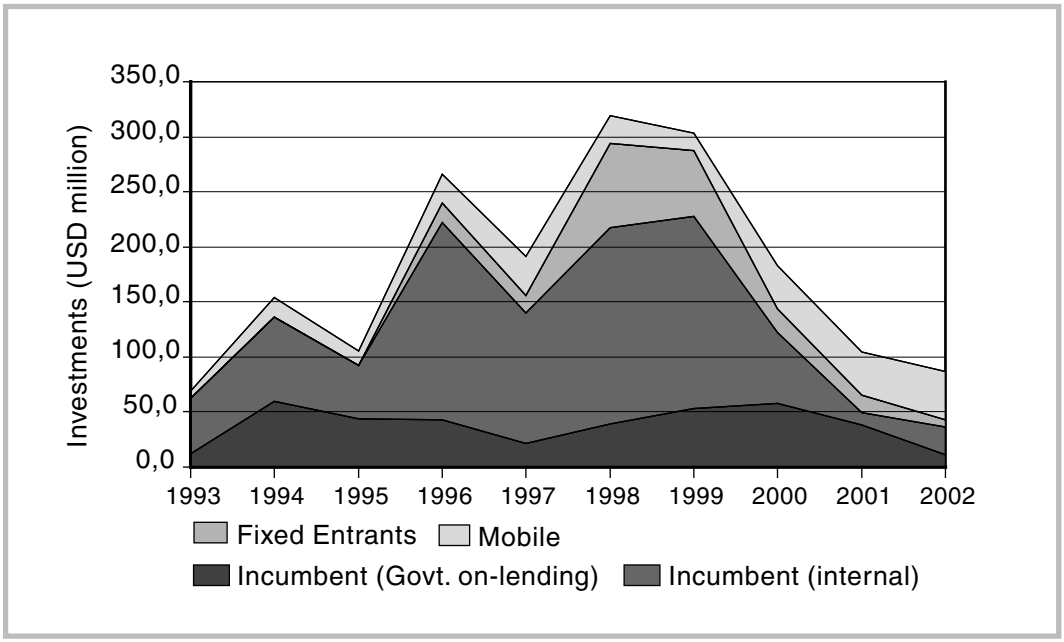
Source: Private Participation in Infrastructure Database, The World Bank.

Figure 2 – **Growth in telecom subscribers, 1993-2002**



Source: Telecommunications Regulatory Commission of Sri Lanka.

Figure 3 – **Trends in telecommunications investment, 1993-2002**



Sources: Company Financial Reports, External Resources Department, Milne et al (1998).

From the beginning of the reforms in 1980 until 1996-97, the fixed telecom sector in Sri Lanka was constituted by an integrated, government-owned monopoly, with marginal roles played by data operators. Investment by the incumbent was driven by government decisions on how much revenue the firm was allowed to reinvest and on the nature and extent of multilateral, bilateral and other forms of credit and aid that were received. With privatisation and the adoption of a more serious approach to competition-oriented regulation in 1996-97, there has been a transition from the reliance on government-raised investment funds to commercial investment. Investment by other operators exceeded that of SLTL for the first time in 2002 – possibly indicating the start of a more normal market-based process. The mobile sector was subject to the dynamics of investment markets since its inception. During the period of this study, the incumbent did not directly participate in the mobile sector, although it held a 40% share in one of the operators after the termination of a build-operate-transfer (BOT) agreement in 1996. The overall pattern of incremental investment in the fixed and mobile sectors is shown in Figure 3.

Investment and Regulatory Risk

The first public listing of a telecom company in Sri Lanka occurred in 2003, outside the time period covered by this study. The study therefore focuses on foreign direct investment in, and reinvestment of internal funds by, operators.

At the point of investment, investors consider risks associated with three environments: macro-level or country, regulatory, and commercial. The macro-level or country risk includes factors that may affect the entire economy, such as inflation and foreign exchange risk, as well as overall political stability. Regulatory risk is a term of art, defined by Spiller and Levy (1994) to refer to risk emanating from government action, including but not limited to the actions of the actual sector-specific regulatory agency with authority over the industry in question. Commercial risk is comprised of factors such as demand, the effect of substitutable products and services, and performance of competitors. The focus of this case study is the regulatory environment within which telecom operators and potential new entrants function, that is, a subset of the overall regulatory risk environment here described as the Telecom Regulatory Environment (TRE) that includes only the telecom-specific aspects.

How good or bad the TRE is, is based on perception. Different factors affect perceptions of the TRE. These include the context of the investment (new or incremental), and the nature of sub-sector (e.g., mobile is seen as posing a higher risk in market terms, but posing a lower risk in TRE terms because the investment can be recovered faster than in the fixed sector). While the expected returns from mobile investments are higher, it is a fact that mobile investments have been made in some of the most volatile and uncertain environments, such as the Congo and Somalia.

The manner in which an investor looks at the TRE is different at the moment of making the investment and subsequently. Prior to committing the investment, the investor has considerable negotiating power vis-à-vis the government. But this changes radically after the initial investment is made, especially in a capital-intensive industry such as telecom. Investment decisions after entry are driven to a great extent by the desire to protect and enhance the initial investment. Once a firm is in a market, deterioration in the TRE might depress the level of investment, but will not necessarily lead to no investment or to withdrawal.

There is no one-to-one relation between TRE and investment. Macro-level factors such as national economic crises (e.g. Argentina) can have major effects on telecom investment. In the case of Sri Lanka, the civil war was a major macro-level factor, but it was more or less constant across the period under study.[2] Exchange rates did vary – the value of the local currency decreased from less than LKR 50 to one US dollar to over LKR 90. However, this too was a gradual process, not the result of a crisis. Because Sri Lanka was not affected by major macro-level changes during the period under consideration, it is assumed that they were not determinative of the pattern of telecom investment.

Investment can also be affected by factors endogenous to a company. Given that every facilities-based voice and data operator in Sri Lanka has significant equity participation by one or more international firms (as shown in Table 1), decisions internal to the parent company most obviously affect investment by the operator in Sri Lanka. For example, changes in Telia's global investment strategy to a focus on Northern Europe could have affected Suntel's investments. The recent financial travails of Millicom may have had a significant effect on Celltel's investments during the past few years. Unlike macro-level risk, endogenous factors are not uniform across operators.

Melody (2003) describes the components of a good regulatory environment. It can be stated without doubt that there is no country, developing or developed, which fully satisfies the criteria of good telecom regulation. It is also relatively clear that developing countries, characterized by general weaknesses in governance, will exhibit greater deviations from the standards of good regulation and will thus have a poorer TRE.

In this case study, the regulatory environment is assessed in terms of five dimensions: market entry; access to scarce resources; interconnection; tariff regulation; regulation of anti-competitive practices. The three time periods for this assessment with respect to the fixed and mobile sectors are: 1993-96; 1997-99; and 2000-02. The assessment is relative and country specific, in that the environment in each period is considered in relation to the other periods, not in relation to an abstract ideal or international best practice. The summary assessment for each dimension is expressed on a five-point scale as poor, unsatisfactory, neutral, satisfactory and excellent.

The first licenses under the 1991 Law were issued in 1991 by the Minister on the recommendation of the Office of the Director General of Telecommunications (ODGT). The ODGT performed its regulatory functions under a powerful Ministry and was not an independent regulatory agency (see Samarajiva 1997). The entry of two new fixed

Table 1 – **Major/strategic investors in fixed and mobile operators, 1993-2000**

Operator	Major/strategic investor	Percentage of equity
SLTL	NTT (Japan) (management contract 1997-2002)	35% in 1997; subsequently added 0.5% of worker shares
Suntel	Telia (Sweden), Telecom AB (Sweden), C-Tech (Hong Kong), IFC (World Bank), Metropolitan Agencies (Sri Lanka), NDB, Kelmarsh (Sweden), NDB (Ayojana) Venture Inv (Sri Lanka)	55%, 16% 11%, 7% 4% 3%, 3% 1%
Lanka Bell	Trans-Asia Tel (Singapore), AIDEC (Japan), MIEL (Singapore), Nortel (Canada) and others	47%, 20%, 18% 7%, 8%
MTN (Dialog)	Malaysian Telekom (Malaysia)	100%
Celltel	Millicom (US)	100%
Mobitel	Telstra (Australia) (until 2002), SLTL	60%, 40%
Lanka Cellular Services (LCSL)	Singapore Telecom (Singapore) to 1997; Hutchison (Hong Kong) from 1997	100%

operators in 1996 marked a significant change in the market. In that year, the 1991 Act was amended to give a greater degree of autonomy to the regulator, replacing the ODGT with the better-resourced Telecommunications Regulatory Commission of Sri Lanka (TRCSL). The government also issued a national telecom policy in 1996. The 1996 policy committed the government to certain actions by the end of 1999. Sri Lanka's WTO commitments more or less reproduced the national telecom policy commitments. While consultations on a new telecom policy commenced in 1999, no significant policy decisions were taken until 2002, making the 2000-02 period something of an interregnum. The appointment of a former Managing Director of SLTL as Director General of Telecommunications in 1999, and subsequent TRCSL actions that were seen as favouring the incumbent, led to increasingly negative perceptions of the TRCSL. These factors justify the identification of 2000 as a watershed in regulatory developments in Sri Lanka.

In Sri Lanka, 2003 proved to be a significant year for telecom policy and regulation, with the opening of the international market, the promulgation of Interconnection Rules, the first assignment by auction of 1800 GSM frequencies, and so forth. At the same time, the acquisition of the remaining 60% of Mobitel's equity by the incumbent fixed operator has roiled the markets and created considerable concern among operators. Regulatory actions and inaction in this regard appear to have resulted in a deterioration of the TRE. However, this study does not directly address 2003 developments because there has been insufficient time for the changes in the TRE to affect investment decisions, and because the investment data for 2003 are fragmentary and incomplete. For example, in April 2003, MTN, the largest mobile operator, announced additional investments of USD 90 million over a period of three years (*Sunday Times*, 20 April 2003). In October 2003, Mobitel announced that it was launching its 1800 GSM network with a four-year USD 200 million investment plan (*Daily Mirror*, 2 October 2003). The network was launched with much fanfare in November 2003. Celltel, the oldest and second largest mobile operator, announced an investment programme that commits USD 4 million in its first phase ending in December 2003 (*Ceylon Daily News*, 8 October 2003). VSNL, a major Indian operator entered the sector with an initial investment commitment of USD 2 million (*Daily Mirror*, 22 July 2003). While these investments suggest a generally positive reaction to the recent changes in telecom policy and regulation, it is too early to draw definitive conclusions.

Sources and Limitations of Data

TRE is based on perception. Ideally, TRE would be measured by collecting data on perception of the TRE from a representative and informed group of respondents. That has not been done in this particular pilot study. The summary assessments are those of the senior author who has attempted to provide the reasoning behind the assessments in the text. For a more detailed discussion of the *ideal* methodological aspects, please see Annex 3.

In this study, investment refers to investment in network infrastructure and excludes investment such as that made by NTT to acquire an equity stake in SLTL. Incremental network investment is specifically required to be reported to the TRCSL, for purposes

of calculation of license fees. However when cross-checked with other sources, such as financial statements, significant discrepancies were evident. Data that are of the highest quality in the opinion of the authors have been used for this study, with footnotes to indicate qualifications and concerns.

The investment data are supplemented by interviews conducted with the operators in Colombo in September 2003. The interviews focused on the factors that affected investment decision-making by the operators.

2. Telecom Regulatory Environment & Investment, 1993-2002

Fixed Sector

Telecom Regulatory Environment

There was no competition in the fixed sector until 1996 and investment decisions by the fully government-owned incumbent prior to 1997 were driven by logic different to that relevant to the present discussion. Therefore, the TRE in the 1993-96 period is not discussed.

Market Entry

Fixed competition was introduced in 1996, with the transparent licensing (for the first time in Sri Lanka) of two fixed access operators, Suntel and Lanka Bell. Except for international telephony and the right to connect end-users by wire, their licenses were equivalent to that of the incumbent. They were assured of a duopoly on service provision solely by wireless local loop for five years, subject to a further extension on good performance. The wireline exclusivity for five years, given in the course of the SLTL privatisation, resulted in a freeze on new entry in the fixed sector. The government honoured its commitments during the 1996-99 period. The regularization of the issuance of frequencies to SLTL for fixed wireless access in the 1997 modification of its license diluted the WLL duopoly commitment. The hope that international telephony revenue streams would be improved by the issuance of at least one additional international telephony license was not realized because the government postponed the international market opening to August 2002, subject to the completion of rate rebalancing, and SLTL stymied interconnection based on claims of exclusivity over international telephony. The regulatory environment in 1996-99 with regard to market entry is assessed as unsatisfactory.

No major changes occurred with regard to market entry in 2000-02, justifying continuation of the same assessment.

Scarce Resources

The two new entrants were given the frequencies they requested. The incumbent was refused frequencies outside the band specified in its license, but was not denied

frequencies in the permitted 800 MHz band and not displaced from some of the other bands that it already occupied. The TRCSL completed the procurement of the Automated Frequency Monitoring and Management System with World Bank assistance in 1999. The regulatory environment in 1996-99 with regard to scarce resources is assessed as satisfactory.

Both Lanka Bell and Suntel began to request frequencies from different bands in the 2000-02 period but received varied responses: Lanka Bell was issued frequencies in the 1900 CDMA band outside normal procedures, while Suntel's requests for frequencies were denied. The regulatory environment in 2000-02 with regard to scarce resources is assessed as unsatisfactory.

Interconnection

The new entrants commenced operations with an interim two-year interconnection determination that was based on a sender-keeps-all arrangement for domestic calls, a 35% discount on outgoing international calls and no termination fees from incoming international calls. In 1998, following mediation, the TRCSL issued a determination that allowed for measured compensation to replace the sender-keeps-all arrangement, subject to satisfaction of specified conditions, a 20% discount on outgoing international calls, and LKR 9.50 per minute termination charge per incoming international minute. This determination was implemented by the new entrants, but only to a certain extent. SLTL appealed the determination in the courts, but failed to stay it. The regulatory environment in 1996-99 with regard to interconnection is assessed as unsatisfactory.

Subsequently, the new entrants enabled massive bypass of the incumbent's international gateway by other operators and the interconnection regime became a mess of lawsuits, technical measures and countermeasures. The regulatory environment in 2000-02 with regard to interconnection is assessed as poor.

Tariff Regulation

The new entrants were exempt from tariff regulation in 1996-99. Government commitments to SLTL regarding tariff rebalancing were kept, with two 25% increases in domestic revenue, including the doubling of rentals, delivered in March 1998 and April 1999. The regulatory environment in 1996-99 with regard to tariff regulation is assessed as excellent.

The situation did not change for the new entrants much, except for an attempt by the Minster of Commerce and Consumer Affairs to roll back tariff increases outside the law in 2002, which was accepted by Lanka Bell but not by Suntel. The incumbent's tariff decisions were subject to considerable delays, including a one-year delay in the case of the fourth rate rebalancing decision. The final step in rate rebalancing, which should have been completed in 2002, was thus only completed in late 2003. The regulatory environment in 2000-02 with regard to tariff regulation is assessed as poor.

Regulation of Anti-competitive Practices

The existence of cross-subsidies allows for anti-competitive practices by the incumbent. The government's delay in removing such cross-subsidies, according to the schedule given in the 1996 policy, and indeed the assurance of cross-subsidies through the international 'exclusivity', harmed the new entrants. The incumbent's delays and discrimination in interconnection, including technical disruptions were contained to a certain extent by the TRCSL. The incumbent was found to have violated a license condition with anti-competitive implications and paid approximately USD 1 million in compensation to subscribers. The regulatory environment in 1996-99 with regard to anti-competitive practices is assessed as neutral.

The TRCSL failed to investigate or act on the collusive memorandum of understanding among the three fixed operators initiated in 2001. The regulatory environment in 2000-02 with regard to anti-competitive practices is assessed as unsatisfactory.

Table 2 – **Telecom Regulatory Environment Assessment: Fixed Sector**

	1997-99	2000-02
Market entry	Unsatisfactory	Unsatisfactory
Access to scarce resources	Satisfactory	Unsatisfactory
Interconnection	Unsatisfactory	Poor
Tariff regulation	Excellent	Poor
Regulation of anti-competitive practices	Neutral	Unsatisfactory

Investment

The incumbent's investment constituted sector investment prior to 1996. Prior to 1997, it was governed by factors internal to the government. However, government funds continued to play a role even after privatisation and the introduction of competition, despite their anti-competitive effects.

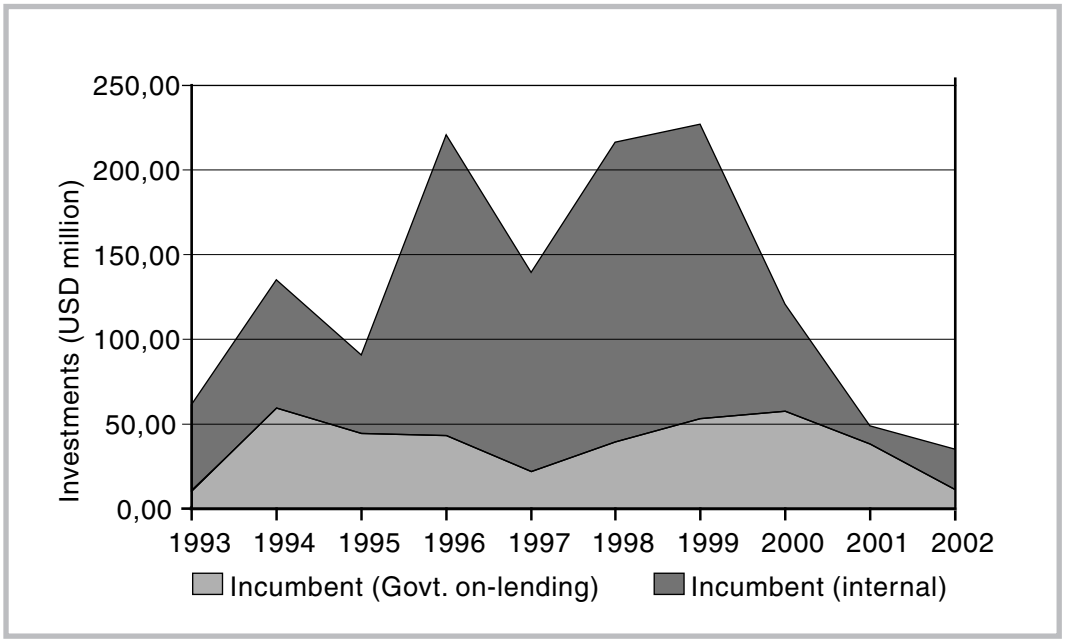
Mobile Sector

Telecom Regulatory Environment

Market Entry

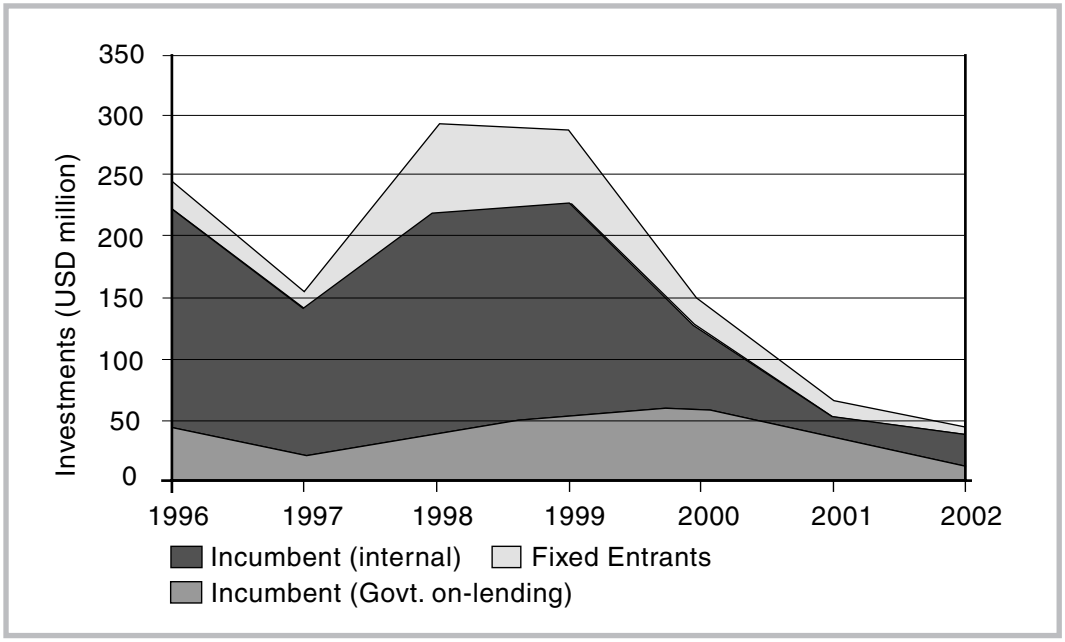
Mobile licensing between 1989 and 1996 lacked transparency; there was no explicit market entry policy. Even when there were policy statements, they were not adhered to. For instance, the statement of the Secretary of the Ministry of Posts and

Figure 4 – **Sources of incumbent's investments, 1993-2002**



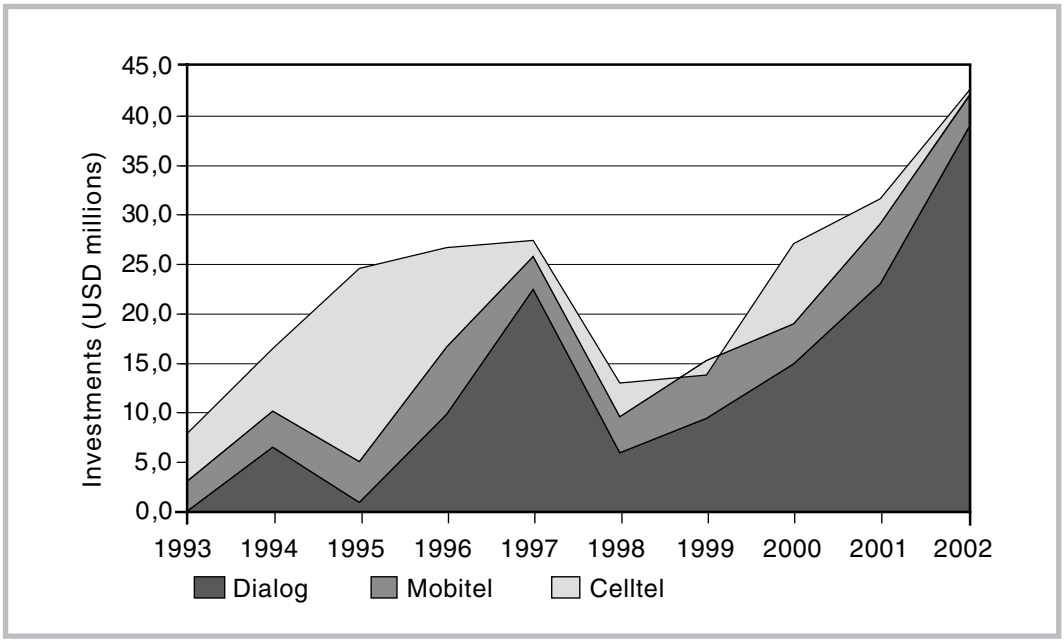
Sources: SLTL Financial Reports, External Resources Department; Milne et al. (1998).

Figure 5 – **Investments by incumbent and fixed entrants, 1996-2002**



Sources: SLTL Financial Reports, External Resources Department; Milne et al. (1998).

Figure 6 – **Investments by mobile operators, 1993-2002**



Telecommunications that only three mobile licenses would be issued, was contradicted by the issuance of the fourth license, in an *ad hoc* manner like all previous ones, in 1994 (Samarajiva 1997: 49). The regulatory environment in 1993-96 with regard to market entry is assessed as unsatisfactory.

The 1996 policy stated that entry would be reviewed in 1999. Practice reflected policy, with no additional entry permitted. When Singapore Telecom (parent company of Lanka Cellular) wished to exit the market, the TRCSL allowed the buyer, Hutchison, to bring in second-hand equipment, contradicting previous stated policy prohibiting second-hand equipment. The regulatory environment in 1997-99 with regard to market entry is assessed as satisfactory.

The promised review did not occur and a new policy on market entry was not issued. However, no further market entry was permitted, in effect continuing the 1996 policy. The regulatory environment in 2000-02 with regard to market entry is assessed as neutral.

Scarce Resources

Access to frequencies in 1993-96 was relatively unproblematic, with requested frequencies for TACS, ETACS, AMPS and GSM 900 standards being issued along with the system licenses. The quantities varied, with MTN as the last operator receiving only 5 MHz, compared to the 10 MHz issued to others. Monitoring and management

was rather rudimentary in the absence of an automated frequency monitoring and management system. The regulatory environment in 1993-96 with regard to access to scarce resources is assessed as neutral.

In 1998, MTN was issued additional 2.5 MHz. The AFMM system was procured. The regulatory environment in 1997-99 with regard to access to scarce resources is assessed as satisfactory. This assessment also applies to 2000-02.

Interconnection

The incumbent gave interconnection to the mobile new entrants on extremely unfair terms: the mobile operators had to pay the entire cost of the links as well as inflated costs of the switch interface; fixed termination was set at national retail prices in fixed services (generally double that of local retail); no payments were made for mobile termination of domestic or international calls; no discount was offered for international calls originated on the mobile networks. The regulatory environment in 1993-96 with regard to interconnection is assessed as poor.

Following a participatory process, the TRCSL issued and implemented a fixed-mobile interconnection determination and related tariff decisions in 1999. The onerous fees for interconnection links were removed; fixed termination was set at the considerably lower levels that had been decided on for fixed-fixed interconnection; a 20% discount on outgoing international calls was made available; mobile termination fees, including that for international calls, were left to a public hearing which was to address the larger question of a calling-party-pays scheme. The regulatory environment in 1997-99 with regard to interconnection is assessed as satisfactory.

The second phase of the fixed-mobile interconnection proceeding, including the issuance of the decision of the public hearing committee, was not completed. In addition, the mobile operators were also caught up in the efforts of the incumbent to police international bypass through technical and legal means, though to a lesser extent than the fixed entrants. The regulatory environment in 2000-02 with regard to interconnection is assessed as neutral.

Tariff Regulation

In 1993-96 tariff regulation of mobile operators was sporadic and unsystematic, despite the legal requirement that all tariffs be approved by the TRCSL with the concurrence of the Ministers in charge of telecom and finance. For the most part, the operators were able to implement tariffs without regulatory involvement. The regulatory environment in 1993-96 with regard to tariff regulation is assessed as neutral.

Systematic implementation of tariff regulation provisions (amended in 1996 to require only consultation with the Minister in charge of telecoms) began in 1998. In light of the sector's requirements for quick approvals and multiple tariff packages, the TRCSL also introduced a fast-track promotional tariffs approval procedure. The regulatory environment in 1997-99 with regard to tariff regulation is assessed as satisfactory.

In 2000-02, many of the mobile tariffs were approved through the promotional window, but considerable delays were experienced with regard to an increase in the basic tariff. The regulatory environment in 2000-02 with regard to tariff regulation is assessed as satisfactory.

Regulation of Anti-competitive Practices

Throughout the period under consideration, there was no activity (or complaints) regarding anti-competitive practices in the mobile sector, except for some concerns about tower and facilities sharing between the incumbent and Mobitel, the operator in which it held a minority share. The fact that the last entrant MTN rose to market leadership during this period is indicative of the low significance of these practices. The regulatory environment in all three periods with regard to anti-competitive practices is assessed as neutral.

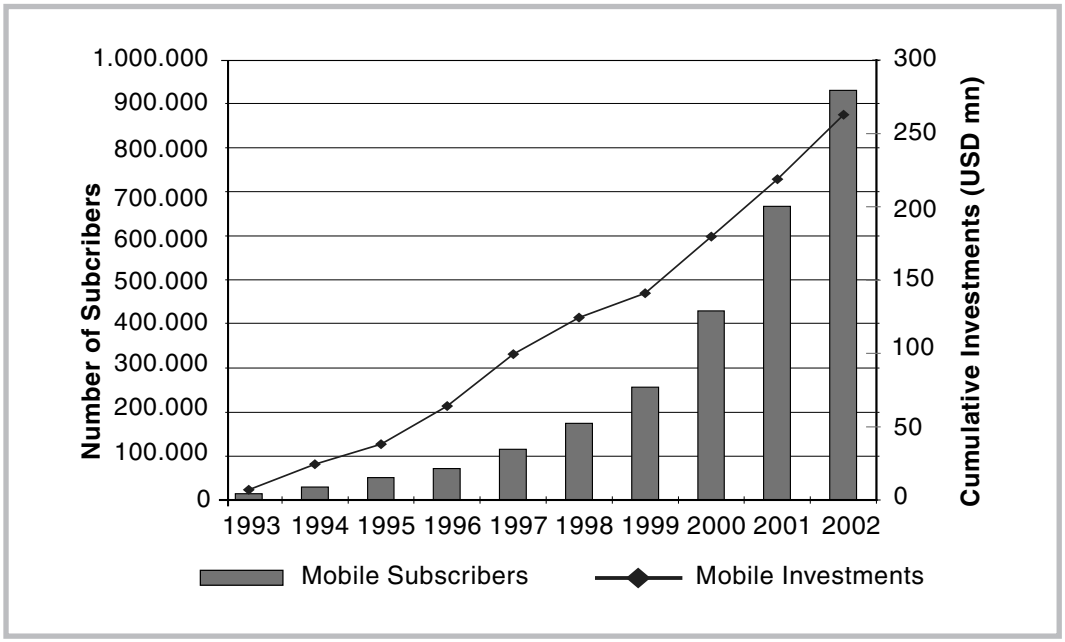
Table 3 – **Telecom Regulatory Environment Assessment: Mobile Sector**

	1993-96	1997-99	2000-02
Market entry	Unsatisfactory	Satisfactory	Neutral
Access to scarce resources	Neutral	Satisfactory	Satisfactory
Interconnection	Poor	Satisfactory	Neutral
Tariff regulation	Neutral	Satisfactory	Satisfactory
Regulation of anti-competitive practices	Neutral	Neutral	Neutral

Investment

Overall, mobile investment increased over the period being studied. Its peaks and valleys are explained more in terms of changes in standards, than in terms of TRE. For example Celltel's conversion to GSM in 2000 resulted in increases in their investments in those and subsequent years. Mobitel's introduction of DAMPS in 1999 is also reflected in the investment data. Dialog, which began operations in 1994, is the only operator that stayed with a single standard for the entire period. Celltel's increase in investments in the 1994-99 period is considered to be an anticipatory response to Dialog's entry into the market. Dialog's investment patterns reflect the massive expansion of its network, from the smallest in 1994 to that carrying the most traffic in 1999, and then to the largest network by all measures by 2001. The perturbations in 1994-95 may be explained in terms of the change in ownership and control wherein Malaysian Telekom gained complete control of the company from its starting position of 80%. The 1997 peak represents the primary network-building phase. The overall improvement in the regulatory environment may have also contributed to the pattern of increasing investment.

Figure 7 – **Investments and subscribers in mobile sector**



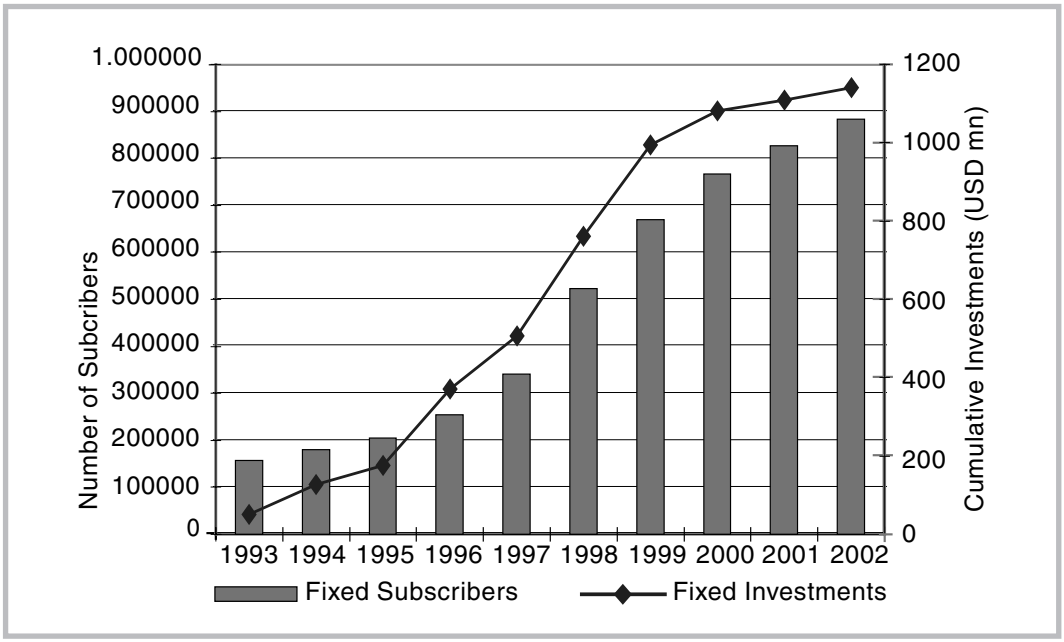
Sources: Company Financial Reports, TRC.

3. Concluding Comments

The question of the effect of TRE on investment decisions makes sense only in an environment where market forces dominate. The mobile sector in Sri Lanka in 1993-2002 was dominated by market forces. Even though the incumbent held 40% of the equity of Mobitel for part of the period, the mobile operator was managed by Telstra as an independent entity. The improved regulatory environment, primarily in the form of a substantially better interconnection regime implemented in 1999, may be seen as contributing to the overall increase in investment. The peaks and the valleys are explained primarily in terms of the overall growth of the sector, driven primarily by MTN, with technology changes contributing to the peaks. It may be surmised that the investments (and customer growth) would have been even higher if Calling-Party-Pays scheme was implemented, the remaining elements of the interconnection regime envisaged in the 1999 determination were implemented in 2000-02 and if 1800 MHz frequencies were cleared and assigned before 2002. The multiple announcements of mobile investments in 2003 suggest a degree of pent-up supply, possibly caused by the above factors.

The fixed sector in Sri Lanka prior to 1996 was constituted by a single government-owned monopoly corporation. Its investment decisions were not affected by perceptions of regulatory risk; its investments were driven by government decisions to allow reinvestment (and not take the net revenues to balance the budget) and negotiate multilateral,

Figure 8 – **Investments and subscribers in fixed sector**



Sources: Company Financial Reports, TRC; Milne et al. (1998).

bilateral and suppliers' credits for the incumbent. Remnants of this practice remained in the post-privatisation and liberalization phase in the form of government on-lending to the incumbent. Given the insulation of government disbursements from normal investment determinants, Figure 8 excludes the government on-lending component.

Incremental investments in the fixed sector were highest around the time of the entry of the two competitors. They invested in order to establish their networks and the incumbent mobilized internal funds to meet the competition and also to earn the incentives set out in the management contract. While the regulatory environment was not perfect, the hope of good regulation created by the legislative amendment and the early actions of the TRCSL could be seen as justifying investments by the new entrants. The natural hostility of incumbents to regulation that allows for competition could be seen as being balanced by the TRCSL's success in delivering substantial tariff increases amounting to an increase of more than 50% of domestic revenues over the 1998-99 period.

By 2000, the incumbent's attempt to frustrate the will of the TRCSL by appealing the interconnection determination had backfired, with the new entrants making massive bypass of international traffic by other operators possible. The proliferation of lawsuits, the marginalisation of the TRCSL, and the perception of problems caused by the appointment of the former Managing Director of the incumbent to head the TRCSL resulted in a serious deterioration of the regulatory environment. In actual fact, by 2000, SLTL did not have internal funds to reinvest because of the enormity of bypass. The

entrants had no reason to invest, shut out from international revenues for the most part (except for revenues derived from bypass and the minimal revenues from legal terminations) and besieged by the technical and legal offensives of the incumbent. The decline of investment in the fixed sector in Sri Lanka from 2000 is a stark illustration of the ill effects of poor regulation. By 2002, the extraordinary growth of the fixed network begun to slow, and the fixed sector was overtaken by the mobile sector, despite the existence of massive unmet demand. There were 270,000 registered on waiting lists for SLTL service in 2002. Other operators do not maintain waiting lists but have been able to gain new customers whenever they did extend their networks in rural areas.

SLTL turned the tide in 2001, with a collusive memorandum of understanding with the new entrants, which provided financial incentives for shutting out incoming traffic volumes brought in by the by passers. In contrast to the LKR 9.50 per minute that SLTL opposed in 1998, it was paying in excess of LKR 17.00 per minute in exclusion payments to the new entrants by 2001. One could therefore expect that with large revenues being generated from international termination by all three fixed operators, investment should have picked up again. But this did not occur.

On the part of the new entrants, the increased revenues did not by themselves create a better regulatory environment conducive to a programme of systematic investment. The MOU was a document of questionable legality that could have been annulled at any point by the government, the TRCSL or by SLTL itself. In addition, the new entrants were caught in a technology trap. Having invested in fixed wireless technology at a time of great hope and hype, they did not see the expected declines in unit prices as a result of the standards failing to gain broad acceptance. In fact, Suntel was driven to build an overlay data network in order to serve the data requirements of its corporate clients in 2000. The two firms had by this time given up their national ambitions and were settling into niche markets, focusing on survival rather than growth. All this contributed to the continuing malaise in the fixed sector.

The deterioration of the investment climate in the fixed sector could be attributed to the inability to improve the TRE, if not on all fronts, at least to create hope of progress. The primary causes may be identified as the ambiguities introduced by the 'exclusivity' language in the privatisation agreements and the failure of the TRCSL. If the basic policy objective is enhanced performance of the sector, priority must be given to increased investment rather than privatisation yield. The USD 225 million realized by the 1997 privatisation of the incumbent, which went to retiring government debt, must be seen in relation to the cumulative investments in the sector, amounting to more than USD 1000 million. Had the TRE been better, it is likely that even more would have been invested. The approximately 20% tax levied on all telecoms bills, which even now constitutes a major proportion of the government's sales-related taxation revenues, would have been even higher. Yet the tight integration of the Finance Ministry and the privatisation agency resulted in privatisation yield being given undue prominence, with deleterious effects on the telecom regulatory environment.

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[2] However, Celltel reported in an interview that the LTTE attack on the international airport in 2001 caused the parent company to suspend an approved investment.

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Annex 1 – Telecom Investments in Sri Lanka, 1993-2002 (USD million)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Government onlending	11.81	59.39	44.31	43.00	21.87	39.57	52.91	57.81	38.06	11.21
SLTL reinvestment	50.40	76.90	47.70	178.90	118.60	178.20	175.00	64.30	11.80	24.90
SLTL total	62.21	136.29	92.01	221.90	140.47	217.77	227.91	122.11	49.86	36.11
Suntel				17.80	15.00	30.20	23.60	17.20	13.60	4.00
Lanka Bell					0.83	45.96	35.68	4.74	1.71	2.90
Celltel	4.89	6.26	19.53	10.06	1.59	3.41	-1.50	8.06	2.46	0.49
Mobitel	3.05	3.68	4.09	6.77	3.34	3.61	5.89	4.03	6.09	3.02
Dialog		6.53	1.01	9.91	22.47	6.01	9.45	15.00	23.08	38.95
Total investment	70.15	152.76	116.64	266.44	183.70	306.96	301.03	171.14	96.8	85.47
Total mobile investment	7.94	16.47	24.63	26.74	27.40	13.03	13.84	27.09	31.63	42.46
Total non-SLTL investment	7.94	16.47	24.63	44.54	43.23	89.19	73.12	49.03	46.94	49.36

Notes:

1. The data for the incumbent from 1996 to 2002 are from SLTL's annual reports. The data for the incumbent for the period 1993-95 are from Milne et al. (1998).
2. The incumbent's investments are broken down into investments from internal sources, and investments from on-lending by government. On-lending funds come from multilateral and bilateral agencies, and export credits. Most of these funds are earmarked for investment in network infrastructure by the incumbent. A small proportion has been directed towards reform measure and investment in spectrum management equipment in the late 1990s. The amount shown above reflects total funding from multilateral and bilateral agencies and export credit.
3. Investment data for new fixed and mobile entrants was procured directly from the companies. For Mobitel data for the period 2000-02 is from financial reports. Data prior to 2000 is from investment figures reported to the TRCSL by the companies. For Lanka Bell, the entire dataset is from the figures reported to TRCSL. LCSL data is not included.

Annex 2 – World Bank: Private Investment Data for Telecommunications (USD millions)

Year	Bangladesh	India	Sri Lanka
1990	110.0	0	0
1991	6	0	0
1992	0	0	0
1993	0	0	41.6
1994	0	96.7	2.0
1995	30.0	309.2	18.0
1996	165.4	306.6	164.0
1997	74.0	1806.0	43.0
1998	26.0	503.9	38.3
1999	142.7	682.0	113.3
2000	74.1	452.7	160.4
2001	51.3	2720.3	10.8
2002	60.9	3811.5	65.5
2003	740.4	10688.9	656.9

Annex 3 – Suggested Methodology on Telecom Regulatory Environment

As stated in the main text, the ideal method for collecting data on TRE would be by collecting data on perception of the TRE from a *representative* and *informed* group of respondents. This has not been done in the case study. The summary assessments of the TRE in the case study are those of the senior author who has attempted to provide the reasoning behind the assessments in the text.

TRE assessment would have to be conducted in a manner that captures perception of efficacy relatively accurately. It is a measure of opinion. The objective should be to capture the relevant representative opinions. TRE assessment for individual countries would be useful; assessments conducted using uniform methods for several countries would be even more useful. The recommended steps for the conduct of comparative TRE assessments are:

1.0 Assemble group of experts to agree on the overall method, including dimensions of TRE, the assessment scale, weights, and assessment periods.

1.1 The dimensions used in this study are based on the Reference Paper of the GATS Protocol 4. The elements of regulation identified in the Reference Paper are: competitive safeguards; interconnection; universal service; licensing; independent regulator; and allocation of scarce resources. Because tariff regulation was mentioned by many operators as an important regulatory function and because universal service is not necessarily a core function, the former was substituted for the latter. Independent regulator was deleted because it is an overall measure, not a dimension. Licensing was renamed as market entry, as were several other dimensions.

1.2 If it is possible, agree also on percentage weights for each of the dimensions so that an overall assessment can be derived.

1.3 The group may wish to consider the appropriate units of assessment: one possibility is to use 3-4 year periods as in the present study, where the assessment is based on the entire period; the other is to score by year and add up the scores for the period.

1.4 While TRE studies have value independently of investment studies, it may also be useful to define standards for collecting and reporting investment data.

1.5 Ideally, this would be the result of a one-day face-to-face meeting. The conclusions of this group should be applicable to all TRE studies.

2.0 Perhaps with the same group as in 1.0, or with a regional group of experts, define the relevant time periods for a specific TRE study as well as the sectors

for assessment. For example, the present study found different results for the TRE in the fixed and mobile sectors. A study of the internet service provider (ISP) sector in Sri Lanka is likely to yield different results. This deliberation may occur via the internet.

3.0 A national group of experts should be consulted to identify a representative group of respondents. This would include senior management from the operators (ensuring that they have direct or indirect knowledge of the sector for the entire period of study); key individuals from civil society or educational/research organizations with knowledge of the sector; representative persons from government entities connected to investment/privatisation; knowledgeable persons from international financial institutions and private investment houses/banks; key journalists; credit-rating agency personnel with knowledge of the sector; selected knowledgeable consultants; and current or former members/senior staff of the regulatory agency. This deliberation may occur via the internet.

Annex 4 – Pilot Assessment Study on Telecom Regulatory Environment

This study was undertaken as a test of the methodology suggested in Annex 3. The objective of this exercise was to assess the practical implications of carrying out such a study and also to enable a broad based evaluation of the telecom regulatory environment (TRE).

An assessment of the TRE is essentially a measure of opinion or perception and requires the collection of data from a representative and informed group of respondents. Whilst the original study incorporates the senior author's assessment of the TRE for specified dimensions across three time periods, the subsequent study and its conclusions provide an alternative broad-based measure of the TRE by enabling the participation of a representative and informed panel of respondents. In order to provide a case for a comparative assessment the study adopted a structure similar to the case study. The questionnaire sent to participants is shown in Annex 5.

Design and structure of the study

Definitions

The Sri Lanka case study examines the telecom regulatory environment within which telecom operators and potential new entrants function. Thus the study focuses on a subset of the overall regulatory risk environment, which would have otherwise included a consideration of the macro-level or country risks and commercial risk in addition to regulatory risk.

The case study evaluates the regulatory environment on the basis of five major dimensions across three time periods for both the fixed and mobile telecom sectors. The dimensions of the definition are based on the Reference Paper of GATS Protocol 4, which identifies the elements of regulation in terms of competitive safeguards, interconnection, universal service, licensing, independent regulator, and allocation of scarce resource. However, the case study substituted tariff regulation for universal service since the former was considered by many operators as an important regulatory function and the latter was not necessarily a core function. Independent regulator was also not considered because it is an overall measure and not a dimension. Licensing was renamed as market entry. Several other dimensions were renamed too. Thus the dimensions under consideration were classified as market entry, access to scarce resources, interconnection, tariff regulation, and the regulation of competitive practices.

We considered asking only one question in the questionnaire that encompasses all five dimensions to get the overall assessment of the regulatory environment for each time period. But we decided that while this maybe a good way to elicit a summary response from the respondents we would not be able to capture the more nuanced aspects that are encapsulated by analysing the respondents' opinion viz. a viz. each of the five dimensions for each time period of the regulatory environment. We also considered

obtaining the respondents' views regarding the prioritisation of the five dimensions but decided that we would give equal weight to all five dimensions since they capture different but important aspects of the overall telecom regulatory environment.

The three time periods – 1993-96, 1997-99, 2000-02 – were selected as the basis for assessment in order to keep the Panel study consistent with the framework of the case study. It is expected that in future, yearly panel studies will be undertaken and the period 2003-04 could possibly be the first such exercise. The TRE for the period 1993-96 for the fixed sector is also not discussed. This is because there was no competition in the fixed sector until 1996, and investment decisions by the fully government-owned incumbent prior to 1997 were driven by a logic different to that relevant to the present discussion.

Panel

Since the ideal format as suggested in the proposed methodology requires the collation of data from a representative and informed group of respondents, the process of identifying the members of the panel required serious consideration. Because the study was primarily intended as a demonstration of the methodology, it was decided to conduct proceedings on the basis of a small select group of informed individuals. However in order to ensure that this group, though small, would encompass all if not most of the related interests within the telecom sector, key stakeholders having both a direct and indirect interests were identified. This included banks, credit rating agencies, journalists, civil society representatives, academics, telecom operators and equipment manufacturers. Next, potential individuals were identified as representatives of these stakeholder groups. In targeting specific individuals, wherever there was a choice of selection from a group of two or three potential individuals, we opted to approach them on the basis of personal contacts within these groups. This approach facilitated access to these stakeholders and helped to obtain responses within specified deadlines. This was particularly important as LIRNE*asia* is a new entity and consequently was little known by stakeholders whose apprehensions could have undermined the panel study. This experience highlights the need to build a network of personal contacts in order to obtain best results in projects of this nature. Thus in the future if similar activity is engaged in on a large scale, it is imperative that effort be made to draw together a regional network of contacts who are able in turn to identify and facilitate the process of obtaining data. This would include the capacity to identify key interest groups (which may vary within regions), potential respondents operating within those groups and also to provide means to facilitate access.

Method of communicating with respondents

Determining the method or means of communicating with the respondents was a crucial step, particularly as the proposed participants represented a varied group, (e.g.: CEOs of companies, financial analysts, journalists, equipment suppliers, academics, civil society representatives) and therefore subject to varied time constraints, levels of experience and familiarity with the subject. The same considerations were also important in designing the questionnaire.

The means of communication used for the study were email and fax followed by a telephone call. In some cases repeated telephone calls to the respondent were the only means to secure a completed response. The breakdown of many internet services in Sri Lanka due to the damage of the undersea cable, contributed both positive and negative elements to the conduct of the panel study. It was advantageous in that some of the more busy respondents were more amenable to respond to the questionnaire since they now had unanticipated free time. The disadvantage was that email, which was to be the primary mode of communicating the questionnaire to the respondents was now no longer possible and consequently, the second option of faxing the questionnaire to the respondents had to be utilized. This resulted in some added practical problems as the structure of the questionnaire had been designed for the convenience and easy use of email communication and not for fax. Matters relating to the design of the questionnaire are explored below.

There was some delay in obtaining the responses, repeated telephone calls to the respondents were often necessary to ensure that responses were received within a reasonable time. Again, in obtaining responses in a timely fashion, personal contacts with the respondent made an important difference, both in terms of access to the respondent and the ease by which the importance of the panel study were underscored. The primary lesson learnt in this process was the importance of building networks of personal contacts in order to facilitate the process of obtaining responses in a timely manner. Subsequent communications with the respondents also made it possible to infer that the time required to answer the questionnaire varied. This was largely attributed to the differences in the levels of experience and familiarity with the subject matter in addition to varied levels of time constraints.

Design of the questionnaire

The design of the questionnaire was complicated by the problem of incorporating a ten-year time period for assessment. An assessment of a ten-year period invariably limited the consideration of the current actors operating in the industry given that many of them may or may not have participated in the industry during this period. Furthermore, it was a very long period for respondents to evaluate. However, utilizing a ten-year period for assessment was justified by Sri Lanka's relatively long experience in telecom reforms, compared to most developing countries. Thus the consequent analysis of the TRE and the pattern of investment during this period is likely to yield useful insights for the 2003-04 World Dialogue on Regulation theme. Furthermore 2003 was also considered a significant year for telecom policy and regulation in Sri Lanka, with the opening of the international market, the promulgation of Interconnection Rules, the first assignment by auction of 1800 GSM frequencies etc. which warranted a more focused yearly assessment and therefore provided an appropriate cut off point. It is expected however, that future studies conducted in this context would not have to face this unique problem of involving a lengthy time period for assessment and would be based on a one or two year period.

In order to counter the difficulties of incorporating a long period of assessment, the questionnaire included a brief objective history of the key events in the telecom regulatory

environments under assessment in order to refresh the minds of the respondents. This was because it was necessary to focus or 'capture' the respondents' minds and transport them to the period under assessment, in order to obtain a response. Thus the design of the forms included a brief history of each of the three periods under scrutiny. The questionnaire is presented in Annex 5.

An important consideration in designing the questionnaire was the need to reduce the number of questions/pages and ensure that the act of responding would take as little time as possible. Consequently, there was a need to make sure that the structure of the form was easy to understand and that it facilitated a quick grasp of its contents with minimal effort and time being utilized by the participating respondent. Thus the form not only included a brief history of the period under assessment, it also included an explanatory note, addressing the key issues pertaining to each of the five dimensions covered by the study. It is expected that future studies conducted in this context, would be likely to address shorter time periods, and therefore able to elicit better results, given the advantages of a much shorter time lapse from the period covered by the questionnaire and the consideration of a shorter time horizon.

Panel Study Process

Initially, it was proposed to conduct the study by inviting all the respondents to meet together on a particular day at a particular time and then once they were all in the room together, to conduct proceedings based on a structured interview framework similar to focus groups. However on further deliberation this approach was rejected, on the basis of its potential for respondents to be influenced by the interviewers or each other (given peer-group dynamics). Furthermore, considerations relating to the lengthy period of assessment, the need to refresh and in some cases educate about industry activities during this time, particularly since some of the respondents may not have a corporate memory of issues during this time, undermined the feasibility of conducting a focus group. It was therefore decided that there was more value in approaching the respondents individually, in this particular instance, so as to obtain an independent view from each of them. However, when conducting studies in the future in this context, it is expected that various other means adopting structured frameworks, including focus groups may be utilized for eliciting responses.

Study Results

The results of the pilot assessment are presented below. Since this was a pilot study, the number of respondents was small, 16 (but had over 50% response rate). However, its significance lies in the fact that it tests the methodology as suggested by the authors of the Sri Lanka case study and presents in some cases alternative conclusions to those of the expert opinion of the authors. The summary of the results are presented below with the appropriate caveats.

The results of the pilot study assessment are presented below for both the fixed sector and the mobile sector. We have used a five point Likert scale based on poor

(equals 1), unsatisfactory (equals 2), neutral (equals 3), satisfactory (equals 4) and excellent (equals 5). The respondent's scores were aggregated and the results were averaged and rounded to arrive at the Likert score for the assessment. The tables below compare the summary assessment with the expert opinion for both fixed and mobile sector.

Overall, the collective assessment of the panel indicated in most cases a broad compatibility with that of the expert opinion with the expert opinion. However the expert opinion was more generous than the panel in the overall assessment of the TRE for both the fixed and mobile sectors. The expert opinion also indicated more variation in his evaluation of the TRE as indicated by his use of the range of available ratings. This included an excellent rating for tariff regulation in the 1997- 99 fixed sector TRE and several satisfactory, poor and unsatisfactory assessments. The panel ratings however tended to be more conservative, and alternated between unsatisfactory and neutral ratings for all the dimensions being assessed for both the mobile and fixed sectors. Overall the panel assessment did not venture over the neutral assessment for any aspect of the TRE.

In assessing the fixed sector TRE during 1997-99, the expert opinion was more generous than the panel with the exception of the market entry dimension which was rated as neutral by the panel and obtained an unsatisfactory score from the expert.

The 2000-02 period assessment for the fixed sector TRE, the expert opinion gave a more varied assessment, and rated the dimensions of interconnection and tariff regulation as poor, whilst the panel rated it as unsatisfactory and neutral respectively.

Table 4.1 – **Fixed Sector Assessment Results**

Dimension	Period	Likert Score	Assessment	Expert Opinion
Market Entry	1997-99	2.8	neutral	unsatisfactory
	2000-03	2.4	unsatisfactory	unsatisfactory
Access to scarce resources	1997-99	2.7	neutral	satisfactory
	2000-03	2.1	unsatisfactory	unsatisfactory
Interconnection	1997-99	2.1	unsatisfactory	unsatisfactory
	2000-03	2.1	unsatisfactory	poor
Tariff regulation	1997-99	3.0	neutral	excellent
	2000-03	2.8	neutral	poor
Regulation of anti-competitive practices	1997-99	2.8	neutral	neutral
	2000-03	1.6	unsatisfactory	unsatisfactory

In conclusion, comparing assessments for the fixed sector TRE for the 1997-99 period with the 2000-02 period, both the panel and the expert gave the former period (1997-99) a more favourable rating. However, the panel rated the interconnection and tariff dimensions for both periods equally (i.e. as unsatisfactory and neutral, respectively), whilst the expert opinion's assessment was more varied. Thus the expert opinion whilst assessing the market entry dimension equally for both time periods (i.e. as unsatisfactory), did not assess the interconnection and tariff regulation dimensions equally. Thus, interconnection was rated as unsatisfactory for the 1997-99 period and poor for the 2000-02 period. Tariff regulation was given an excellent rating for the 1997-99 period whilst the 2000-02 period was rated as poor.

The mobile sector TRE is assessed over three time periods, and overall, the panel's assessment rated the 1997-99 period better than the other periods. However the TRE for the interconnection dimension for all three periods obtained the same rating (i.e. unsatisfactory) whilst the expert opinion' assessment was more varied for the three time periods having rated the 1993-96 period in relation to interconnection as poor, the 1997-99 period as satisfactory and the 2000-02 period as neutral.

Table 4.2 – **Mobile Sector Assessment Results**

Dimension	Period	Likert Score	Assessment	Expert Opinion
Market Entry	1993-96	2.3	unsatisfactory	unsatisfactory
	1997-99	3.0	neutral	satisfactory
	2000-02	3.1	neutral	neutral
Access to scarce resources	1993-96	2.1	unsatisfactory	neutral
	1997-99	2.9	neutral	satisfactory
	2000-02	2.2	unsatisfactory	satisfactory
Interconnection	1993-96	1.9	unsatisfactory	Poor
	1997-99	2.4	unsatisfactory	satisfactory
	2000-02	2.2	unsatisfactory	neutral
Tariff regulation	1993-96	2.4	unsatisfactory	neutral
	1997-99	3.0	neutral	satisfactory
	2000-02	2.8	neutral	satisfactory
Regulation of anti-competitive practices	1993-96	2.1	unsatisfactory	neutral
	1997-99	3.0	neutral	neutral
	2000-02	2.0	unsatisfactory	neutral

Overall, the expert opinion of the mobile sector TRE during the 1993-96 period was more favourable than the panel who gave an unsatisfactory rating to all the dimensions. The exception was the interconnection dimension, which the expert opinion rated as poor for this period.

The TRE for the mobile sector during the 1997-99 period was again assessed more favourably by the expert opinion which gave a satisfactory rating to four of the dimensions. The fifth dimension relating to the regulation of anti-competitive practices was rated as neutral. The panel assessed four of the dimensions as neutral and rated the dimension on interconnection as unsatisfactory.

Expert opinion of the TRE during the 2000-02 period indicated a more favourable rating than the panel who alternated between neutral and unsatisfactory ratings for all the dimensions. Expert opinion however indicated a neutral rating for the dimensions relating to market entry, interconnection and the regulation of anti-competitive practices, whilst access to scarce resources and tariff regulation was rated as satisfactory.

Conclusion: Lessons Learned

The finding of this study indicates a multiplicity of views and diverse opinions, which clearly could not have been fully captured by a single expert opinion. This demonstrates the value of panel study assessments and the need to regularly conduct such assessments in order to capture a broad based perception of the TRE from interested stakeholders. This will also complement an expert assessment of the TRE, which cannot be considered a substitute but is in fact a key element to the overall assessment of the telecom regulatory environment.

Overall the pilot panel study was successful in that a reasonably high response rate (over 50% of the respondents completed the assessment) was obtained. In addition several lessons were learned that would be useful for conducting future panels. One important finding, which confirms prior assumptions, is that the assessment response rate dramatically improves with a known network of contacts. Respondents with whom there was a prior established relationship and contact base was much more likely to complete the questionnaire which underscores the need to build and maintain networks within the broader telecom regulatory community. It follows that it is much more difficult to elicit a response from those with whom there was no prior relationship therefore outside the network of contacts. In addition, the success rate of obtaining responses increased with follow-up calls and reminders – which again emphasizes the importance of building a network of contacts.

Design of the questionnaire is crucial and needs to be as short as possible and easy to fill out. In this regard a modular design that requires quantitative scoring dramatically reduces the time taken to complete a questionnaire and is more likely to be completed by the respondents. Questions that require qualitative answers such as comments are much less likely to be completed by the respondents. In addition, qualitative responses are difficult to aggregate and summarize and therefore lead to inconclusive results.

Annex 5 – Sample Form

Telecom Regulatory Environment Assessment

- The respondents are kindly requested to make their assessments of the telecom regulatory environment (TRE) for each of the specified dimensions within each period for the fixed and mobile telecoms sector on the scale provided. This should take less than 10 minutes of your time.

- The TRE assessment of the fixed sector is for two time periods (1997-99; 2000-02) only. The period 1993-96 is not included as there was no competition in the fixed sector during this time

- The TRE for the mobile sector is for three time periods; 1993-96; 1997-99; 2000-02. The dimensions used in this questionnaire are broadly based on the WTO Regulatory Reference Paper and are briefly described below.

Dimension	Aspects Covered
Market Entry	Transparency of licensing, Applicants should know the terms, conditions, criteria and length of time needed to reach a decision on their application, License conditions, exclusivity issues.
Scarce resources	Timely, transparent and non-discriminatory access to spectrum allocation, numbering and rights of way; Frequency allocation, Telephone no allocation, Site rights.
Interconnection	Interconnection with a major operator should be ensured at any technically feasible point in the network, quality of interconnection comparable to own like services offered, reasonable charges for interconnection rates, interconnection be unbundled, interconnection offered without delay, Sharing of incoming and outgoing IDD revenue, Payment for cost of interconnection links and switch interface, Payment for cost of technical disruption of interconnection.
Tariff regulation	Regulation of tariffs charged from consumers.
Regulation of anti-competitive practices	Anti-competitive cross-subsidization, using information obtained from competitors with anti-competitive results, not making available to competitors on a timely basis technical information about essential facilities and commercially relevant information, excessive prices, price discrimination and predatory low pricing, refusal to deal, vertical restraints, cross-subsidies, technical disruption of interconnection, sharing of towers and facilities by parent company and subsidiaries in different segments of the market.

Please tick the appropriate box or write the number for each dimension and each period.

Fixed Sector						
Dimension	Period 1	Poor 2	Un-satisfactory 3	Neutral 4	Satisfactory 5	Excellent 6
Market Entry	1997-99					
	2000-02					
Access to scarce resources	1997-99					
	2000-02					
Inter-connection	1997-99					
	2000-02					
Tariff regulation	1997-99					
	2000-02					
Regulation of anti-competitive practices	1997-99					
	2000-02					
Comments						

Please tick the appropriate box or write the number for each dimension and each period.

Mobile Sector						
Dimension	Period 1	Poor 2	Un-satisfactory 3	Neutral 4	Satisfactory 5	Excellent 6
Market Entry	1993-96					
	1997-99					
	2000-02					
Access to scarce resources	1993-96					
	1997-99					
	2000-02					
Inter-connection	1993-96					
	1997-99					
	2000-02					
Tariff regulation	1993-96					
	1997-99					
	2000-02					
Regulation of anti-competitive practices	1993-96					
	1997-99					
	2000-02					
Comments						

Annex 6 – Key Events in the Telecom Regulatory Environment During the Periods Covered

Period 1993-96

1994 The Government issued National Telecommunications Policy. Objectives included provision of telecom facilities to all at cost-based tariffs, achievement of universal service provision of an acceptable quality of service, elimination of waiting lists, protection of defence, security and environmental interests of the country.

1989-96 Licensing of mobile operators and two WLL fixed operators.

1993-96 Other than for statement by the Secretary, Posts and Telecommunications that only three licenses would be issued in the mobile sector, there was no explicit policy on market entry for Mobile Sector (prior to 1996).

1994 Dialog began operation as the fourth mobile license.

1996 Licensing of two WLL Operators (Suntel and Lanka Bell). Given duopoly status on WLL for five years (until 2000), subject to further extension on good performance.

1996 New entrants commenced operations on an interim two year interconnection determination by the TRC based on: sender-keeps-all arrangement for domestic calls; a 35% rebate on the collection rate for outgoing international traffic from the WLL networks; no payment for incoming international traffic to the WLL network and all costs of physical links being fully borne by the WLLs. Interconnection charges between the WLLs were on a sender-keeps-all basis with the two operators splitting interconnection costs on a 50:50 basis.

1993-96 Incumbent(SLT)/mobile operators interconnection arrangements required mobile operators to pay the higher national rate calling charges for calls terminating on SLT's network (double that of local retail), required to interconnect at only one point, bear the full cost of physical interconnection, i.e. cost of the links and switch interface, and no payments to be made for mobile termination of domestic or international calls and, no discounts were offered for international calls originated on the mobile networks.

1993-96 WLL/mobile interconnection and mobile/mobile interconnection followed a sender-keeps-all arrangement, with these operators sharing physical interconnection costs on a 50:50 basis.

1993-96 Despite legal requirements that all tariffs were to be approved by the TRC with Minister's concurrence, mobile operators able to implement tariffs without regulatory involvement.

1996 Regulation changed so only consultations with Minister in charge of telecoms required to change mobile tariffs.

1996-99 Fixed new entrants exempt from tariff regulation.

1993-96 Requested frequencies were issued with licenses, subject to variations in quantity e.g.: Dialog initially received 5 MHz compared to 10 MHz given to others.

1993-96 SLT refused frequencies outside the band specified in its license. However SLTL was not displaced from frequencies it already occupied and allowed to use the permitted 800 MHz band.

1996 Amendment to the 1991 Telecom Act – creation of Telecommunications Regulatory Commission .

1996 40% stake in Mobitel taken by SLT on termination of the Build Operate Transfer (BOT) agreement in 1996.

1996 National Telecom Policy issued.

Period 1997-99

1997 Partial privatisation of Sri Lanka Telecom (SLT); 35% of SLT sold to NTT with five year management contract. Consequences included changes to incumbents license, Government committed to not issuing further licenses for wireline and international telephonic services until August 2002; tariff rebalancing programme that would yield a minimum 148% increase in domestic revenue, not adjusted for inflation over five years.

1997 Regularization of the issuances of frequencies to SLT for fixed wireless access in the 1997 modification of its license – SLTL permitted to operate WLL services within a specified range of frequencies.

1997 Hutchison allowed bringing second hand equipment into the country when buying over Singapore Telecom's stake in Lanka Cellular contradicting previous stated policy prohibiting second hand equipment.

1998 Fast track promotional tariff approval procedure for mobile operators introduced.

1998 First stage of SLTL Tariff Rebalancing increases domestic revenue by 25%.

1998 Determination issued by TRC for WLL operators and SLT (fixed to fixed). Provided for: measured compensation to replace the sender-keeps- all arrangement for local call termination, a 20% discount for all international calls originated from WLL networks, SLTL to pay Rs 9.50 termination changes to WLL operators for international calls terminating in the WLL networks, WLLs to bear full cost of physical interconnection links up to the interface connection unit, and SLTL to be responsible for providing the interface unit.

1998 SLTL appeals determination in Court. Stay order not issued.

1998 MTN (Dialog) issued additional 2.5MHz frequencies.

1998 Completion by TRC of the AFMM (Automated Frequency monitoring and Management System) with World Bank assistance.

1999-2000 Whilst 1996 Telecom Policy stated that entry into mobile sector would be reviewed in 1999, the expected review did not take place and no new policy announced. No further entry was permitted into mobile sector.

1999 Second stage of tariff rebalancing to increase SLTL domestic revenue by 25% per year implemented in April 1999.

1999 TRCSL issued and implemented a fixed-mobile and mobile-mobile interconnection determination and related tariff decisions. The onerous fees for interconnection links were removed; fixed termination were set at considerably lower levels than fixed-fixed interconnection; a 20% discount on outgoing international calls was made available .Mobile termination fees including that for international calls was left to a public hearing which was to address the larger question of a Calling Party Pays scheme. At this time, the Mobile Party Pays (MPP) system was in effect. This required mobile operators to pay fixed networks for calls terminated on its network and were not compensated for calls terminated by fixed networks on their networks.

1999 SLTL found to have violated license condition with anti-competitive implications and paid out approximately USD 1 million to subscribers.

1999 Commencement of consultations for new telecom policy but no significant policy decisions were made until 2002.

1999 Appointment of former Managing Director of SLTL as Director General of Telecommunications.

1999 Completion by TRCSL of the Automated Frequency monitoring and Management System with World Bank Assistance.

1999 Mobitel introduction of DAMPS.

Period 2000-02

2000	Celltel conversion to GSM.
2000-02	Lanka Bell issued frequencies in the 1900 CDMA band.
2000-02	Suntel denied request for frequencies.
2000-02	Bypass activities of SLT's international gateway by other operators commence. Interconnection regime subject to law suits. Accusations levelled at SLTL of blocking calls originating on the WLL networks.
2001	MOU signed between the three fixed line operators to provide financial incentive for shutting out incoming international calls from bypassers.
2001	Fourth stage of SLTL tariff rebalancing not implemented in 2001, but only in 2002.
2001	Investments by other telecom operators in 2002 exceeded SLTL for the first time.
2000-02	Most mobile tariff changes approved through promotional window but considerable delay in approval of basic tariff.
2002	Former Minister of Commerce and Consumer Affair rolls back tariff increase of fixed entrants – accepted by Lanka Bell but not Suntel.
2002	Final SLTL Tariff Rebalancing approval did not go through till 2003.
2002	SLTL acquires remaining 60% of Mobitel from Telstra prior to IPO.
2002	SLT IPO in December; two previous attempts in 2000 and 2001 failed.

10. Regulation and Investment: Case Study of the Indian Telecommunications Industry[1]

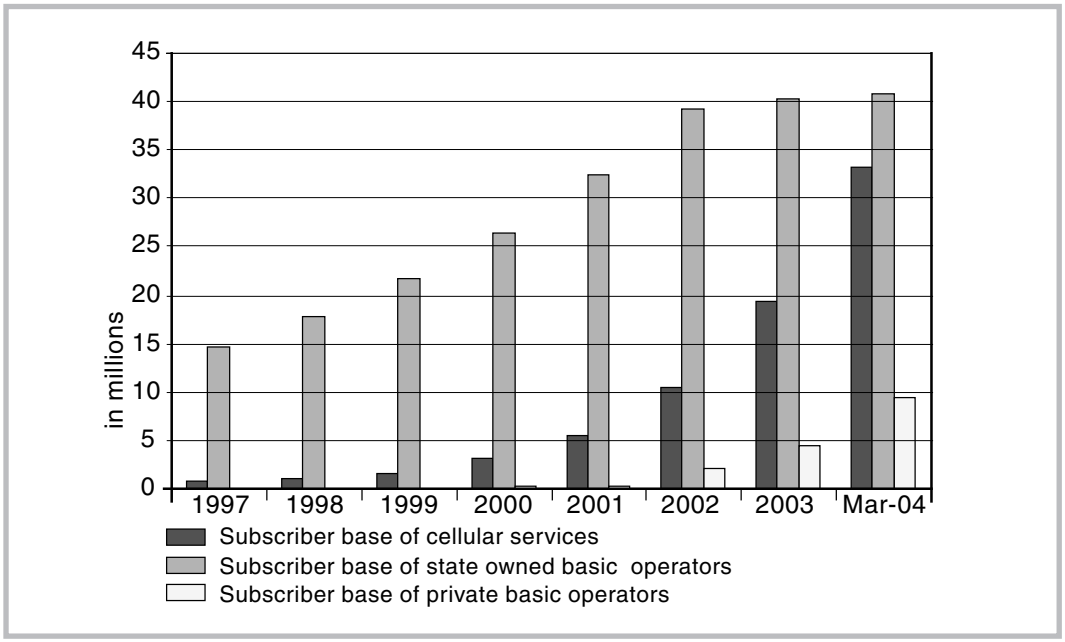
Payal Malik

1. Introduction

In India, as for many other developing countries, the abysmal performance of the state-owned telecoms service provider and the increasing requirement to attract capital for upgrading the sector were the major drivers for the liberalisation. Moreover, technological changes weakened the argument of telecom being a natural monopoly. The end of the Indian planned economic development, which was inspired by socialist principles, lead to across the board policy changes – the most important of which was the liberalisation of the industrial policy with a state commitment to introduce competition in some industries that had been previously served by government-owned monopolies. Telecom was one of them. By the early 1990s, it was clear that the problems of government failure in most of the infrastructure industries made the remedy to absorb these industries into the state's eminent domain worse than the disease of market failure. Simultaneously, a renewed faith emerged in the forces of competition and the market. It was realised that provided the correct institutional foundations and properly designed mechanisms, greater reliance on competition and private investment need not be inconsistent with more equitable access. The more nuanced modern view that was gaining limited acceptance was to allow private provisioning of these services subject to independent regulation, so as to maximize social welfare, however framed by the political process.

As for other infrastructure sectors, privatisation and liberalisation in telecom came to be viewed as necessary to overcome organizational inertia and to attract new investment. The transformation of telecoms markets in India as elsewhere took several dimensions in terms of the changing structure of demand, the convergence of services and the evolving structure of the industry. The two key elements defining the change in the market structure were (i) the restructuring of the government operator and (ii) the entry of private operators. The restructuring of the incumbent was initiated in October 1999 involving the bifurcation of the Department of Telecommunication (DoT) into two departments, namely, the Department of Telecommunications and the Department of Telecommunication Services, later corporatised in October 2000 into a new entity-Bharat Sanchar Nigam Limited (BSNL). While the former functions as

Figure 1 – **Subscriber base**



Source: ABTO, COAI, Indian Telecommunication Statistics, DoT 2002.

the licensor and policymaker, the latter was entrusted with responsibilities for the operation and maintenance of the system. BSNL provides telecom services in the entire country except in Delhi and Mumbai, where the government controlled corporate entity, Mahanagar Telephone Nigam Limited (MTNL), continues to be the service provider. Thus, there has been a shift from a static, monopolistic industry that provides a single product, telephone service to a dynamic, multi-product, multi-operator industry (see Annex 1 for a brief overview of the major policy changes in the Indian telecom sector). It should be noted that this change in market structure has taken place without the privatisation of the domestic incumbent service provider BSNL and MTNL. The privatisation of the overseas carrier Videsh Sanchar Nigam Limited (VSNL) in April 2002, with the strategic sale of a stake of 45% to Tata and the government and employees retaining a stake of 26.13% and 1.97% respectively, represents the first and only instance of the government transferring control of a telecom undertaking to the private sector.

The results of liberalisation have been impressive. Teledensity has increased from around a mere 2% in 1999 to close to 7% in 2003, and is set to surpass 20% in the next five years exceeding the government's target by three years. According to an Ernst and Young report, total telecom revenues are expected to almost triple from USD 9 billion to USD 23-25 billion by 2005-07. Wireless has been the principal engine for telecom growth in the country. The wireless subscriber base has grown from 1.6 million in 1999 to 28.2 million in 2003. Consequently, wireless now accounts for 40%

of the total telephone subscriber base, as compared to only 9.5% in 2000. Wireless subscriber growth is expected to accelerate further from just under two million subscribers per month currently to 2.5 million by 2005. It is expected that wireless will surpass wireline in late 2004. Until December 2002, the capital outlay by the cellular and private basic operators for the set up of service was USD 2.4 billion and USD 3.3 billion respectively. Cellular operators spent USD 1.5 billion in licence fee dues up to November 2003, while the amount paid out by the private basic service operators for entry fees was USD 0.86 billion. By March 2003, private cellular operators had made an investment of 23000 crores[2] (almost USD 5.1 billion). During the period of 1993-2003 the total foreign direct investment in the telecom sector was USD 2.4 billion.

In this chapter we describe how the regulatory environment (the details of the regulatory structure are discussed in a latter section) resulted in changing of the market structure and increased investments. Analysts agree that an environment of macroeconomic stability, policy credibility, and the existence of a sound regulatory framework are necessary for lowering the perceived risk of expropriation and thus for attracting private capital. In particular, the character of the entities entrusted with regulation determines confidence in the integrity of the system as a whole (Kerf et al. 1998). In the absence of such credible institutions and commitment, potential investors might avoid investing in the first place or may require additional premiums to account for risk, raising the cost of capital.

Did the Indian telecom regulatory intervention inhibit or encourage investment? Was the regulatory framework adequate for the effective development of competition? In other words, how successful was regulation during the transitional stages of liberalisation in diluting the inherited strength of the incumbent so as to mitigate the potential abuse of market power and ensure that effective competition emerged? We analyse the role of the Indian regulator,[3] positive or otherwise, on five broad parameters (a) market entry (b) access to scarce resources, mainly spectrum (c) interconnection (d) tariff regulation and (e) regulation of anti-competitive practices.

Unlike European countries, for which establishing an independent regulator preceded the opening up of the market, in India, the sequence was reversed. The Telecom Regulatory Authority of India (TRAI) did not exist during the first three years of operation of private telecom companies. Until TRAI was set up in 1997, DoT was supposed to be the regulator. Thus, the government's reluctance in the first round of reforms to break the dominance of DoT and to overhaul the legal and regulatory regime led to endless litigation, which delayed the liberalisation process for almost a decade. During 1997-99, TRAI's effectiveness was severely constrained by DOT's successful litigation against it. Only after the New Telecom Policy of 1999 (NTP-99) and the amendments to the TRAI Act of 2000 did TRAI became effective. However effective it may be, TRAI functions within and shares its regulatory function with the judicial and administrative system. Telephone operators use and are subject to the entire system (Desai 2004).

For this study, we assess India as an example of how the regulatory regime at an institutional level and a clear commitment to pro-competitive market principles at the political level, are necessary preconditions for successfully reforming the telecom sector and attracting investment. This case study demonstrates that private participation (investment) has to be preceded by sector restructuring and the creation of independent regulatory mechanisms, giving regulators clear and politically viable mandates. In absence of this institutional support, investor confidence will dwindle. However, once established the substantial private investment flows will effectively supplement the meagre public investments that may be feasible given the dire fiscal situation of the state. The Indian telecom case also clearly shows that prior to the year 2000 the Indian telecom regulatory environment was not sufficiently credible either to protect the investors from opportunistic behaviour by the government (read DoT) or to ensure competition between new entrants and the dominant incumbent operators where feasible. The post-2000 effectiveness manifested in many ways but most important of all was the regulator's credible attempts in fostering competition by removing barriers to entry and through implementing competitive tariffs. Guaranteeing access to the incumbent network and reducing the incentives of the incumbent to foreclose competitive markets strengthened this endeavour. Not that reform in the telecom sector is complete, and the gaps where they occur are due to the regulator's inability to completely dilute the inherited strength of the state-owned incumbent. Moreover, the wireless in local loop (WLL) controversy between 2001 and 2003, which eventually got resolved with TRAI's initiative on unified licences did not provide the correct signals. Nevertheless, the results have been notable.

We cannot provide a year-wise correlation between investment and the institutional framework within which the investment came in, but the performance of the regulator (as we have broadly defined it) and its impact on the market structure and sector performance is analysed. In doing so the competitive situation of the Indian telecom sector is examined, as the level of competition in the sector affects the investment incentives of the operators.

2. Investment and Regulation

The challenge facing countries like India was to respond to a new framework for the communications sector that could deliver the full potential of the much wider range of services and products that had become possible. Introducing competition was no longer a choice but the only option to improve performance and attract investment. The benefits of introducing competition were obvious. Free entry almost inevitably implies the influx of low cost technology and rational prices. While new firms are endowed with greater responsiveness to changing technologies and consumer preferences and are more agile to grasp business opportunities, the threat of displacement by the entrant forces the incumbent to refurbish its business strategies. The desirability of competition thus arises from its ability to compel the market players to coalesce the preferences of consumers and the existing technological possibilities in a manner that optimises social welfare.

However, in a sector like telecom new entrants face formidable challenges. Their competitor, the incumbent, typically, has huge sunk investments and 'owns' all existing subscribers. Accessing the incumbent's subscribers is critical for the new entrants if their new users are to reach others. Predictably, the incumbent denies or resists interconnection. Delivering competition in this sector therefore requires regulatory intervention as an essential pre-condition. The crux of the problem, in developing countries like India, has been that the state and its associated agencies like the bureaucracy, long used to exercising control, have been unable to build a regulatory structure that provides credible commitment against the exercise of arbitrary discretion by the state and changes in regulatory environment. It is precisely this regulatory environment that potential investors include as 'regulatory risk', which is a key factor in determining their investment strategies. The components of a regulatory regime needed to provide a credible commitment to investors include (Noll 2000; Intven and Tetrault 2000; Samarajiva 2002; Melody 2003):

- Clear specification of rules related to competition and entry or the right to offer services without the erection of entry barriers by the incumbent; regulation setting out fair access rates and tariff rates that will permit a certain degree of profitability as well as the allocation of the spectrum in a fair and transparent manner;

- The separation of the government from the incumbent monopoly and the creation of a regulatory authority to interpret and enforce the contracts;

- In a sector where competition is still nascent, investments are sunk and returns are realised over a long span of time, entrants require a regulatory regime that will act as a safeguard against arbitrary government action and collusive behaviour between the government and the incumbent monopoly.

This study assesses how well the Indian regulatory structure performed on the dimensions that are considered by the investors in evaluating regulatory risk. In this section we outline the implications of the market opening initiatives on the market structure of both the basic as well as mobile services. In basic service provision, MTNL and BSNL enjoy a 92% share of the market with only a marginal presence of private operators. Private companies have performed well in the competitive cellular segment, with three private operators providing service in almost all the circles and metros. BSNL is emerging as a major player in the cellular segment with almost 18% share, next to only Reliance Telecom, with a market share of 22%. (See Annex 2 for the network status and public private split of ownership as of April 2004. Also see Annex 3 for circle-wise list of companies operating as cellular operators and basic service operators and the operators in the national long-distance (NLD) segment and international long-distance (ILD) segment). The important aspect of the Indian telecom reform process is that the incumbent BSNL still has a major presence. This had important ramifications for both policy and regulation. Whereas, the policymaker would drag its feet in the introduction of competition, the regulatory effectiveness would depend upon the monopoly wielding power of the incumbent and stronger is this power greater is the

chance of undermining regulatory independence. The Indian policymaker initially allowed entry into value-added services, and treated private investment as a way to get capital for *fancy* services like cellular. But that was 1991, little was it realized that attempts to protect turf by allowing these marginal and fringe operations by the private players would in due course (on account of declining costs of wireless technology) challenge its core wireline business. With the removal of serious constraints on the wireless business in the new millennium a diverse mix of public and private ownership of the Indian telecom sector has emerged. Table 1 provides the ownership structure of the largest basic and mobile telecom operators in India.

The market shares of the basic and cellular service operators as shown in Figures 2 and 3 clearly demonstrates that investment and hence growth is driven by wireless and ownership structure is in the favour of domestic players with a marginal presence of foreign players. However, some large domestic companies have large amounts of foreign capital through the holding company route.

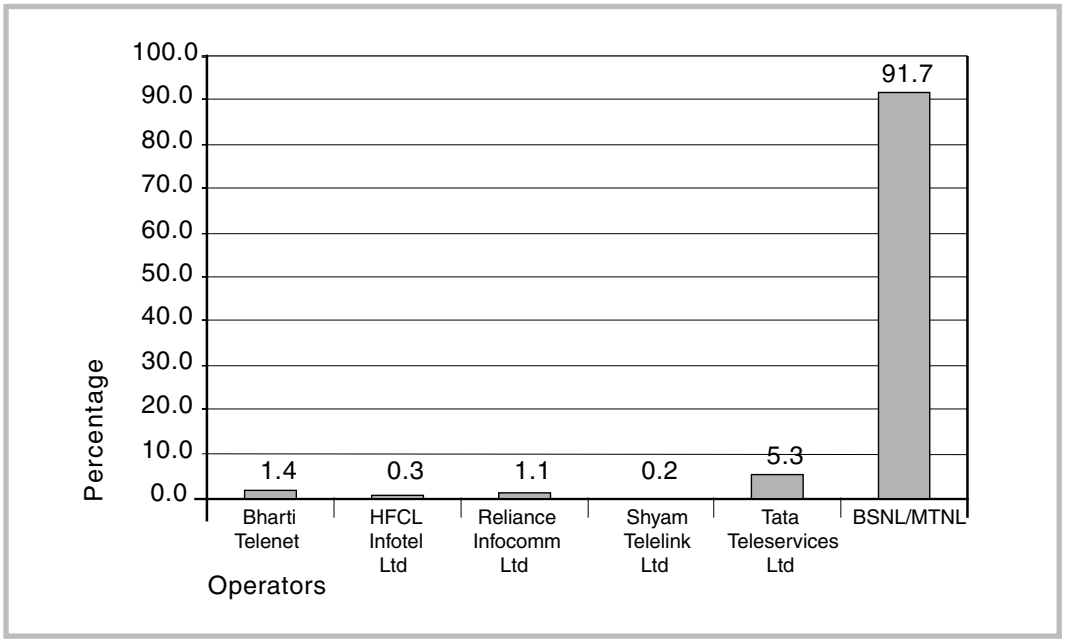
The new industry structure is putting competitive pressure on the incumbent, especially MTNL, which operates in the two lucrative metros of Delhi and Mumbai. For instance, during 2003-04 while MTNL's core fixed line business saw a negative growth of 5.40%, the countrywide operator BSNL saw a modest growth of 0.58% in its fixed line business. MTNL's ability to fund future investments for BSNL would be rather limited as the monopoly surplus is continuously declining.

Table 1 – **Ownership of largest basic and mobile telecom operators in India**

Company	Ownership
BSNL and MTNL	Majority government ownership, with MTNL having a some public shares
BHARTI CELLULAR LIMITED	Bharti Televentures 100%
BHARTI MOBILE	Bharti Cellular/ Bharti Tele Ventures Limited 100%
BHARTI MOBINET (previously SKYCELL COMMUNICATIONS LIMITED)	Bharti Tele Ventures 95.3% and Crompton Greaves (Thapar group) 4.7%
BHARTI MOBITEL (previously INDIAN TELECOM, then MODI TELSTRA, then SPICE CELL)	Bharti Enterprises 100%
BHARTI TELENET LIMITED	Bharti Telecom 100%
BIRLA AT&T COMMUNICATIONS LIMITED (BACL)	Aditya V Birla Group (held by four Birla group companies) 51% AT&T (USA) (held by wholly owned subsidiaries AT&T Wireless Services and AT&T Communications Services International Inc.) 49%

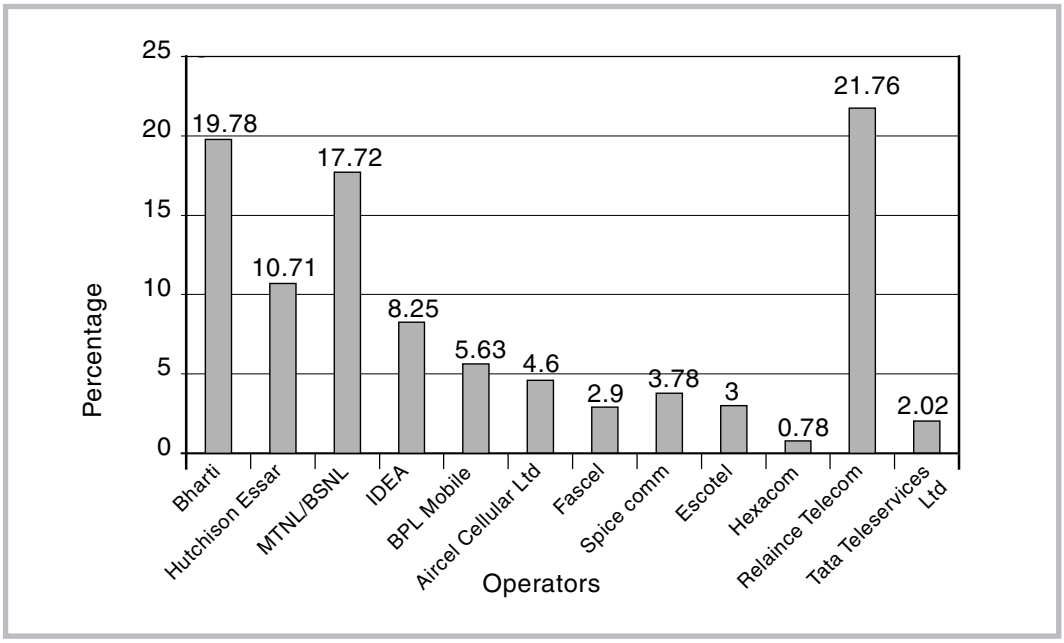
Company	Ownership
BPL CELLULAR LIMITED or BPL MOBILE CELLULAR LIMITED (previously BPL-US WEST CELLULAR LIMITED)	BPL Cellular Holdings (later BPL Communications Limited) 100%
BPL MOBILE TELECOM	BPL Group (held by nine BPL companies)51% and Orange SA 49%
ESSAR COMMVISION (later HFCL INFOTEL)	HFCL Group 100%
FASCEL LIMITED	Hutchison Telecom 49%, Hindujas (Induslnd Telecom Network. a JV of the Hinduja Group and Sumitomo Corporation of Japan) 30%, Kotak Mahindra Finance Limited 11%, Usha Martin Telematics 10%.
HEXACOM INDIA LIMITED (HIL)	Telecommunications Consultants of India Limited (TCIL) 30%, Bharti Tele Ventures Limited 67.5% Other financial investors 2.5%
HFCL INFOTEL (previously ESSAR COMMVISION)	Essar group 80% and HFCL Group (of the Maloo-Nahata combine) 20%
TATA TELESERVICES (MAHARASHTRA) (previously HUGHES ISPAT, then HUGHES TELE.COM)	Ispat Industries 33.65% Public 15.52% FIIs, FIs and MFs 33.65%, Tata Teleservices Limited 50.83%
SPICE COMMUNICATIONS LIMITED (previously MODICOM NETWORK PRIVATE LIMITED)	Spicecorp (of the B K Modi group) 51% , Distacom Communications (Hong Kong) 49%
RELIANCE INFOCOMM LIMITED	Reliance Group 97%
TATA TELESERVICES LIMITED (TTSL)	Tata Group 100%

Figure 2 – **Market share of basic service operators**



As is evident from Figure 3, multiple operators exist in the cellular service segment. However, the industry is headed for major consolidation, which is likely to be further accentuated by the convergence of telecom technologies. In order to lift policy restrictions on the consolidation process, the Group of Ministers (GoM) on telecom recommended that intra-circle merger of service providers be allowed, provided there are more than three operators in a circle, rural telephony obligations are transferred to the new entity and that the new owner is allotted spectrum only as per user base. Presence of an operator in many circles of operation generates economies of scale in technological know-how and support services. Merged entities can exploit network rollout economies as well as have the ability to better leverage over contractors as their size increases. Another factor driving consolidation is the need to develop strong national brands that help to establish uniform service conditions, improve customer loyalty and spread advertising and promotion costs over a larger base. However, these numerous benefits need to balanced against the consolidation of market power that result from mergers and acquisitions. TRAI has come out with its recommendations on intra-circle mergers. In these it is noted that during the process of consolidation the basic objective of maintaining competition in the market would be paramount. In the cellular segment a delicate balance exists between the efficient utilisation of spectrum on the one hand and ensuring adequate competition on the other. Therefore, in its recommendations TRAI emphasizes that merger and acquisitions should not be allowed if it leads to less than three operators in the market.

Figure 3 – **Market share of cellular service providers**



3. Telecom Regulatory Environment

Before we examine the telecom regulatory environment (TRE) across the five broad parameters outlined in the introduction, it is useful to understand the broad structure of the Indian telecom regulation. Desai's (2003) comments on the reform programme are quite useful in understanding the complex institutional context of the Indian telecom sector:

> The reform of the Indian telecom sector has been an amalgam of regulation, administrative intervention and political decisions. The interplay of forces has increased regulatory uncertainty, introduced political forms of competition, and favoured or disfavoured particular players. That is not a good legacy if what is looked for is vigorous, fair competition unaffected by arbitrary official interference.

Regulatory Structure

The Telecom Regulatory Authority of India was established in January 1997 through an Act of Parliament. The creation of TRAI should have led to a redefinition of the role of Telecom Commission and DoT, but this was not effected satisfactorily. TRAI had neither been given power to issue licences nor allowed to set standards and allocate spectrum. In the following years, DoT and TRAI became entangled in court cases and the role and credibility of the regulator was seriously undermined in the process.

In January 2000, the government of India issued an amendment ordinance, leading to major changes in the institutional structure of TRAI. TRAI was split into two agencies: a *new* TRAI, divested of all its adjudication and dispute-settling powers, and a newly created agency named the Telecommunications Dispute Settlement and Appellate Tribunal (TDSAT). This institutional change was brought about by an interministerial group, Group on Telecommunication (GoT). The successor TRAI has been further strengthened by three specific mandatory powers dealing with tariff fixation, fixing of interconnectivity charges and laying down standards for service and technology. In addition, it was now mandatory for the government to seek the opinion of TRAI on the need and timing of the new service providers although the recommendations will not be binding. The TDSAT was empowered to adjudicate on disputes between the licensor and licensee, between two or more service providers and between a service provider and a group of consumers. It was also an appellate authority with respect to any direction, decisions, and orders of TRAI. However,

Table 2 – **Regulatory structure of the Indian telecom sector**

Regulatory Body	Function	Comment
DOT – Department of Telecom	Licensing, License fee, frequency management of telecom sector	Policymaking and enforcing body
Telecom Commission	Executive and policymaking function of ministry	Part of DOT
WPC – Wireless Planning Commission	The national radio regulatory authority responsible for spectrum management, including licensing. Caters for the needs of all wireless users in the country, government or private, security or non security	Country's spectrum management
GOT-IT – Group on Telecom and IT	Decides on ad hoc issues depending on the immediate needs	Prime Minister's council
TRAI – Telecom Regulatory Authority of India	Regulating, issuing directions and settlement of disputes between various service providers. Mandatory for DOT to seek recommendation of TRAI in respect of specified matters and then setting up separate dispute settlement mechanism. Also has the power to call for any information, conduct investigations and to issue directions (directives)	Day to day management of sector
TDSAT - Telecom Dispute Settlement Appellate Tribunal	To adjudicate any dispute: - between a licensor and a Licensee - between two or more service providers - between a service provider and a group of consumers	Dispute settlement body

cases involving questions of monopoly and consumer grievance redress by individual consumers are outside this body's jurisdiction. Decisions of TDSAT can be appealed only to the Supreme Court of India.

4. Market Entry

Prior to 1991, telecoms services and products were provided by a state-owned monopoly that was a division of the Department of Telecommunications, itself an arm of the Ministry of Communications. We have come a long way from there, with the sector witnessing continuous policy reform. The evolution of reform though the 1990s has led to a rejection of manufacturing-led investment in favour of a new focus on enabling private investment in services. When private service provision was first contemplated in July 1992, the policymaker's goal was not to allow competition in basic services, but instead to supplement basic services by allowing private providers to offer premium services at higher prices (such as mobile services). Telecom licences were auctioned for basic and cellular services by the DoT, the incumbent government policymaker, regulator and service provider in January of 1995. Thus, while evaluating the regulatory environment for this period, it must be borne in mind that during the initial phases of India's telecom industry liberalisation there was no independent regulator. The entire country was divided into roughly 20 circles, categorised as A, B or C depending upon their revenue potential. For all licences, bidding was a two-stage process: the first was pre-qualification based on the evaluation of financial worth and experience in service provision; and the second was an evaluation of bids. The bids were accepted in a single round, with the licence awarded to the highest bidder drawn from those that satisfied the pre-qualification conditions.

Prior to the bidding, no ceiling on the number of circles that could be awarded to a single entity had been specified. Subsequent to the receipt of the bids for basic services, it was found that a single firm had overbid and won nine circles. Speculation regarding its ability to pay the licence amount for all the circles led to an offer by the government to choose three circles. The government could have settled for re-bidding but did not do so in the fear of leading to loss of investor confidence. By allowing the firm to choose and not letting it withdraw on its own, the government lost the minimum reserve price that such withdrawals would have generated as per the bidding conditions. Five circles received extremely low and single bids and subsequently 15 circles were put up for re-bidding with the government specifying a reserve price. There was a poor response and nine circles remained without any service provider. Finally, only six providers signed the licence agreement for the provision of basic services for the service areas of Andhra Pradesh, Gujarat, Madhya Pradesh, Punjab, Rajasthan and Maharashtra.

For cellular services, duopoly was introduced through a bidding process and 42 licences were awarded. In some areas like Bihar, West Bengal and Orissa only a single cellular licence could be awarded. Despite relatively fewer problems with the award of cellular licences, services were slow to take off due to high bids, slow frequency allocations and lack of a suitable framework for managing the interconnect arrangements (Jain 2001).

The revenue earned by the state through licence fees and other charges on private providers was to be used to fulfil the state-owned incumbent's investment and rollout targets. Licences were issued to those who bid the highest up-front fees. The intention was to create at least two viable service providers in each circle of operation (each circle being contiguous with individual states, in addition to the four metros). However, the concept of private service provision suffered a serious setback when none of the mobile service licensees, as well as private basic service licensees, were able to pay the fees that they had bid, due to overbidding. In the licence auction system prevalent in 1995-96, the mobile operators had bid for very high licence fee and the initial peak tariffs were fixed at more than Rs 16 per minute for both incoming and outgoing calls. Thus, one of the important tools of competition, i.e. the price, was preordained on two accounts (i) the operators had to bid on licence fees and not on prices and hence in their exuberance to get the licence the bids were unrealistic, (ii) to recover these high licence fees they had to accept the high tariffs as that was the only way that they could recover their costs. It was quickly realised that with these tariffs, there would be no growth and a number of companies would go bankrupt. Both cellular and basic service operators had committed to unrealistic licence fees and were struggling to survive in the Indian market. They owed almost USD 873 million to the government towards their outstanding licence fees.

The government issued the New Telecom Policy in 1999 (NTP-99). NTP-99 tried to redress the problems of this false start to liberalisation. The theme of NTP-99 was to usher in full competition through unrestricted private entry in almost all service sectors, unless restricted by spectrum availability, under the aegis of a strong regulator. It provided for a new beginning with the government at the centre committed to the implementation of this policy. In addition to the creation of a competitive environment in the telecom sector, NTP-99 recognised the need to: (i) strengthen research and development efforts in the country (ii) provide an impetus to build world-class manufacturing capabilities (iii) achieve efficiency and transparency in spectrum management and (iv) understand the importance of convergence of markets and technologies.

A key fall-out of NTP-99 was the development of a migration package according to which all fixed service providers would pay their licence dues as of 31 July 1999 as a one-time entry fee as well as a stipulated percentage of their revenue as licence fee over the period of their licence. Both cellular and basic service operators are required to pay a licence fee at 12% of adjusted gross revenues (AGR) in metropolitan areas and category A circles, 10% in category B circles and 8% in category C circles.[4] So under NTP-99 they were allowed to migrate from the earlier fixed licence regime to revenue sharing of licensee revenue, while duopoly rights were discontinued. As a result of this policy, the government decided to reduce mobile operator's licence fee from USD 59 billion to USD 1.5 billion and converted the regime into revenue sharing. The regulatory intervention in this regard brought some stability and the operators both basic and cellular agreed to migrate to the new regime. The details of the licence fees paid by the basic and cellular operators are provided in Table 3.

Table 3 – **Licence fees paid by the cellular and the basic service operators**

Rs (in millions)	Cellular		Basic		
	Old	New	Old	New	
				Entry Fee	Bank guarantees
Category A					
A P	3412.5	1030	1614.7	350	140.00
Gujarat	6116.3	1090	1790.9	400	160.00
Karnataka	4432.3	2060		350	140.00
Maharashtra	5691.3	1890		1150	460.00
Tamil Nadu		790		500	200.00
Category B					
Haryana	917.9	214.5		100	40.00
M P	177.8	174.5	353.3	200	80.00
Punjab	4028.1	1517.5	1775.9	200	80.00
Rajasthan	1302.3	322.5	292.9	200	
Rajasthan*	1215.4			200	80.00
U P (E)	1897.8	452.5		150	60.00
U P (W)	1384.7	305.4		150	60.00
Kerala		405.3		200	80.00
Category C					
Bihar	819.2			100	40.00
Himachal Pradesh	51	10		20	8.00
West Bengal				20	8.00
Orissa				50	20.00
Andaman & Nicobar				10	20.00
Metros				0	
Chennai	185.3	1540		500	
Chennai*	170.5			0	
Mumbai	843.3	2036.5		1150	

Rs (in millions)	Cellular		Basic		
	Old	New	Old	New	
				Entry Fee	Bank guarantees
Mumbai*	915.4			0	
Delhi	654.8	1707		500	200.00
Delhi*	822.9			0	
Calcutta	215.3	780		2500	
Calcutta*	276.2			0	

Source: ITU, ABTO.

Notes: *For some states and the metros, the licence fees are different for the two licensees.

Cellular Old: The entry fee for the first two cellular licences. This is after the implementation of the migration package as a part of which the licence fee instalments paid until a certain date were treated as entry fee.

Cellular New: This is the winning bid for the fourth cellular licence.

Basic Old: The entry fee paid before NTP-99 by private operators

Basic New: This is the fixed entry fee for new basic services licences. Only six licences had been issued after the initial auction of basic licences. Like the initial cellular licences these were also migrated to a revenue sharing regime with instalments for the winning bid being paid up until the cut-off date, being treated as the entry fee.

On 13 August 2000 the government announced the opening up of domestic long-distance to the private sector ending the DoT monopoly. Under NTP-99, the private sector was allowed to provide NLD and international long-distance ILD voice services, with no limits placed on the number of participants. Wireless-in-local-loop (WLL) based limited mobility was allowed for private basic service providers. Data services were fully opened to the private sector. Cellular service providers were permitted to carry their own long-distance traffic within their service area (earlier operators had to pay charges for carrying calls on the DoT network within the same circle too). The duopoly in cellular service was broken to allow for unlimited competition and public sector entities entered as third cellular operator in their respective circles. This essentially meant that BSNL had licences to operate nationwide other than in the two metros, where MTNL was operating. In January 2001, the government announced guidelines for the fourth cellular operator to provide cellular services in the country and the licences were issued in September 2001 through a revised three-round open bidding system instead of the earlier sealed bid system. Thus, while the initial auctions resulted in perverse outcomes with respect to market entry the design of the fourth cellular licence was extremely efficient.

The regulatory environment prior to NTP-99 with regards to market entry was extremely *ad hoc* and non conducive for the operators to rollout their investment plans.

In early 1999, Indian telecom reform was on the verge of a disaster. The independent regulator had been declared to have no authority over prices and entry decisions of the public sector[5] and DoT had made a series of decisions that were bankrupting the private entrants and thereby re-monopolizing the industry. The TRAI Act of 1997 in principle had given clear powers to TRAI to give directions to operators and adjudicate disputes between them. DoT had contested these powers in court on many occasions and in most of the cases received decisions in its favour. This made the initial investor wary as DoT, with the help of legal intervention, escaped regulatory oversight. TRAI was not given responsibility to issue and revoke licences, but only to recommend them. However, under the NTP-99 framework TRAI was promised that it would be consulted on issue of number of competitors and the timing of their entry. It had responsibility to fix tariffs and resolve disputes. The DoT surrendered its regulatory role in principle, though it still retained policymaking, licensing, and operative powers within the same organisational boundaries. Nevertheless, DoT was unwilling to relinquish its dominant position and was uneasy with an outside body stemming its arbitrary powers. While the NTP-99 and the regulatory recommendations of migrating to the revenue sharing regime rescued the private operators and restructured their licence agreements, it did not succeed in strengthening TRAI.

In 1999, a disagreement between TRAI and the government led to the reconstitution of TRAI. Independence of regulation requires that the decisions of regulators do not require the approval of elected political officials, and that the regulator cannot be removed from office solely because a decision is unpopular with a minister or the legislature. This is precisely what happened in India. On the initiative of an interministerial GoT-IT and convergence the government issued an ordinance in January 2000, to amend the TRAI Act. Through this ordinance it dismissed all the members of the then TRAI, and made way for appointment of new members. It took away the arbitration powers of the TRAI, which was the first arbitrator in telecom disputes, and removed the jurisdiction of the Delhi High Court in matters relating to telecom. Last, it made it obligatory on the part of the government to consult TRAI on the issue of new licences. Some analysts (Desai 2004) argue that this amendment removed the basis of the conflict between DoT and TRAI. DoT was now under the directive power of TRAI and could no longer seek the protection of the Delhi High Court for matters that went against it. The legal recourse by DoT had in many instances undermined the TRAI authority. Despite this rationale there was suspicion about the government and some loss of credibility. However, telecom reforms continued with private entry into domestic long-distance, freed in 2000-01; and into international long-distance, freed in 2002-03.

5. WLL(M) licences and the regulator

An important consequence of NTP-99 was that wire line operators were allowed to use wireless in local loop (WLL) technology for their basic service provisioning. The logic was that due to costly digging requirements, etc., it was better to connect the last mile to fixed telephones through wireless. On the recommendation of TRAI, WLL technology, which allowed limited mobility (and hence WLL(M)) with handsets, was permitted in

March 2001, for faster rollout by fixed service providers. This market entry decision was vehemently opposed by the cellular operators on several grounds, but primarily because of the iniquitous entry conditions for almost similar services. It was decided that the WLL telephone should move within a short distance calling area (SDCA) – a local call area.

The provision of WLL with limited mobility by basic service operators had led to an anomalous situation with respect to licence fees and spectrum availability. WLL was subsumed under the provision of basic services though it used the spectrum, as did the cellular services. Thus while entry into cellular services was limited with licences being auctioned, entry into WLL with limited mobility was not limited and the associated licences are not auctioned. These anomalies in market entry conditions led to much litigation. Between 2001 and late 2003 the regulatory environment on account of the WLL controversy was quite unsatisfactory. Some observers[6] have also commented that due to this controversy the value of the fourth cellular declined sharply (Gupta 2002).

Recognising that the telecom sector was undergoing major changes due to technological developments, TRAI recommended that it was absolutely necessary to get away from the existing regime of licencing services and technologies. It came out with a consultation on a unified access licence in July 2003 and based on TRAI's recommendation the government allowed the issuance of unified licences to allow local wireline players to provide cellular service and vice-versa. The introduction of the unified access licences – unifying the WLL, cellular and basic services – was the inevitable first step for initiating a unified licence regime. In fact, TRAI in 1999 had indicated in its recommendations that the licence regime should not hinder technological change. The system of separate licences for WLL(M) and cellular licences was doing just that. Finally, the regulatory environment with regards to entry was lent stability after the introduction of the unified access system. Litigation based on allegations of a non-level playing field was withdrawn and after receiving some concessions on revenue sharing the cellular operators were finally appeased. However, the whole imbroglio demonstrates the highly complex regulatory processes governing the sector.

6. Scarce resources

While wireless has significantly accelerated the growth of teledensity, it has also raised spectrum requirements. Governments and regulatory authorities have had to examine issues linked with the adequacy of spectrum, procedures to distribute this scarce resource and the consequent requirement to build technical and economic frameworks to promote its efficient utilisation. How well was this scarce resource was allocated and was the allocation principle efficient? The efficiency of this allocation provides a litmus test of the regulator's performance. With the liberalisation of the telecom sector, regulation of scarce resources such as spectrum has shifted from being purely an issue of planning and coordination to an effective tool in the creation of a competitive environment (Falch and Tadayoni 2004). As mentioned in the section on market entry, in India, cellular mobile services started with a duopoly in 1994-95. The technology at that time was specified

as GSM and the licenses had a spectrum commitment of 4.5 + 4.5 MHz, later amended in 2001 to 4.4 + 4.4, with a possibility of increase to 6.2 + 6.2. Keeping in view the development of technology, all the licenses were made technology neutral in 1999. The third cellular mobile licence was granted to the incumbent in 1999. In 2001, the fourth cellular licence in 1800 MHz band was auctioned. For the fourth cellular license, the committed spectrum was 4.4 + 4.4 MHz, and a possibility of increasing it to 6.2+ 6.2 MHz was mentioned. The spectrum charges were earlier based on number of mobile terminals and allocated spectrum. Since August 1999, the spectrum charges were converted to percentage of adjusted gross revenue (AGR). This varies from 2% to 6%, based on the amount of spectrum allocated. The amount of revenue share increases with the increased allocation, i.e. 3% up to 6.2 + 6.2 MHz, 4% up to 10 + 10 MHz, 5% up to 12.5 + 12.5 MHz and 6% up to 15 + 15 MHz. Competition was introduced in the basic services segment in 1997-98, with the introduction of duopoly. For these service providers also, the spectrum was allocated to offer telecom services through wireless access.

Post NTP-99, open competition was introduced in the basic services in 2001 and these licenses were available on first-come-first-serve basis. In order to add value to their services, basic service operators (BSOs) were permitted to provide 'limited mobility' services. The frequency bands for providing WLL(M) services included 824-844 MHz paired with 869-889 MHz (FDD), and 1880-1900 MHz (Micro-cellular technology based on TDD). Service providers were given an initial 2.5 + 2.5 MHz to start service. The amount of spectrum could be increased to 5 + 5 MHz upon meeting certain criteria (largely based on subscriber base and rollout) in increments of 1.25 MHz.

The allocation of the electromagnetic spectrum was carried out through fiat allocation. Under this purely administrative mechanism of spectrum allocation, the government (which had set up the Spectrum Management Committee of the GoT and Wireless Planning Commission on Spectrum Pricing in May 1999) assessed the relative merits of plans proposed by various competing firms and grants a share of the spectrum accordingly. Economists (Valletti and Prat 2001) argue that bundling the spectrum with a service licence, as has been done in the Indian case, is an inefficient arrangement because it leads to an underpricing of the spectrum below its market value. If the spectrum is underpriced, which it is, when bundled with a service licence service providers who have the option of using wired infrastructure will be inclined to use the spectrum, resulting in a crowding out of other services. Further, the arbitrariness inherent in the specification of criteria and consequent evaluation of plans makes this process time consuming and vulnerable to lobbying and political intervention.

The regulatory set-up for allocation of spectrum until now has ignored the issue of efficient utilisation, spectrum allocation procedures and pricing. The present spectrum assignment policy is riddled with other anomalies as well. At present the spectrum allocation is linked to subscriber numbers rather than usage. There is no policy beyond 10 MHz. There is also no provision of a guard band, which results in interference in the signals of contiguous operators. While the licence auction process did not allow companies to bid for a group of contiguous circles, subsequent changes in the ownership patterns show that cellular operators may have preferred to bid for the

same. Before the shift to unified licences, in the case of cellular licences, there was no clear specification of the amount of spectrum being made available. This generated uncertainty about the value of the licence since bid amounts are offered based on the operator's assessment of spectrum assignment and the associated time-frame. Several representations have been made to the government in recent times by mobile operators as well as some others regarding the small amount of spectrum available for services. The delays in frequency allocation are frequently criticised.

Spectrum is a scarce resource that India uses wastefully. Spectrum management is beset with several shortcomings resulting in spectrum availability rapidly becoming a major constraint. First, is the use of the non-NATO band by the defence services. All NATO countries and allies have adopted the NATO band of spectrum for defence requirements while the non-NATO band accommodates most commercial requirements. Due to global interconnectivity considerations and the fact that most telecom equipment is manufactured in NATO country markets, both defence and private users in India end up competing for the same spectrum bands. Due to this, the average frequency allotted to an Indian cellular operator is 6.2 MHz as against the world average of 17.18 MHz (Sihag and Singh 2003).

The growth in cellular mobile has exerted pressure on spectrum. In cities like Delhi and Mumbai, where operators have been allocated up to 10 MHz, there is already demand for more than 10 MHz. With the 900 MHz GSM band completely occupied, the allocation beyond 8 MHz to each operator is possible only in 1800 MHz band. In 800 MHz CDMA band, some licensees have been allotted up to three carriers, out of a total of four. With the growth of data, there is likely to be demand for more. Internationally, the next band for expansion of GSM and CDMA systems is 1800 MHz / 1900 MHz. Other government users presently occupy a large part of these bands, and refarming of this spectrum is a continuous but long drawn process. This increases pressure on existing spectrum and necessitates most efficient utilisation by all. In areas where demand for spectrum exceeds supply, some criteria would need to be applied for allocation. These could be technical, economic or techno-economic. TRAI in its consultation paper on spectrum pricing has pointed out the following anomalies in the existing spectrum allocation:

(a) The low level of spectrum fees during the early stages of network rollout does not provide any significant financial incentive to use it more efficiently, hence the level of efficiency is determined by the regulatory limit placed on spectrum assignments. This is currently linked to the number of subscribers, which means that in the initial phase of network rollout service providers may be tempted to adopt a sub-optimal approach to network design. For instance if spectrum is cheap then the incentive will be to expand network with the help of spectrum based services.

(b) The prevalent spectrum pricing mechanism tends to penalise the most efficient operator (in terms of revenue). The spectrum charge per MHz paid by efficient operators would be more than inefficient ones, even with the same technology.

(c) Under Unified Licenses with service providers deploying technologies that are significantly different in efficiency and revenue realisation, it would be difficult to ascertain the service that would be provided using the spectrum, thereby, making the spectrum charges highly unpredictable and variable.

This has led the government to ask the TRAI to provide recommendations for efficient allocation and pricing of spectrum. TRAI has recently come out with an extensive consultation paper where it has raised very pertinent issues regarding spectrum allocation. It is requesting comments on issues such as: (a) which competitive spectrum allocation procedure should be adopted in cases where there is scarcity? (b) If auction methodology is used for pricing the spectrum, then how to avoid 'winner's curse' and ensure that spectrum is available to those who need it? (c) Should the new pricing methodology, if adopted, be applicable for the entire spectrum or should the revenue share mechanism till 10 + 10 MHz be continued with and the new method be applicable only for spectrum beyond this? In parallel, efforts would have to be made by the government to accelerate the process of refarming (TRAI 2004).

Once the consultation process is over and the TRAI comes out with its recommendations it is hoped that the telecom regulatory environment with regard to the allocation of the scarce resource is most likely to improve in the future.

7. Interconnection

Refusal on the part of the incumbent to provide access to the network calls for active regulation. The regulator may itself fix access charges and other interconnection conditions. If the entrant's coverage is small, the incumbent has an incentive to refuse interconnection, since in the absence of interconnection it can corner the market at a profitable price. Thus in the case of free negotiation, the incumbent has the incentive to indefinitely delay an agreement. If an agreement has to be reached, the entrant will tend to over invest in coverage in order to reduce the incumbent's pre-agreement profit and reach a better deal. However, if interconnection is mandated but each operator is left free to set its access charge, the entrenched firm has an incentive to set its access charge at a prohibitive level, as this constitutes a standard 'raising rival's cost' strategy. In India, interconnection was a part of the licence agreement that specified actual amounts that each party could charge the other. The license agreement route to setting interconnection terms meant that newcomers were saved most, though not all, of the delays and negotiation to connect to the incumbent's network when they needed to get their services off the ground. The disadvantage was that the actual charges for interconnection in the licence agreements were arbitrary in most cases. Further, there was a tendency to confuse user tariffs and interconnection charges in the same breath.

Thus, in an asymmetric situation the incumbent could use interconnection charges to handicap new entrants. This is what DoT did. In January 1997, after most cellular operators had made their minimum investment and started service, DoT raised the

interconnection charge for mobile services to Rs 10 (about USD .22) per minute from Rs 1.25. The pricing action made cellular calls that interconnected with the fixed wire-line network ridiculously expensive for the carriers, especially compared to the ceiling prices that they could charge for service. Moreover, DoT decreed that all calls from one wireless carrier to another had to be interconnected through the state-owned incumbent, only calls within the same network could avoid the interconnection charge.

By late 1999, the decisions by courts raised serious concerns about the role and powers of TRAI. This was especially true in context of the role that the regulator could play in ensuring a fair interconnection regime. In 1999, TRAI also attempted to introduce a calling party pays (CPP) regime, through its Telecommunication Interconnection (Charges and Revenue Sharing-First Amendment) Regulation 1999, for interconnection from fixed to wireless. This was to encourage wireless customers to discontinue the practice of not answering their phones but observing the calling number and then returning the call over wire-line telephones. TRAI's attempt to reverse the high interconnection charges charged by DoT and the existing receiving party pays (RPP) regime was challenged. DoT sued TRAI again, and again TRAI lost. The court interpreted that access charge payment as proposed in the CPP regime was not under the purview of the regulator. A Delhi High Court ruling argued that these charges were a part of the licence agreement and the regulator's powers in this regard were only recommendatory and the government was not bound to abide by the proposals.

The successful challenge to the CPP regime was also a sign that TRAI lacked the power to enforce technically adequate and fairly priced interconnection for all players in the market, arguably, the most important function regulators carry out in telecom markets. The regulatory environment on interconnection, as in the context of other parameters, was highly unsatisfactory during this period. High interconnection charges erected barriers to entry and quite possibly induced inefficient bypass.

The amendment ordinance of 2000 restored TRAI's powers relating to tariffs and interconnection, which had earlier been deemed by courts to be limited. Even the government would have no right to overrule the TRAI in these two areas. Other thorny issues regarding interconnection were partly addressed in the NTP-99. Under the old policy, if a private operators' facilities did not enable it to connect two subscribers within the circle or if its clients wanted to call someone outside the circle, the operators had to use the DoT network. This enabled DoT to monopolise the lucrative long-distance traffic. Under the new policy, long-distance traffic can be carried by any private operator – not necessarily DoT. However, the newly constituted TRAI retreated on CPP, which was a serious bone of contention between the old TRAI and DoT. Finally, CPP was introduced in 2003 as part of a tariff rebalancing exercise.

Thus, there was certainty of jurisdiction in matters relating to interconnection and some level playing field has been created. On 12 July 2002, TRAI issued the Telecommunication Interconnection (Reference Interconnect Offer – RIO) Regulation, 2002 (2 of 2002). The regulation mandates that service providers with significant market power to publish an RIO, "stipulating the various technical and commercial conditions including a

basis for Interconnect Usage Charges for Origination, Transit and Termination. Following these, the new entrants can seek Interconnection and agree upon specific usage based charges." All RIOs are to be approved by the regulator. The Telecommunication Interconnection Usage Charges (IUC) Regulation of 29 January 2003, was a comprehensive review, providing estimates of costs of network elements involved in interconnection.

Although the final interconnection rules[7] were not adopted until late 2003 (TRAI 2003), their general form was known by early 2002, and explains the recent boom in wireless networks. The current regulatory environment with regards to interconnection is fairly stable now and the system at least eliminates much of the unnecessary complexity and unfairness. However, interconnection prices are still far above cost due to the "universal service" plan i.e. the access deficit charges (ADCs), which are incorporated into interconnection charges and are paid directly to the incumbent state-owned enterprise (BSNL) in order to compensate it for providing below-cost service in rural areas (See Annex 4 for the ADC charges on various calls). The ADC regime imposed by the regulator is very controversial and has diluted some of the gains made by the regulator in putting in place an otherwise acceptable IUC regime, the most important achievement being the introduction of the CPP regime. The current ADC regime is criticised on the following grounds (Noll and Wallsten 2004):

- The ADC calculations are based on annual reports of the incumbent, which neither separates various costs to levels required for rigorous calculation. A major concern is the conflict of interest since the source of the data in question and the intended beneficiary of the ADC payment are both BSNL.

- The magnitude of the funds transferred through the ADC is not trivial. TRAI originally estimated the annual "access deficit" at Rs 130 billion (nearly USD 3 billion), but reduced its estimate to Rs 53.40 billion (approximately USD 1.1 billion).

- The distribution of payments from the ADC charges also varies according to the type of call. For local calls between fixed and mobile networks, the fixed network gets the fee regardless of whether it originates or terminates the calls. For long-distance charges between fixed line carriers or other long-distance calls originating in a fixed line carrier, 'bill and keep' will apply – that is, the originating network keeps all of the revenue. For intra-circle calls (whether local or long-distance) from mobile to fixed networks, the former pays the latter directly, but for inter-circle calls the long-distance carrier collects the tax and pays it to the terminating carrier. For international calls originating or terminating in a mobile carrier, the ADC charge goes to BSNL.

- The magnitude of the ADC fee is the same for all fixed carriers, regardless of their actual costs of service. Thus, carriers for which usage is especially high receive a greater total subsidy than carriers for which usage is low. Like most goods, telephone usage has a positive income elasticity of demand; hence, the reimbursement scheme provides a greater cross-subsidy from usage to access service in richer parts

of India. Moreover, because rural areas generally have lower average incomes but higher costs per user, the magnitude of the subsidy is likely to be inversely proportional to a community's ability to pay for service. In short, the highest per capita subsidies will flow to from mobile carriers to fixed carriers in the highest income urban areas. Fixed carriers in low-income rural areas with no mobile service will receive the smallest subsidy. Even within BSNL, which receives most of the ADC payments, the incentive created by this system is to extend access service in rich urban areas before service is provided to low-income and rural areas.

- The inclusion of ADC in interconnection charges makes the existing competitive service tariffs unviable and opaque. Moreover, building ADC through interconnection charges and hence through individual calls creates severe market distortions.

Our own view on this is that interconnection charges should be cost-based and unbundled and that inclusion of ADC imparts an element of non-transparency and discrimination in the interconnection process. Further, ADC inflates prices and may encourage inefficient bypass and network duplication. Removing this anomaly from the current interconnection regime soon would go a long way in improving competitive conditions as well as in strengthening the regulatory environment in this regard.

8. Tariffs

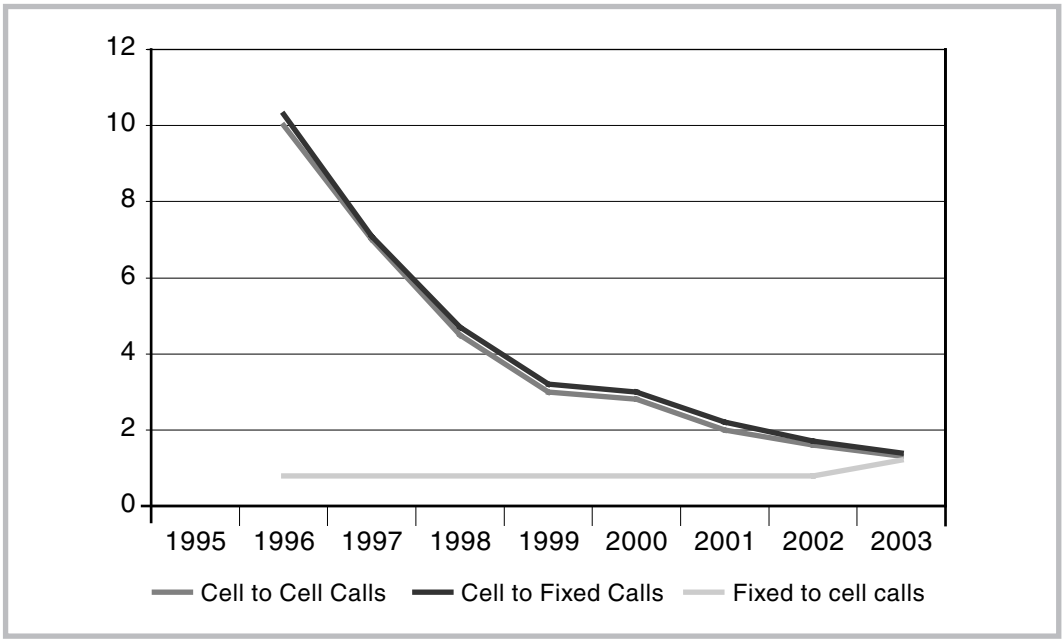
The Telecommunication Tariff Order (TTO) 1999, issued by the regulator began the process of tariff rationalization with an increase in monthly rental and decrease in STD and ISD tariffs. This rebalancing exercise was implemented by TTO in three steps, the first carried out in May 1999 and the third implemented on 14 March 2002. This resulted in a reduction of NLD tariffs by about 56% and ISD tariffs by about 47%. Under the 24th amendment of TTO, issued on 24 January 2003, the regulator has brought down the tariff for domestic long-distance calls by imposing a ceiling of Rs 8.40 per minute for calls beyond 50 kilometres. It has been left to the operator's discretion to bring down tariffs further, depending on market economies, and companies have further slashed their rates.

Table 4 – **Trends in tariffs (Rs per minute)**

	1998-1999	1999-2000	2001	2002	March 2003 onwards
NLD (beyond 1000 km)	30.0	30.0	24.0	9.6	4.8
ILD (USA)	61.2	61.2	49.2	40.8	24.0
Mobile	14.5	6.1	2.4	1.9	1.6

Source: TRAI.

Figure 4 – **Converging tariffs**



However, all this was not so smooth. From 1997 until 1999, at which time TRAI came out with its TTO, the DoT strongly defended the highly complicated cross-subsidy regime on absurd arguments that the elasticity of demand for long-distance calls was zero! The major reason for putting up a strong resistance to a slashing of the NLD rates was that DoT did not want to lose the revenue with which the government could extend its patronage to individual subscribers by subsidizing their rentals. However, in subsequent tariff orders TRAI succeeded in lowering free calls and increasing call charges. Since, the rentals were stipulated as ceilings DoT did not implement the increased rentals.

Attempts were made to establish a level playing field through the tariff rebalancing exercise. First, TRAI issued an order on telecom charges[8] in which maximum tariffs aimed at reducing cross-subsidies by DoT were laid down, rentals and call charges were raised and domestic and international trunk charges on which DoT made large profits were lowered. It thus took a small step towards aligning DoT charges to costs. TRAI also proposed a shift to a CPP regime. It proposed that for a wireline-to-cell calls, the wireline caller should pay Rs 3.90, of which the cellular operators should get 85%. But once the government agreed to replace licence fees with a proportional charge, TRAI realized that cell phone companies' costs would be greatly reduced, and issued another consultation paper,[9] in August 1999, in which it made some reductions in the rental and call charges of the cellular operators. However, by 2002 the prepaid revolution and competition in the wireless segment meant a reduction in the gap in the call charges in comparison to the wireline.

TRAI issued Telecommunication Tariff (Twenty Third Amendment) Order 2002 (7 of 2002), forbearing from prescribing cellular tariff and required only integrated operators to seek prior approval for their tariffs from TRAI. In this order, TRAI pointed out that in light of the emerging market scenario, it was of the view that a stage had been reached in which market forces could effectively regulate cellular tariff and the regulator must step aside except for a broad supervision in the interest of the consumer.

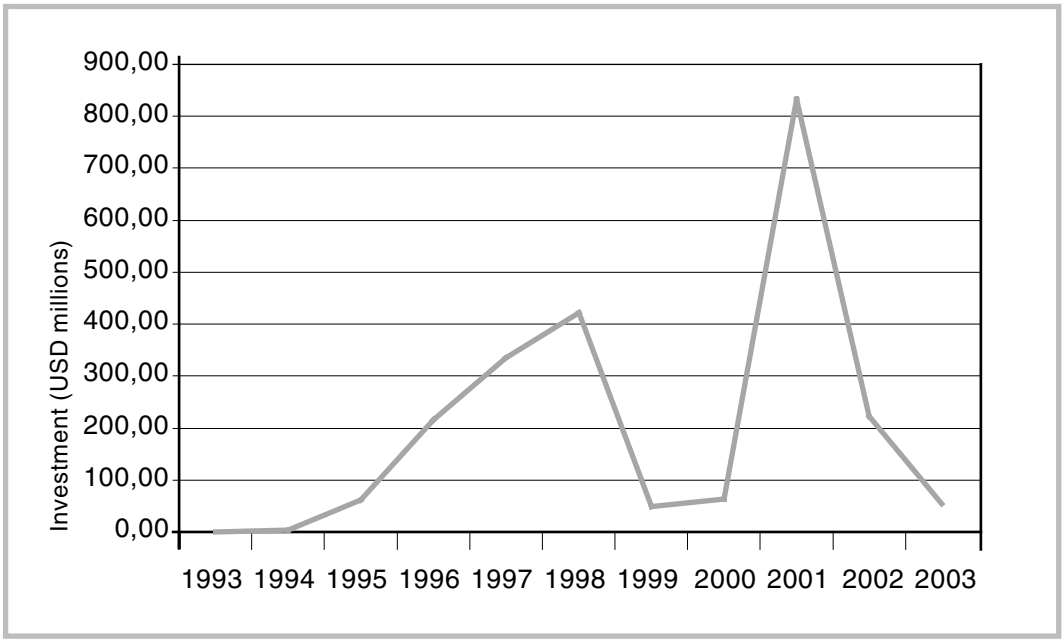
Despite lack of support from the government, the incumbent, or the courts, TRAI was pro-competitive and was successful to a certain extent in rebalancing telecom rates. This is no small achievement as the tariff restructuring had to be carried out under conditions of opaque and complicated accounting practices of the incumbent, which was the major source of information of the unbundled cost components.

9. Regulation of Anti-competitive Practices

Due to unequal entry decisions made by the DoT as a licensor, where the state-owned incumbent, had a pan-Indian licence while the competitors of the private telecom companies had service specific and circle-wise licences, the monopoly elements of the incumbent were bound to be retained. Thus, at the very outset of the reform process, India's telecom market structure was highly skewed in favour of the state-owned incumbent. Given this initial condition of an unequal arrangement the old as well as the new TRAI has been unable to create parity between the state-owned incumbent and the private telecom operators. The regulator's attempt to regulate the incumbent asymmetrically has not been very successful. The regulator has accepted the market structure as given even though this structure has a huge risk for anti-competitive behaviour by the incumbent. The crucial missing link is the insufficient regulatory attention devoted to the design of appropriate market structures. Moreover, the ease with which policy, TRAI membership, and judicial oversight of TRAI decisions were shifted because the government wanted to change policies in its own favour shows the fragility of TRAI's independence (Uppal 2003).

As has been pointed out above, the regulator's attempt to dilute the inherent strength of the incumbent was met with severe challenges by DoT, be it on the issue of CPP or on the entry of MTNL/BSNL into the cellular business. In the later years, the interconnection regime promoted by the regulator was pro-competitive, but the regulator's inability to do away with the cross-subsidy regime in the form of ADC still leaves much desired in the area of controlling anti-competitive practices by the incumbent. This legitimising of cross-subsidy in the favour of the incumbent by the regulator has been criticized on the grounds that it will merely lead to the further enrichment of BSNL at the expense of the rival private telecom operators. The absence of reliable, separated costs and the regulators weak attempts in forcing accounting separation, means such cross-subsidy which is based on the cost information provided by the incumbent is difficult to establish. The weak enforcement regime, lacking sensitisation to competition issues, is likely to compound an already serious risk and could distort com-

Figure 5 – **Foreign direct investment inflows in telecoms (1993-2003)**



petition in the market place and encourage abuse. It may especially hurt marginal consumers who do not provide large revenues to operators.

The handling of the WLL controversy by the regulator, mainly on account of the alleged anti-competitive behaviour of a few basic service operators wanting to get a toehold in the cellular business, is another instance of a weak regulatory environment. Between 2001 and 2003, a series of litigations on this matter seriously jeopardized the regulatory environment, especially in the context of fostering competition. India's new unified licensing regime for telecoms is a step in the right direction since it would reduce – as it already has done – the debilitating litigation and much controversy in the sector. But it does present an increased challenge in regulating market power. With larger market size the scope for anti-competitive subsidy by the integrated players, especially the incumbent, increases many fold. Until now the general perception is that the incumbent's market power has been feebly checked by the regulator.

The regulator has not been very successful in demonstrating sufficient power over the incumbent. However, this may be due to TRAI's limited jurisdiction in the licencing process and because it is carrying forward the universal access policies of the government. Whatever the case, the point is that the regulator can and must improve its perception on this count and not be seen as subservient to the government and hence the incumbent.

10. Investment

The initial response of the private sector to the liberalisation of the sector was very encouraging. The attractiveness of the Indian market due to its low teledensity, the high latent demand and a burgeoning middle class brought in some of the largest global telecom players, foreign institutional investors and the major Indian industrial houses to invest in telecom, especially in the Indian cellular industry. Annual foreign investment in telecom increased steadily from an insignificant USD 0.67 million in 1993 to USD 422.06 million in 1998. However, poor policy prescriptions as well as lack of direction in the regulatory process were responsible for a sharp drop in foreign direct investment (FDI) inflows. In any case, the foreign equity partners were very cautious and this caution has even carried through until now. Initially, scepticism was valid as the incumbent, which was state-owned was also the regulator. Disillusioned by the government's handling of telecom services deregulation, several international telecom giants had, by 1999, pulled out of India or had frozen new investment. They blamed the government for having unfriendly telecom policies. Vexed by the long delays in implementing policies as well as the ownership cap, several telecom companies including US West, Nynex, Swiss Telecom, Bell Canada, Bezeq of Israel, Telecom Italia, Shinawatra of Thailand, Philippine Telecom and Australia's Telstra Corporation wound up their investments in India.

As shown in Figure 5, the total FDI inflow (in telecom) into the country fell from USD 422 million to a little under USD 50 million during 1998-99. It was only after the NTP-99 and other policy interventions that provided the regulator credibility did a degree of investor confidence re-emerge. One important bottleneck to FDI in the sector is the 49% cap on foreign holdings. The Group of Ministers (GoM) on telecom has proposed a hike in the foreign investment limit from 49% to 74%. FDI ceiling would remain at 49% with the incremental foreign investment being permitted via foreign institutional investment.

Between August 1991 and March 2004, Rs 99.5 billion (USD 2.2 billion) of foreign direct investment was made in telecoms in the broad sense. Its debt equity break-up is not known. But slightly less than half of it went into holding companies. Almost Rs 26.6 billion went into cellular operating companies. Table 5 provides a breakdown of the cumulative FDI (until March 2004).

The incumbent, BSNL, also responded to the entry of private operators by infusing more funds for network expansion. However, most of the financing came from the monopoly surpluses of the incumbent. However, with competition catching up, this source as well as the monopoly profits of MTNL would not be available to the incumbent to finance its investments. BSNL has plans to rollout an additional 15 million GSM and three million CDMA-based WLL connections in India by the fiscal end of 2004-05 at a cost of Rs 60,000 million (USD 1.3 billion) and Rs 10,000 million (USD 217 million) respectively. The funding of these additional investments requires major financial restructuring, including raising equity from the market. The expansion pressures are also likely to induce cost cutting measures that would include organizational restructuring.

Table 5 – **Break-down of the cumulative FDI (from August 1991 – March 2004)**

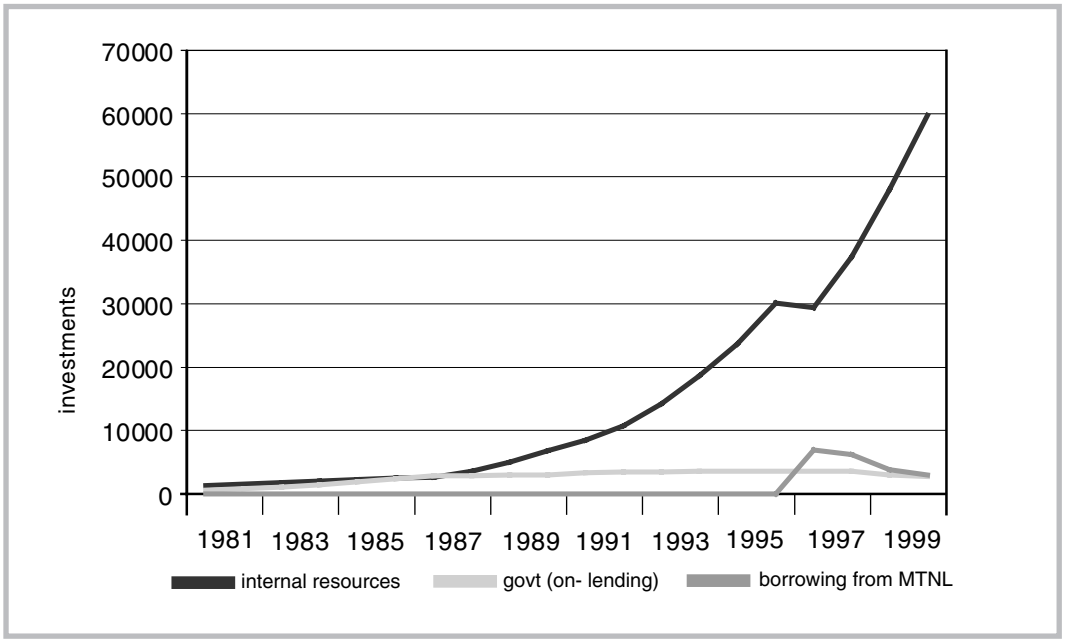
Service	Cumulative Investment in Rs Million	Percentage of total
Basic Telephone Service	3937	3.96%
Cellular Mobile Telephone Service	26646	26.78%
Radio Paging Service	910	0.91%
Email Service	688	0.69%
VSAT Service	281	0.28%
Cable TV Network+Internet	1704	1.71%
Satellite Telephone Service	481	0.48%
Radio Trunking Service	71	0.07%
Manufacturing & Consultancy	15784	15.86%
Holding Companies	48420	48.66%
Other Value Added Services	227	0.23%
Automatic Route	361	0.36%
TOTAL	99509	

Source: DoT website, <www.dotindia.com>.

Thus, while regulatory uncertainty and policy changes were not palatable to foreign investors given high risk aversion of foreign investors, the domestic entrepreneurs familiar with government's vacillating policies and continuous mid-course revisions were enthusiastic in their response, as can be seen from the level of investment both in basic as well as cellular. The regulatory apparatus did not worry the incumbent either and while the new foreign entrants were apprehensive, which resulted in a flight of capital, the incumbent continuously increased its investments.

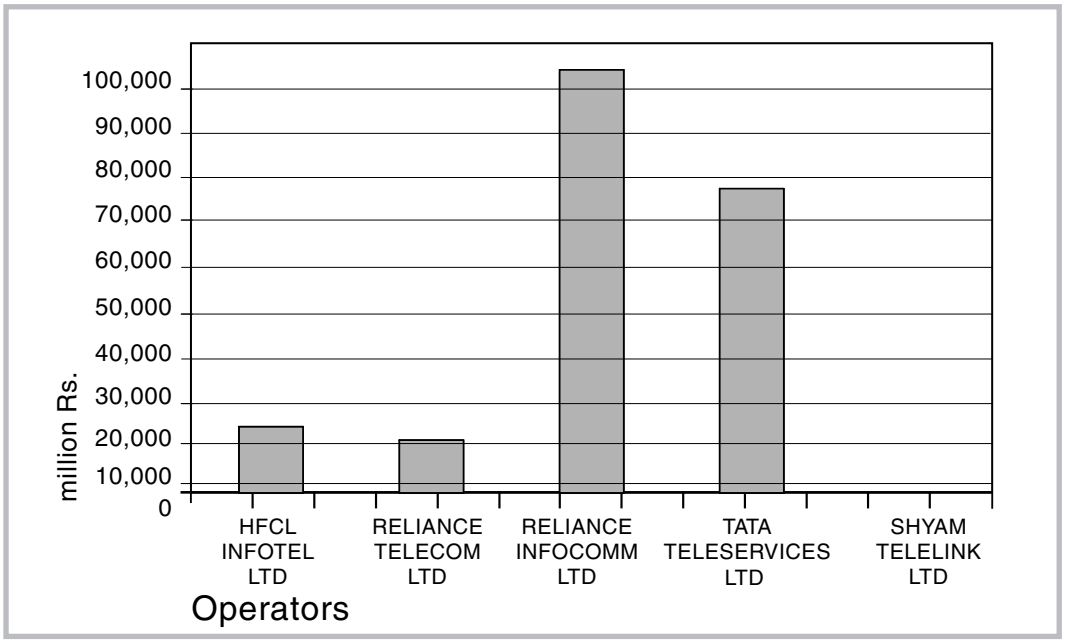
Domestic financial institutions also played a pivotal role in the expansion of telecom infrastructure in the country. The total sanctioned assistance of major financial institutions to various telecom service providers in the form of debt and equity stood at Rs 177300 million and Rs 2940 million respectively, at March 2003. The disbursements of debt and equity aggregated to Rs 127320 million and Rs 2100 million respectively. Thus the total exposure of financial institutions in telecom sector, at 31 March 2003, stood at about Rs 129420 million. The details of year-wise sanctions and disbursements of debt and equity of various financial institutions are given in Annex 5.

Figure 6 – **Sources of incumbent's investment**



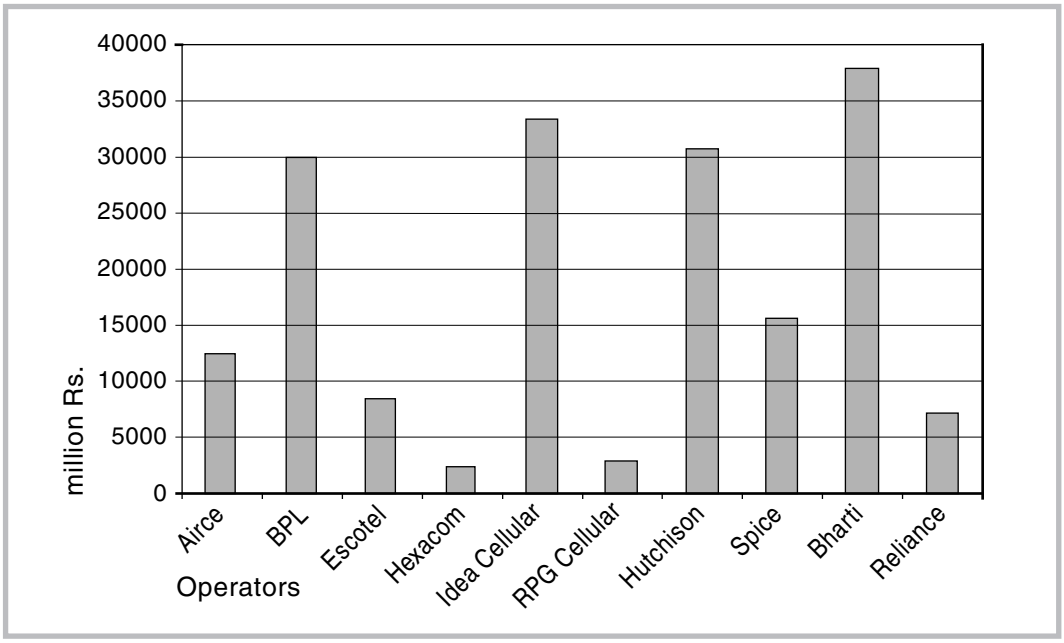
Source: Indian Telecommunication Statistics, DoT, 2002.

Figure 7 – **Cumulative investments of the basic service operators (in million Rs)**



Note: The investment includes set up costs and the entry fee paid till November 2003.

Figure 8 – **Cumulative investments of the cellular operators (in million Rs)**



The scale of investment has been impressive but in order to achieve the targeted 20% teledensity, India needs incremental investments of USD 10-15 billion over the next five years. Issues on foreign equity holding continue to hamper the fund raising ability of the sector and this protectionist policy has to be reversed to be able to meet the targets (see Annex 6 for the financing of these investments for a few major telecom companies).

11. Conclusions

Regulatory effectiveness is crucially mitigated by the monopoly wielding power of the incumbent and the stronger it is, the greater the chance of undermining regulatory independence. An important observation on the infrastructure reforms in India is that irrespective of the sector, the incumbent has slowed down reform, as reform would lead to an annulment of their arbitrary powers. So much so, the inherited strength of the incumbent coupled with the powers residing with it can impinge on the process of liberalisation. Until a clear policy on competition is put in place, economic growth and consumer welfare will remain hostage to incumbents' control. Moreover, with the incumbent player entrusted with the formulation of reform strategies, there is a serious conflict of interest as these reform programmes strike at the roots of their power and privileges, exacerbating the problems of the economic regulator.

The telecom sector was no different. Earlier attempts to introduce real competition in the sector were severely constrained by the incumbent's anti-competitive behaviour. Further, as per the TRAI Act, issues covered by the Monopolies and Restrictive Trade Practices Commission (akin to a Competition

Commission) were excluded from TRAI's jurisdiction. This implied that anti-competitive behaviour by BSNL could not be referred to the former. Any attempts on competition management by the regulator were undermined by the incumbent DoT as and when it could do so. Until DoT was separated from its operational arm, BSNL, and the reconstituted TRAI provided with more powers to manage competition, investment in the sector was arrested.

It should also be borne in mind that India does not have a long institutional history of independent regulation. The manner in which TRAI was conceived requires a

Table 6 – **Regulatory and policy developments and investor perception**

	Regulatory and Policy developments	Perception
1995-97	DoT auctions licences, high bids for the licences, operators renege on payment of licence fees. Litigation on account of cashing of bank guarantees. Poor response to basic service auctions. Opening of the sector without setting up of a regulator. Finally, TRAI established in January 1997 and quashed DoT's move to increase tariffs for calls from fixed-line to cellular phones.	Neutral
1998-2000	DoT and TRAI in serious litigation on issues of tariff, entry of MTNL into cellular. New National Telecom Policy 1999 announced. Telecommunication Tariff Order (TTO) 1999 comes into effect. DoT is separated from its operational arm. Conditions for migration to revenue sharing from fixed licence fee regime issued. TRAI (Amendment) Ordinance 2000 promulgated and the old TRAI dissolved.	Initially very risky but improvement in the environment on account of NTP-99 and migration to revenue sharing regime and TRAI's tariff rebalancing exercise, thus investment was on hold till this unfolded.
2001-03	Opening up domestic long-distance telephony for carrying both inter-circle and intra-circle traffic, with no restriction on the number of players. WLL controversy. Subsidy to the incumbent through interconnection charges.	Investment, both domestic and foreign, responded positively to the policy and regulatory developments of the past, until the WLL controversy caught up.
2004-	Unified licence, Mergers and acquisitions, Allocation of scarce spectrum. Convergence?	Positive

strong administrative tradition, ability to undertake commitment that can endure any political interference backed by an independent judiciary that is able to make enforceable decisions (Levy and Spiller 1996). Moreover, it also requires substantial professional cadres capable of handling the complex regulatory practices and processes. Until some of these stringent conditions for effective regulation could be established TRAI was not in a position to establish investor confidence. Investors were not confident that TRAI could protect them from *de facto* expropriation through arbitrary changes in policy or from the anti-competitive practices of the incumbents. It is not surprising therefore that telecom was the most litigious sector. However, as the institution developed the much required credibility and commitment, the outcomes in the form of increased network expansion have been impressive. Table 6 provides an overview of the regulatory and policy developments and the investor perception of the same over a period of approximately ten years from the time of the first attempts at liberalising the sector:

In conclusion, we must put the regulatory tasks of the Indian telecom regulator in the correct perspective. With a disproportionately large percentage of people without access to telecom and an atypical structure of the telecoms industry in India (where state-wise and service-wise players compete with a fully integrated incumbent) the task of the regulator is no mean feat. Unlike in developed economies where telecom penetration is near saturation, the Indian regulator must also keep the objective of increasing teledensity in mind in determining regulatory principles. Thus not only is the regulator responsible for setting a fair rate of return and preventing concentration of market power, it also has the mandate to ensure incentives for investments and hence growth. This developmental role sets it apart from regulatory agencies in developed markets. It also determines the optimal timing and sequence of regulatory changes. This cannot be overlooked considering the skewed distribution of the network rollout, evident in the wide disparities in the rural and urban teledensities of 1.49 and 15.16 respectively. However, the regulator's ability to meet this challenge crucially depends upon the ability to restrain the domestic incumbent and to enforce a fair interconnection regime.

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[2] 1 crore = 10 million; USD 1 = Rs 46 in May 2004, or Rs 1 = 2.2 cents USD.

[3] This analysis is based on the 'Telecom Regulatory Environment' (TRE) framework proposed by Samarajiva and Dokeniya (2004, this volume).

[4] Further concessions were provided in 2003 at the time of the introduction of the Unified Access Service Licence, which was a reduction of revenue shares by 2% for all players and a further concession of 2% for such cellular players who had entered the field in the first round of bidding with higher licence fee.

[5] The November 1997 MTNL decision to start CDMA based – cellular service without the government seeking recommendation from TRAI on issuing new licence. This lead to legal battles that seriously undermined the power of the regulator and in October of 1999 MTNL went ahead with the cellular service without even seeking TRAI's approval on tariffs

[6] For example the Chennai service area valuation is believed to have almost halved to a modest USD 75 million – USD 80 million from USD 150 million. See "Hutchison to Bid for More Cellular Licences", *Total Telecom* (22 June 2001) available at <www.totaltele.com>.

[7] Termination charge for calls to basic (Fixed, WLL (Fixed), and WLL with limited mobility) and Cellular networks would be uniform at Rs 0.30 per minute. The same termination charge would be applicable for all types of calls viz. Local, National Long-Distance and International Long-Distance.

[8] TRAI, The Telecommunications Tariff Order 1999. Delhi.

[9] TRAI (1999): Consultation Paper on Cellular Mobile Service Tariffs Following Migration to an Interim Revenue Share of 15 Per Cent As Licence Fee and Introduction of Calling Party Pays (CPP) Regime for Cellular Mobile. Delhi. Consultation Paper 4 of 1999.

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Annex 1 – Chronology of Indian Telecom Liberalisation

May 1994	National Telecom Policy announced.
July 1994	Radio paging, V-SAT data services, electronic mail services, voice – mail and video – text services opened to private providers.
September 1994	DoT guidelines for private sector entry into basic telecom services in the country.
October 1994	Eight cellular licensees for four metros finalized after over two years of litigation.
January 1995	DoT calls for proposal to operate basic, cellular telecom services and public mobile radio trunked (PMRT) services.
August 1995	VSNL began public internet access in selected cities.
	DoT receives bids for basic, cellular and PMRT services.
December 1995	DoT announces cap on the number of circles basic operators can rollout services in. Licensees selected for five circles.
	Most cellular operators in circles sign licence agreements.
January 1996	After setting reserve prices for circles, DoT invites fresh bids for basic services in 13 circles.
March 1996	Five successful bidders short-listed for providing basic services.
May 1996	Poor response to third round of basic telecom bidding. Only one company bids – for Madhya Pradesh.
July 1996	Selected bidder of first round refuses to extent bank guarantees for its four circles. Challenges in court, DoT moves to encash guarantees.
Oct. 1996 - Jan. 1997	Three more companies move court against DoT move to encash guarantees.
January 1997	Telecom regulatory Authority of India (TRAI) formed.
February 1997	First basic telecom service company signs licence and interconnect agreements with DoT for Madhya Pradesh.
March 1997	Second basic service provider signs basic telecom licence pact for Gujarat.

April 1997	TRAI quashes DoT move to increase tariffs for calls from fixed-line telephone to cellular phones.
August 1997	VSNL calls for global tenders to find a partner for its South Asian regional hub project.
September 1997	Internet Policy cleared; licence agreement for basic services in Maharashtra also becomes operational.
November 1997	Basic service licensees for Andhra Pradesh and Punjab sign basic telecom agreements with DoT.
January 1998	DoT announces the policy for ISPs; no limit on number of licences. Fee to be Re1.
March 1999	TRAI Issue First Tariff Order.
	New Telecom Policy approved.
May 1999	Tariffs were restructured with lower rates for long-distance and higher rentals.
July 1999	Conditions for migration to revenue sharing from fixed licence fee regime issued.
	Guidelines for setting up International gateways for internet announced.
October, 1999	Bifurcation of the Department of Telecommunication (DoT) into Department of Telecommunications and the Department of Telecommunication Services.
December 1999	Private ISPs allowed to set up satellite gateways.
1999-2000	An Interministerial Wireless Planning Coordination Committee (WPCC) was created for effective and efficient spectrum management and allocation.
January 2000	TRAI (Amendment) Ordinance 2000 redefines the role of TRAI by splitting it into two, with one acting as a regulator and the other as an arbitration unit in the form of tribunal, named as TDSAT.
August 2000	Government announces guidelines for opening up domestic long-distance telephony for carrying both inter-circle and intra-circle traffic, with no restriction on the number of players.

October 2000	The second phase of tariff rebalancing was done to reduce the domestic long-distance and international long-distance tariff.
	Department of Telecom Operation (DTO) and Department of Telecom Services (DTS) have been corporatised as BSNL.
2000-01	BSNL and MTNL permitted to enter as third cellular operator in their respective circles.
	Additional Basic Service operators would also be permitted.
	Termination of monopoly of VSNL for International Long-Distance (ILD) service has been moved to 31 March 2002, from 31 March 2004.
January 2001	Fixed service providers have been permitted to provide limited mobility in the form of Wireless in Local Loop (WLL) on a restricted basis.
	Private ISPs having satellite gateways formally allowed to sell bandwidth to other ISPs.
July 2001	Policy for Voice mail/Audiotex service was announced in July 2001 by incorporating a new service called Unified Messaging Service. Licences for Voice Mail/Audiotex service will be granted, on non-exclusive basis, SDCA (Short Distance Charging Area) wise. Licence fees and entry fee will be nil.
August 2001	The Communication Convergence Bill'2001 was introduced in Lok Sabha on August 31, 2001, referred to standing committee.
	Opening of National Long-Distance service to competition.
Sept/Oct 2001	Fourth cellular operator, one each in four metros and thirteen circles has been permitted. In all, 80 licenses (56 private and 22 to BSNL and two to MTNL) have been issued.
2001	TRAI has given its recommendations for opening up of internet Telephony in 2002, which are under consideration of the government.
2002	Three companies have been given licence for ILD and two more companies were granted provisional clearance during 2002-03. So far three licences have been issued for NLDOs.
March 2002	Government issues final guidelines for Internet Telephony services. ISPs allowed to provide the service on payment of additional licence fees. However, Incoming IP Calls may not be terminated on the phone network which means subscribers can call out but not receive calls directly from the internet on their own telephones.

April 2002	Internet or IP telephony service allowed.
September 2002	TRAI decides to "forebear" from regulating cellular tariffs.
October 2002	With a view to increase competition in the cellular segment, BSNL launched India Mobile Personal Communication System (IMPCS) project in October 2002.
November 2002	The Standing Committee on Communications and IT has presented its report on 20th November 2002 on the Communication Convergence Bill 2001. The observations/recommendations made by the committee are under consideration.
March 2003	The Union Ministry of Communication relaxed the non-transferability clause in telecom service licences in the last week of March.
May 2003	The Telecommunication Interconnection Usage Charges (IUC) Regulation 2003 has been implemented from 1st May 2003. (It's currently under review).
July 16, 2003	TRAI issues a Consultation Paper on Unified Licensing for Basic and Cellular services.
August 8, 2003	TDSAT allows basic operators to offer WLL limited mobility services.
Aug/Nov 2003	A GoM on telecom is set up.
	TRAI imposes ADC charges on cellular operators with effect from 15 December 2003.
	GoM releases 25 MHz of spectrum.
	GoM proposes a hike in foreign investment from 49% to 74%.
	The Cabinet approves intra circle mergers, though TRAI is yet to lay down clear guidelines.
	Government allows the issuance of unified licences that will allow local wireline players to provide cellular service and vice-versa.
	DoT amends NTP-99 to recognise unified telecom licence and unified access licence that will allow local wireline players to provide cellular service and vice-versa.

Source: Annual Reports of DOT, Press Releases, ADB project report, NCAER.

Annex 2 – Network Status

S. No.	Description	Status (in million)
1.	No. of DELs (Public / Private)	50.758 (40.842 /9.916)
2.	Cellular mobile phones (Public / Private)	27.174 (5.759/21.415)
3.	VPTs	0.522
4.	Rural DELs	12
5.	PCOs	1.75
6.	Internet Subscribers	4.1

Source: DoT, April 2004.

Annex 3.1 – Circle-Wise Cellular Service Operators and Basic Service Providers

Circle	States	Cellular companies	Basic service operators
Metros			
	Delhi	Bharti Cellular	Reliance Infocom Ltd.
		Hutchison Essar	Bharti Telenet Ltd.
		MTNL	Tata Teleservices Ltd.
		Idea Cellular	MTNL
	Mumbai	BPL Mobile	Included in Maharashtra
		Hutchison Max	
		MTNL	
		Bharti Cellular	
	Chennai	RPG Cellular	Included in Tamil Nadu
		Bharti Mobinet	
		Hutchison Essar	
		BSNL	
	Kolkata	Bharti Mobitel	Included in West Bengal
		Hutchison Telecom	
		BSNL	
A' Circle			
	Maharashtra	BPL Cellular	Reliance Infocom Ltd.
		Idea Cellular	Tata Teleservices (Maharashtra) Ltd.
		Bharti Cellular	BSNL (All the areas except Mumbai)
		BSNL	MTNL (Mumbai)
	Gujarat	Fascel	Tata Teleservices Ltd.
		Idea Cellular	Reliance Telecom Ltd.
		Bharti Cellular	BSNL
		BSNL	
	Andhra Pradesh	Idea Cellular	Reliance Infocom Ltd.
		Bharti Mobile	Tata Teleservices
		Hutchison Essar	BSNL
		BSNL	
	Karnataka	Bharti Mobile	Reliance Infocom Ltd.
		Spice Communications	Bharti Telenet Ltd.
		Hutchison Essar	Tata Teleservices Ltd.
		BSNL	BSNL
	Tamil Nadu	BPL Cellular	Reliance Infocom Ltd.
		Aircel Limited	Bharti Telenet Ltd.
		BSNL	Tata Teleservices Ltd.
		Bharti Cellular	BSNL

Circle	States	Cellular companies	Basic service operators
B′ Circle			
	Kerala	Escotel Mobile	Reliance Infocom Ltd.
		BPL Cellular	BSNL
		Bharti Cellular	
		BSNL	
	Punjab	Spice Communications	Reliance Infocom Ltd.
		Bharti Mobile	HFCL
		BSNL	BSNL
	Haryana	Escotel Mobile	Reliance Infocom Ltd.
		Aircel Digilink	Bharti Telenet Ltd.
		Bharti Cellular	BSNL
		BSNL	
	Uttar Pradesh(W)	Escotel Mobile	Reliance Infocom Ltd.
		Bharti Cellular	BSNL
		BSNL	
	Uttar Pradesh(E)	Aircel Digilink	Reliance Infocom Ltd.
		BSNL	BSNL
	Rajasthan	Aircel Digilink	Reliance Infocom Ltd.
		Hexacom	Shyam Telelink Ltd.
		BSNL	BSNL
	Madhya Pradesh	Idea Cellular	Reliance Infocom Ltd.
		Reliance Telecom	Bharti Telenet Ltd.
		Bharti Cellular	BSNL
		BSNL	
	West Bengal	Reliance Telecom	Reliance Infocom Ltd.
		BSNL	BSNL
C′ Circle			
	Himachal Pradesh	Bharti Telenet	Reliance Infocom Ltd.
		Reliance Telecom	BSNL
		BSNL	
	Bihar	Reliance Telecom	Reliance Infocom Ltd.
		BSNL	BSNL
	Orissa	Reliance Telecom	Reliance Infocom Ltd.
		BSNL	BSNL
	Assam	Reliance Telecom	BSNL
		BSNL	
	North East	Reliance Telecom	BSNL
		Hexacom	
		BSNL	
	J & K	BSNL	BSNL
	Andaman & Nicobar	Merged with West Bengal	Reliance Infocom Ltd.
			BSNL

Source: COAI & ABTO.

Annex 3.2 – List of National Long-Distance Service Providers

S. No.	Service Providers	Licence Signed On
1	M/s Bharti Telesonic Limited	29.11.2001
2	M/s Reliance Communication Limited	28.01.2002
3	M/s VSNL	08.02.2002
4	BSNL	It has got the licence and also operating in its area

Source: TRAI.

Annex 3.3 – List of International Long-Distance Service Providers in Addition to VSNL

S. No.	Service Providers	Licence Signed On
1	M/s Reliance Communications Limited	25.02.2002
2	M/s Bharti Telesonic Limited	14.03.2002
3	M/s Data Access (India) Ltd.	27.03.2002
4	VSNL	It is having the licence and also operating in its area
5	BSNL	It has got the licence but not yet started operating

Source: TRAI.

Annex 4 – ADC Component for Various Types of Inter-network Calls

Access Deficit Charges	Local	Intra Circle Calls		Inter Circle Calls			ILD
in Rs per minute	Local	0-50 kms	> 50 kms	0-50 kms	50-200 kms	> 200 kms	ILD
Fixed – Fixed	0.00	0.00	0.30	0.30	0.50	0.80	
Fixed – WLL(M)	0.30	0.30	0.30	0.30	0.50	0.80	4.25
Fixed – Cellular	0.30	0.30	0.30	0.30	0.50	0.80	
WLL(M) – Fixed	0.30	0.30	0.30	0.30	0.50	0.80	
WLL(M) – WLL(M)	0.00	0.00	0.00	0.30	0.50	0.80	4.25
WLL(M) – Cellular	0.00	0.00	0.00	0.30	0.50	0.80	
Cellular – Fixed	0.30	0.30	0.30	0.30	0.50	0.80	
Cellular – WLL(M)	0.00	0.00	0.00	0.30	0.50	0.80	4.25
Cellular – Cellular	0.00	0.00	0.00	0.30	0.50	0.80	

Annex 5 – Sanctions and Disbursement by Financial Institutions for Telecom Sector (Rs millions)

Year	IDFC	IDBI	ICICI*	IFCI	SBI	Total
A. Debt						
1988-99				35		35
1988-99				0		0
1990-91				0		0
1991-92				0		0
1992-93				0		0
1993-94				0		0
1994-95				920.86		920.86
1995-96		1730.00		40.50	90.57	1870.07
1996-97		500.00		410.61		910.61
1997-98	0	9300.00		2290.52	1590.00	13180.52
1998-99	2250.00	9250.00	13950.00	2140.05	1270.40	28860.45
1999-2000	5000.00	0	7620.00	0	700.93	13320.93
2000-01	16100.00	8630.80	13650.00	180.40	1500.00	40070.20
2001-02	14950.00	6000.00	20350.00	500.00	8020.00	49820.00
2002-03	690.00	2050.00	12660.00	0	12560.55	27960.55
Sub-total	38990.00	37460.80	68230.00	6850.94	25750.45	177300.19

Year	IDFC	IDBI	ICICI*	IFCI	SBI	Total
B. Equity						
1988-99				0		0
1988-99				0		0
1990-91				0		0
1991-92				0		0
1992-93				0		0
1993-94				0		0
1994-95				0		0
1995-96		0		0	0	0
1996-97		0		0		0
1997-98	0	0		0	0	0
1998-99	0	0		50.00	150.70	200.70
1999-2000	0	0		80.24	0	80.24
2000-01	500.00	1110.00		0	0	1610.00
2001-02	500.00	0		0	0	500.00
2002-03	0	0		0	0	0
Sub-total	1000.00	1110.00	0	130.24	150.70	2390.94
Grand Total	39990.00	38570.80	68230.00	6990.18	25910.15	179700.13

Note: No separate data for Debt and Equity for Sanctions of ICICI. Available data shown under Debts.
*Source: Data submitted by Institutions.

Disbursements (Rs millions)

Year	IDFC	IDBI	ICICI*	IFCI	SBI	Total
A. Debt:						
1988-99				350		350
1988-99				0		0
1990-91				0		0
1991-92				0		0
1992-93				0		0
1993-94				0		0
1994-95				0		0
1995-96		1360.00		30.00	0	1390.00
1996-97		300.00		120.90		420.90
1997-98	0	1520.00		2290.10	0	3810.10
1998-99	1600.00	5150.00	8260.00	1580.25	910.10	17500.35
1999-2000	2850.00	2870.50	7710.00	1550.71	220.00	15210.21
2000-01	4500.00	8920.93	6160.00	180.40	1400.00	21170.33
2001-02	7750.00	2620.30	28500.00	100.00	600.13	3957.43
2002-03	4150.00	1390.42	8130.00	0	14210.00	27880.42
Sub-total	20850.00	24150.15	58760.00	6220.36	17340.23	127320.74

Year	IDFC	IDBI	ICICI*	IFCI	SBI	Total
B. Equity:						
Year	IDFC	IDBI	ICICI**	IFCI	SBI	Total
1988-99				0		0
1988-99				0		0
1990-91				0		0
1991-92				0		0
1992-93				0		0
1993-94				0		0
1994-95				0		0
1995-96		0		0		0
1996-97		0		0		0
1997-98	0	0		0		0
1998-99	0	0		50.00		50.00
1999-2000	0	0		80.15		80.15
2000-01	440.00	1110.00		0.90		1550.90
2001-02	420.00	0		0		420.00
2002-03	0	0		0		0
Sub-total	860.00	1110.00	0	130.24	0	2100.24
Grand Total	21710.00	25260.15	58760	6350.60	17340.23	129420.98

Notes:

* No separate data for Debt and Equity for Disbursements of SBI. Available data shown under Debts.

** No separate data for Debt and Equity for Disbursements of ICICI. Available data shown under Debts.
Source: Data submitted by Institutions.

Source: Performance indicators of Indian Telecom Operators, September 2003, TRAI.

Annex 6 – Sources of Finance of some Major Telecom Companies

Bharti Cellular Limited

December 2001

Term loan of Rs 2.5 billion from IDBI (Rs 2 billion) and IL&FS (Rs 0.5 billion). The interest rate was to be linked to the yield on one-year government securities.

February 2003

BTVL secured a USD 315 million loan. It was the largest overseas borrowing in the telecom sector. With this Bharti managed to achieve financial closure of all its cellular projects. The interest was 1.6% over LIBOR and the average tenure of the loan was five years. The funding increased the debt-equity ratio of BTVL from 0.59% to 0.7%. The overseas loan had three tranches.

A syndicated loan of USD 125 million from the consortium including DBS Bank, ABN-AMRO, StanChart and West LB with an effective rate of interest of 5.45% and a tenure of six years.

A 160 million buyer facility guaranteed by the export credit agency of Sweden – Export Kredit Namnden with an effective rate of interest of 5.55% and a tenure of ten years.

A USD 30 million loan from the Nordic Investment Bank with an effective rate of interest of below 5% and a tenure of eight years.

Bharti Mobile

January 2002

Rs 2.1 billion through private placement of non-convertible debentures. The bond issue had a USD 50 million partial guarantee from IFC and three maturity options of five, eight and ten years. The first was a Rs 600 million bond with a book building yield band of 10.25-10.65%, the second a Rs 900 million bond with a book building range of Rs 10.65-11.05% and the third, a Rs 600 million bond with a book building range of 11.05-11.45%.

Bharti Telenet Limited

1998

Vendor finance USD 4.5 million from Motorola and Alcatel. Rs 1.25 billion term loan from SBI.

First telecom loan of Rs 750 million approved by Infrastructure Development Finance Company. Another Rs 250 million assistance was given by the IDFC to SBI, which was a part of the consortium funding the company.

April, 1999

One billion first tranche of Rs 2.5 billion was promised by IDBI with a tenure of 11.5 years with a moratorium of 3.5 years. IDBI purchased non-convertible debentures of the company.

February, 2001

Rs 2 billion loan from IDFC.

Birla and later IDEA

June 1997

Mobilisation of the largest off-shore telecom project loan on a non-recourse basis. The USD 283 million (Rs 10 billion) loan completed the financing of its USD 1.5 billion (Rs 51.5 billion) project. Banks of Japan, Europe and US participated. Setting-up of TRAI and raising of the external commercial borrowing limit to 50% facilitated the borrowing. The syndicated loan was arranged by Bank of America NT&SA through its subsidiary BA Asia and Toronto Dominion (South East Asia) Limited, and divided into a foreign currency portion and a rupee tranche. The non-recourse financing with a term of eight and a half years did not require the promoters- AT&T or the Aditya Birla Group to offer corporate guarantees.

January 2002

Raised Rs 1 billion through one-year paper with an A1+ rating. The amount was arranged by Deutsche Bank and was a part of a Rs 4 billion refinancing of its higher-cost loans.

BPL Cellular Limited

June 2000

It tied up Rs 23 billion to achieve financial closure. The debt and the equity components were Rs 12 billion and Rs 11 billion respectively. The debt consortium consisted of ICICI (Rs 5.5 billion), IDBI (Rs 3.5 billion), UTI (Rs .5 billion), ABN AMRO (Rs 1 billion) and Bank of India (Rs 1.5 billion).

Escotel later merged to IDEA

1997

First cellular company to achieve financial closure despite the unwillingness of banks and FIs to provide long-term finance to the sector. Of the total project cost of Rs 14 billion, Rs 3.1 billion was to be equity, Rs 0.9 billion subordinated debt and USD 129 million to be the overseas borrowings. The rest was to be financed through short-term loans, cash credit, customer deposits and sales revenues. The company approached its lenders in early 1996. Closure helped by 1) Absence of a complicated holding structure and existence of only two shareholders with deep pockets, 2) reasonable licence bids based on conservative demand forecasts, 3) poor quality of service of competitor DoT in Uttar Pradesh, 4) credentials of the venture partners and their prior experience in the telecom sector (Escorts had manufactured PABX and PBX systems

and had a joint venture with Hughes Network Systems in the VSAT market; First Pacific had provided cellular services in Hong Kong and Philippines and paging services in Indonesia), and 5) willingness of promoters to provide backing to the company in the form of subordinated debt. The recourse element enabled the company to get loans with easier covenants. The recourse element could be withdrawn once a threshold level of earnings and revenues was achieved. Debt equity ratio of 2:1 was accepted reluctantly by the lenders as the average for the Indian telephone companies was 1:1. IL&FS led the rupee loan syndication of Rs 1.25 billion which was around 10% of the total project cost. These had a tenure of seven to eight years and the interest rate was close to 20%. Association of IL&FS helped the company as the foreign lenders insisted on participation by at least one Indian lender. Overseas lenders included the US Exim Bank, Norwegian export credit agency, Chase Manhattan, ABN AMRO, Fuji, Sumitomo, Societe Generale, Bayerische Landesbank, Bayerische Vereinsbank and Hypobank. The tenure of the loans was around seven years with a grace period until early 2001. Since the financing had a large foreign debt component, it was adversely affected by the rupee devaluation for lack of hedging devices.

May 2001

Escotel opted for the restructuring of its USD 75 million offshore debt and the refinancing of its domestic debt of Rs 5.25 billion. The initial moratorium period of four years was extended by two years for both domestic and offshore debt. Escotel secured the refinancing of the domestic debt from ICICI at lower rates of interest. Of the offshore debt of USD 75 million, 70% was hedged through currency swaps.

Tata Teleservices

September 2000

The first company to float bonds and raise funds through a public issue in the domestic market. Raised Rs 7.49 billion through an IPO, 90% through book building; floor price Rs 12 per share. The remaining 10% issued to public a fixed price offer at a price discovered through the book building process. The total project cost of expansion for the company was Rs 34.85 billion. The proposed financing pattern was:

- Rs 6.67 billion through the promoters' original equity contribution
- Rs 7.49 billion through the IPO
- Rs 1.37 billion through the promoters contribution to the IPO
- Rs 8.54 billion through project financing
- Rs 3.89 billion through internally generated cash flows
- Rs 10,78 billion vendor finance.

In October 2000, it achieved financial closure. Of the Rs 34.85 billion cost of the project, Rs 15.53 was funded through equity and Rs 19.32 billion through debt.

January 2002

TTSL tied up a Rs 11.6 billion loan from 15 banks and FIs in December 2001. The loan was raised at an average rate of 13.5% and had a term of 10 years with a moratorium of four years on repayment. The loan was syndicated by IDBI, SBI Capital Markets.

IDEA (a merged entity consisting of Birla- AT&T and Tata Cellular)

February 2001

Idea got a term loan of Rs 2.5 billion from IDFC to finance the takeover of RPG Cellcom. The remaining Rs 500-600 million for financing the takeover were mobilized through loan syndication from the market and contributions from the promoters.

2002

Early in 2002 it closed a syndicated loan facility of Rs 17.9 billion led by IDBI. Contributions were made by IDBI (Rs 4 billion), IDFC (Rs 2.5 billion), LIC (Rs 2.5 billion), SBI (Rs 1 billion), BOI (Rs 1 billion), Canara Bank (Rs 1 billion). IDBI arranged a non-rupee debt of Rs 5 billion from the Bank of America and Deutsche Bank.

October 2003

The company achieved financial closure on 30th October 2003.This was the most complex deal of the telecom sector. The cost of the project was Rs 50 billion. Except for Delhi operation, the financing was refinancing of old debt at lower interest rates and longer tenure and not the raising of fresh funds. A number of factors made the financial closure difficult: the existence of two separate companies- Tata Cellular Limited and Birla AT&T Communications Limited - with different managements, unwillingness of all the promoters to infuse funds, the decision of the Birla Group to walk out of the venture at one point, complications on account of the use of different financial instruments such as rupee loans, dollar loans and non-convertible debentures, and the policy uncertainty on account of the proposed move to a unified licensing regime. Sixty lenders and eight legal counsels participated. Among the lenders were IDBI, Rabo India Finance, Nordic Investment Bank and Standard Chartered Bank. The offshore lenders who had supported BACL and TCL to achieve their financial closures, continued to lend to the merged venture of the two. The financial closure helped in financing the acquisition of RPG Cellular. A ‘security merger’ as a common security was extended to the erstwhile TCL and BACL debt facilities. However the Delhi financing was kept separate as it was a new acquisition not under BACL and TCL and needed fresh financing and not restructuring as in the case of the Circles earlier under BACL and TCL. The project cost of Delhi was financed on a debt equity ratio of 1:1 by Rabo India Finance as the sole financier through a Rs 3.75 billion loan.

11. Regulation and Investment: Case Study of Bangladesh

Harsha de Silva & Abu Saeed Khan

1. Introduction

The objective of this case study is to provide insight into the relationship between investments in telecoms and the respective regulatory environment in Bangladesh. The period under investigation is from 1989 to mid-2004. This case study applies the Telecommunication Regulatory Environment (TRE) assessment methodology outlined in the annexes to Samarajiva et al. (this volume).

Developing World Scenario

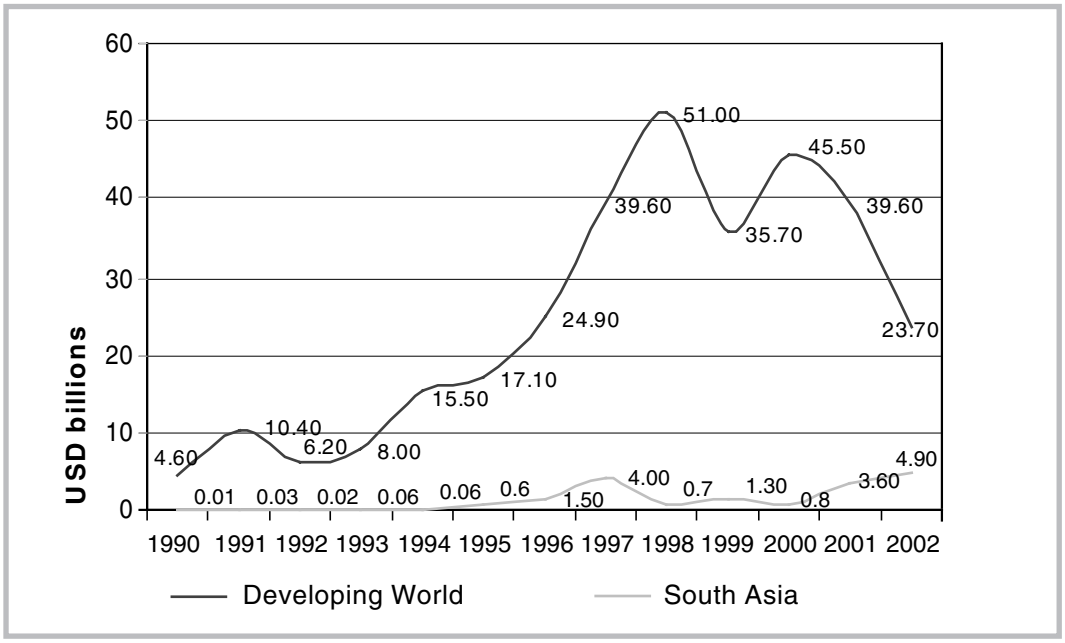
Telecom is fast becoming an important sector for developing world economies. While telecoms infrastructure expansion is catalysing economic growth in the industry *per se*, its impact on information technology and related services are becoming even more significant in terms of productivity growth across sectors. With the growing evidence of causality there is a strong argument for further investment in this sector to help developing countries leapfrog. However, their governments are now more than ever, restrained in undertaking investments in economic infrastructure such as telecoms, needing to concentrate more on social infrastructure such as health and education. Given this background and the resulting opening up of opportunities for private participation, it is important to understand the reasons underlying private investment patterns in these countries.

Figure 1 shows the total private investments in telecoms infrastructure, including purchases of previously government owned assets, in the developing world as compared to that of the South Asian region. A salient feature is that while total investment is declining after peaking in 1998, investment in the South Asia region is increasing. A detailed analysis of these investments however, indicates that the bulk of the funds were applied to India.

Bangladesh – Background

Bangladesh came into existence in 1971 when Bengali East Pakistan seceded from its union with West Pakistan. Situated on the northern coast of the Bay of Bengal,

Figure 1 – **Trends in telecom investments (USD billions)**



Source: Private Participation in Infrastructure Database, The World Bank.

Bangladesh is surrounded by India, with a small border with Myanmar in the south-east. The country is low-lying land of 144,000 square kilometres, traversed by the many branches and tributaries of the Ganges and Brahmaputra rivers.

Despite sustained domestic and international efforts to improve economic and demographic prospects, Bangladesh remains a poor, overpopulated, and ill-governed nation. Its current population is 140 million with per capita income of USD 380. Bangladesh is ranked at 139 (of 175) in the Human Development Index of 2003. Economic reform is stalled in many instances by political infighting and corruption at many levels of government. Progress also has been slowed due to opposition from the bureaucracy, public sector unions, and other vested interest groups. The present government has the parliamentary strength to push through needed reforms, but the party's political will to do so has been lacking in key areas. However, there is one very encouraging note about Bangladesh, which is its steady growth rate of 5% for the past several years.

The Telecoms Sector

In 1971, Bangladesh Telegraph and Telephone Department was set up under the Ministry of Posts and Telecommunications to run telecom services in Bangladesh. This was converted into a corporate body named Bangladesh Telegraph and Telephone Board (BTTB) in 1975. However, by Ordinance No XII of 1979, BTTB was re-converted into a Government Board to function under the Ministry of Posts and

Telecommunications (MoPT). BTTB's management board consists of a Chairman, four full time members and three part time members, all of whom are appointed by the Government. The MoPT reviews BTTB's annual development plans while the Ministry of Finance (MoF) approves the financing plan and allocates funds. BTTB has a *de facto* monopoly on domestic fixed-line public telephony and a *de jure* monopoly over international telephony.

Table 1 – **Framework of the Bangladesh telecoms sector**

Policymaker: Ministry of Posts and Telecommunications (MoPT)			
Regulatory Agency: Bangladesh Telecommunications Regulatory Commission (BTRC)			
Service Providers			
Basic Fixed Local (limited competition) Domestic long-distance (monopoly) International (monopoly)		Mobile Competition	Value-added Competition
Public Sector	**Private sector**	**Private sector**	**Private sector**
Company and number of lines Bangladesh Telegraph and Telephone Board (BTTB) 900,000	Company and number of lines Bangladesh Rural Telecom Authority (BRTA) 24,000 Sheba Telecom 2,000	Company and number of lines Grameen Phone 2,000,000 Pacific Bangladesh Telecom (PBTL) 300,000 Telekom Malaysia International Bangladesh (AkTel) 800,000 Sheba Telecom 50,000	ISPs VSAT Others

Source: The World Bank, Project Appraisal Proposal No. 25561 and Operators.

The sector was first opened up in 1989 with nationwide operating licenses being issued to Hutchison Bangladesh Telecom Limited (HBTL) for mobile and fixed wireless applications for all-Bangladesh for 20 years. This was followed by another licence to Bangladesh Rural Telecom Authority (BRTA) in the same year for rural telephony for

25 years. Pacific Bangladesh Telecom (PBTL) acquired HBTL in 1991. Since then four licensed private sector mobile operators and a number of value added service providers, including internet service providers (ISPs), have entered the Bangladesh market.

The sector was regulated (licensing and spectrum management) by BTTB until the responsibility was transferred to MoPT in 1995. Later, under the National Telecommunication Policy of 1998 and the subsequent Bangladesh Telecommunications Act of 2001, the Bangladesh Telecommunications Regulatory Commission (BTRC) was established to be effective as at 31 January 2002. Table 1 depicts the framework of the telecoms sector and the current markets (as at September 2004 for BTTB, GrameenPhone, PBTL and AkTel, end 2003 for others).

After opening up the market in 1989, Bangladesh did not see any significant growth in total connections until around 1998. Since then the growth in new connections has been very rapid, increasing from 602,660 to over 4,000,000 between 1999 and mid-2004. A pertinent observation is that while the total number of fixed lines increased from 474,000 to only 926,000, mobile connections grew 24 fold, from 128,660 to 3,150,000 during the same period indicating the success of the private mobile operators led by GrameenPhone with almost 65% share of the market. We shall consider below the role of the regulatory regime in this expansion – positive or negative.

The pattern of total private investments in to telecom infrastructure in Bangladesh is depicted in Figure 2.[1] Note that these figures correspond only to new capital infusions and not to internal funds reinvested by the respective companies. Also note that given the unavailability of the latest investment data, the new connections up to mid-2004 have not been shown.

These new capital investments, totalling USD 740 million, reflect five large projects undertaken by the private operators as given below until the end of 2002:

(a) GrameenPhone invested USD 343 million between 1996 and 2002 for mobile access. GrameenPhone has 63.5% mobile market share (as at mid-2004)

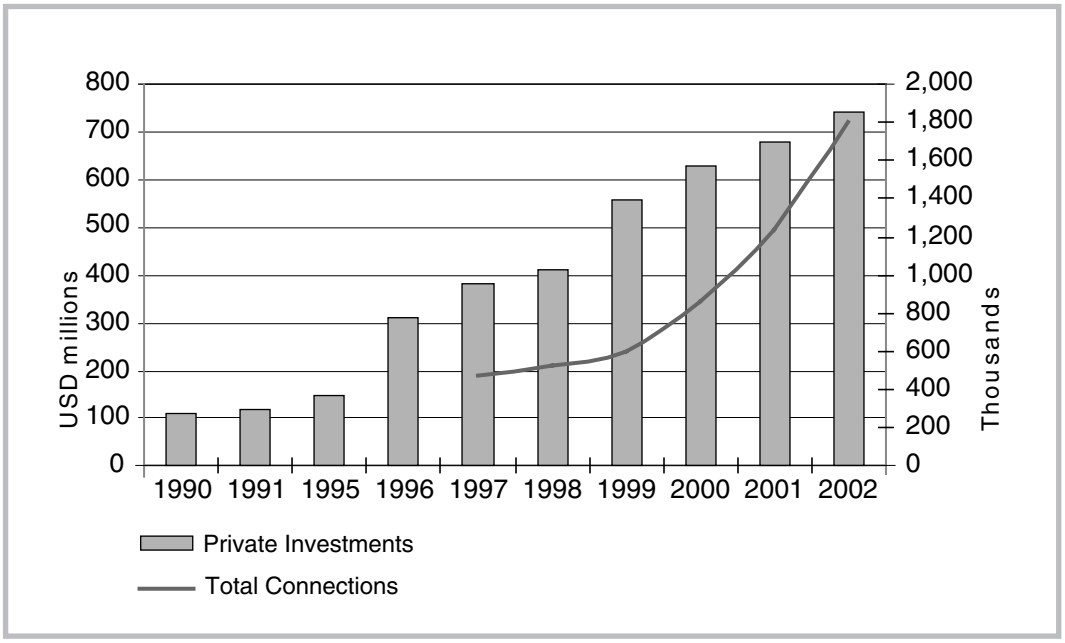
(b) Bangladesh Rural Telecom Authority invested USD 150 million between 1990 and 1998 for fixed access. BRTA has less than 3% share of the fixed market.[2]

(c) Sheba Telecom invested USD 123 million between 1995 and 2002 for mobile access. Sheba has less than 2% of mobile market share.

(d) Telekom Malaysia International Bangladesh (AkTel) invested USD 76 million between 1996 and 2000 for mobile access. AkTel has 26% of the mobile market (as at mid-2004).[3]

(e) Pacific Bangladesh Telecom invested USD 48 million between 1991 and 2002 for mobile access. PBTL has 10% of mobile market share.

Figure 2 – **Cumulative new private investments vs. connections**

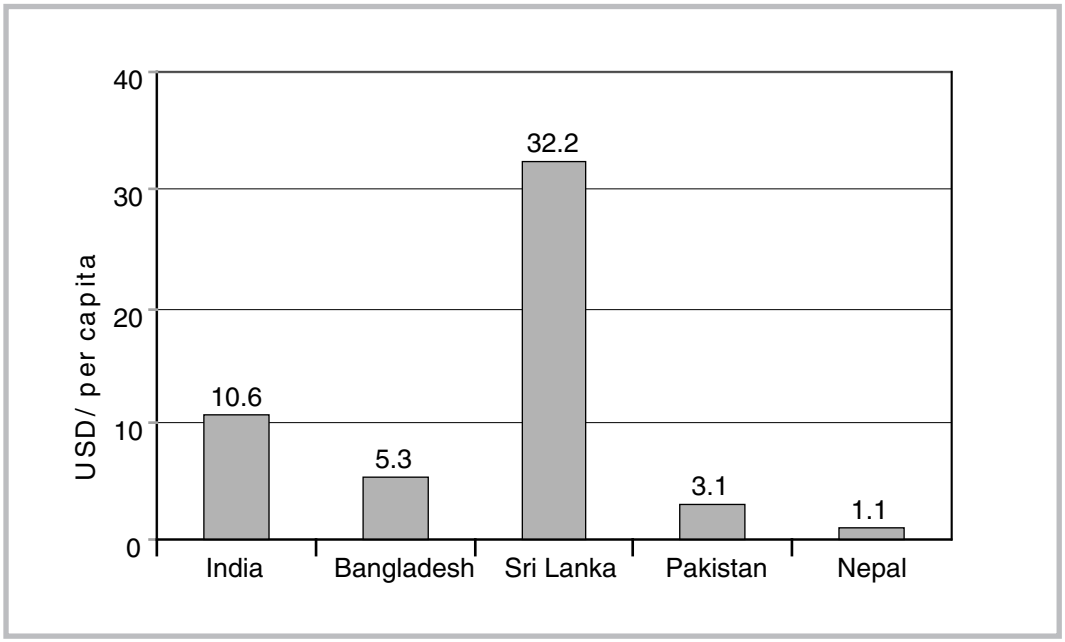


Source: World Bank database on Private Participation in Infrastructure Projects.

USD 740 million in twelve years is not a substantial amount of new private investments in a country with the potential of Bangladesh (population 140 million), compared with USD 656 million in Sri Lanka (population 19 million) and USD 10,600 million (population 1,065 million) in India for new private investments during the same period excluding investments through divestiture.[4]

According to the World Bank's Project Appraisal Document for the Bangladesh Telecommunication Technical Assistance Project of May 2003, the telecoms sector of Bangladesh has "fallen far short of its potential and remains a significant constraint to economic growth". The report highlights poor sector performance, weak competition and private investment environment as the main reasons for this situation. The following is brief assessment of the sector performance evaluation as per the above report.

Figure 3 – **Cumulative per capita telecom investments across South Asia***



* Excluding divestiture proceeds.

Source: Calculated from The World Bank database on Private Participation in Infrastructure Projects.

Limited access to telecoms services

BTTB's capacity limitations constrain supply within the overall sector. Despite high fixed-line connection charges, BTTB cannot keep up with demand, and installation wait times average several years. Capacity constraints affect interconnection for mobile operators, who in the absence of adequate interconnection, offer mobile-to-mobile only services for a majority of their customers and are unable to expand services in line with growth in demand.

Low Rural Teledensity

Although some cellular operators, such as GrameenPhone, have initiated a village phone programme to bring connectivity to rural areas, less than one-third of Bangladesh's 68,000 villages have access to phones.

Poor performance of BTTB

BTTB has not improved its performance despite substantial public investments in the organization. It continues to operate under a protective regime with little accountability to either its owners or customers. As an indicator of efficiency, the BTTB has approximately 29 lines per employee (in 2002), compared to the international low-income group average of 69 lines per employee. BTTB, in its current structure lacks financial, tech-

nical and human resources along with the autonomy to achieve its target of meeting demand. It has very limited decision-making authority and needs MoF and MoPT approval for most investments and general expenditures. This has led to limited service availability, lack of new product rollout and generally poor service quality. Competition is also growing in several forms: mobile telephony is creating a viable substitute for BTTB's services, informal voice-over internet protocol (VoIP) and falling international settlement rates have eroded BTTB's highly profitable international monopoly.

The remainder of this chapter is structured as follows. We discuss theoretical aspects of risk and investment in telecoms in Section 2. In Section 3 we explain the methodology of the practical study. Section 4 is a detailed analysis of the Bangladesh case. We conclude with Section 5.

2. Risk and Investment

Global investments in telecom infrastructure, having dramatically increased during the late 1990s have now equally dramatically slowed down over the last few years (see Figure 1). Bangladesh, which was unable to capitalize during the boom-time, is now facing an even more difficult situation in attracting investments to overcome its woeful telecom sector in a depressed global financial market with scores of badly burnt investors.

Areas of Risk

Return on any investment is a function of its risk. As pointed out by Samarajiva and Dokeniya (2004), investors segment risk associated with investments into three areas: (a) macro level or country risk, (b) regulatory risk, and (c) commercial risk.

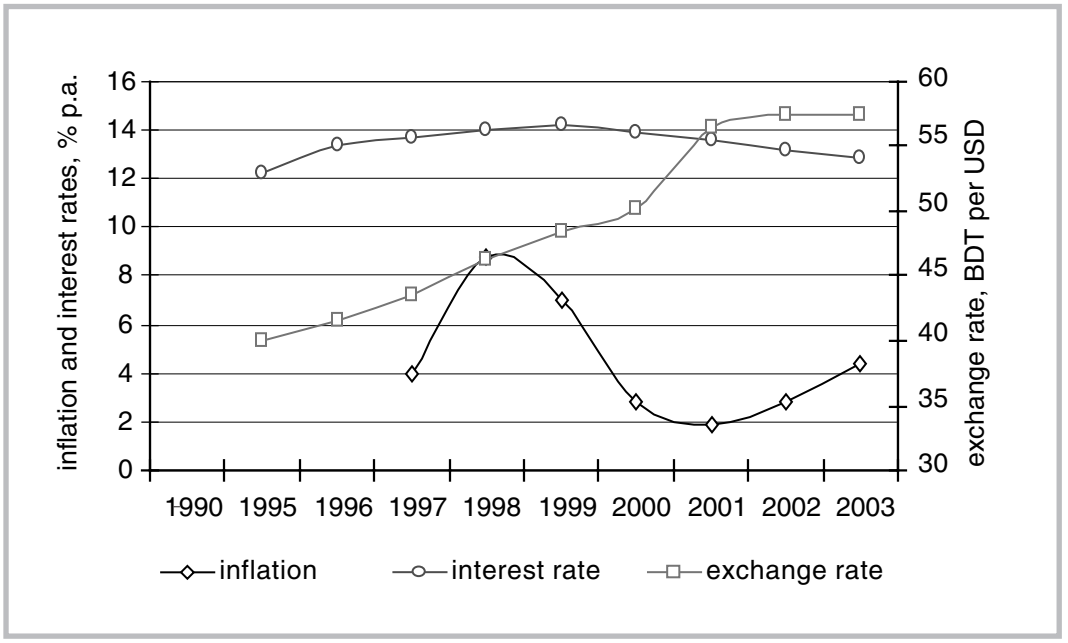
Macro Level Risk

Macro level or country risk is defined as the factors affecting the entire economy, such as the stability of macroeconomic variables and political risk. This also captures other non-country specific risk factors such as the dynamics of global financial markets, for instance the appetite for investment in the telecom sector at a given point in time.

For Bangladesh, in terms of macro variables, the exchange rate (viz. USD) has been rather steady, declining only gradually as seen in Figure 4. The inflation rate, despite a spike in 1998, has remained in the single digits throughout. Interest rates, proxied by the weighted average lending rate of all banks, have been steady between 12 and 15%.

While the macro environment remains quite stable, there is no apparent long-term strategy for sector development supported by the central government. To outside observers, industry reform proposals appear to be subject to changes in the political tide – as is the case in Bangladesh for just about every sector. The two bitter rival political parties have sought to block initiatives vetted by the opposition, and each accuses the

Figure 4 – **Macroeconomic indicators in Bangladesh**



Source: Bangladesh Bank.

other of favouritism in assigning major projects. The 1998 Telecommunications Policy outlines broad principles and long-term development goals but is not a concrete roadmap for the near future. The few specific developments it defines – for example, raising the teledensity to 1 (one line per 100 persons) by 2000 – have not been achieved. According to government officials, there are no immediate plans to update the policy.[5]

Regulatory Risk

Regulatory risk generally refers to the potential for laws related to a given industry, sector, country, or type of security to change and impact relevant investments. More specifically, Spiller and Levy (1994, cited in Samarajiva and Dokeniya 2004) define regulatory risk as "risk emanating from government action, including but not limited to actions of the actual sector-specific regulatory agency with authority over the industry in question." For this study we define *Telecom Regulatory Environment* (TRE) as the subset of the overall regulatory risk environment that deals specifically with the telecom (and also ICT) sector as set forth in Samarajiva and Dokeniya (2004).

In the traditional sense, telecom regulators focus on the supply side of the investment equation, particularly in building physical network capacity. The argument is that if networks are built, customers will sign on. Attention therefore is placed on access to scarce resources, licensing conditions for network construction, interconnection agreements and fair pricing, etc. In this vein, Melody (2003) sheds new light for evaluating,

and improving the TRE and the regulatory function using two arguments as means of promoting investments in telecom, particularly in the developing world. One is the dichotomization of the investment equation into supply side (as earlier defined) and demand side issues to incorporate factors that would stimulate demand such as facilitating awareness, capabilities for service applications by end-users, etc. The other is adopting a dynamic approach to reflect the changing global appetite for telecom investment. By way of example, Melody points out that applying boom-time regulatory practices during a bust-time would seriously constrain investment.

No country in the world, however developed, has an ideal TRE.[6] Given the general weakness of overall governance in developing countries, there is sufficient evidence to suggest that these TREs deviate much more from the ideal than in developed countries.

The Regulatory Framework in Bangladesh

The Bangladesh Telecommunications Regulatory Commission was established on 30 January 2002, under the auspices of the Bangladesh Telecommunication Act of 2001, to take over the regulatory functions from MoPT. A prime objective of BTRC was its financial and administrative independence. These were originally proposed in the law. But appointing retired civil servants to the Board largely reduced these provisions.[7] When BTRC took over its function from the MoPT, the mobile industry had been suffering from a gruelling interconnection crisis. Regrettably, the commission took no steps to mitigate this crisis. On 17 April 2003, the frustrated mobile operators awarded a USD 2 million turnkey contract for a switch to BTTB. The operators' lack of confidence in the regulator became evident when they directly appealed to MoPT for compensation when the government shut down mobile networks during elections alleging mobile phones could be used for poll rigging. Instead of addressing long disputed interconnection issues the regulator announced further competition and sector liberalization. BTRC Chairman told BBC's *World Business Report* "three or four mobile licenses would be issued this year and a fixed-line phone license by June 2003." The Chairman also said that internet telephony would be 'legalized' by early 2003 to reduce the cost of long-distance calls. This BBC report caused an influx of investor inquiries. But the regulator's promise of fixed and mobile licenses was proved to be a misnomer in the market that has been struggling with a dysfunctional interconnection regime. Moreover, the issuance of any such licenses is subject to the government's approval. The regulator's statement on licensing GMPCS and 'legalising' VoIP was also rhetorical. Commencement of either service is subject to liberalizing the international gateway, which requires major policy reforms. The government is yet to open up the international gateway for voice traffic.

Spectrum management has been chaotic with haphazard issuance of frequency during the regulatory regime under MoPT and now no better with a 21-member spectrum management committee that is dominated by civil and military bureaucracy and allegations of conflicts of interest.

BTRC is also deferring the restructuring of BTTB. The telecom law mandated BTTB to apply for an operator license within one year from the commencement of telecom

law (30 January 2002). Accordingly, BTTB submitted its license application in January 2003, but BTRC only recently (July 2004) issued BTTB the license. However BTTB continues to function as a government department with undue advantages over the competitors.

The foregoing is only a taste of such examples highlighting the regulatory environment in Bangladesh. While regulatory independence is a relative concept, good governance is a universal standard for effective regulation. There is a widely held view in Bangladesh that unless BTRC improves its enforcement of regulatory authority strictly in accordance within the existing legal framework, the future of the industry will be seriously affected.[8]

The Secretary to the MoPT at an international forum recently made the following comment:

> To make the public sector more dynamic, restructuring of the national telecom operator is *also being thought of and kept in mind*. In developing countries like Bangladesh, the public sector has a role to play because there would be areas where the private sector would not find it immediately profitable to operate. Besides, building of essential telecom infrastructure like transmission backbone could perhaps be so costly that the private sector may not feel encouraged getting actively involved. However, this could not also wait. Therefore, *the public sector would have to be involved*.[9]

This statement illustrates the public-sector attitude of officials, which may further hamper the growth of private sector participation in the industry.

Commercial Risk

Commercial risk refers to factors that are internal to the company, when investment is itself internal. Risk is not uniform across operators.

GrameenPhone and AkTel are the only operators with substantial foreign ownership, which may explain their investment pattern and the diversification of their global telecom investment portfolio. Although Telenor had the option to reduce its share in GrameenPhone to below 35% by October 2002, and Grameen Telecom was ready to acquire the majority shareholding, Telenor declined to do so. Grameen Telecom (GT) served legal notice to Telenor on 27 November 2002. GT claimed that while GrameenPhone was incorporated on 10 October 1996, it was stipulated in the Articles of Association that Telenor would retain 51% of shares for the first six years and then transfer the control by selling its minimum 16% of shares to GT under a first right of refusal.

GT further claimed the share reduction issue was raised with Telenor in October 2000 and in August 2002. But the Norwegian investor has yet to make its Bangladeshi partner the majority shareholder in GrameenPhone. GT considered this to be "a breach of obligation" under the Articles of Association. Neither party has officially commented on the press report unveiling the dispute. But they have reportedly decided not to go to the court, for the time being.

Table 2 – **Major Shareholders**

Operator	Major shareholder	Share
Fixed		
BTTB	Government of Bangladesh	100%
BRTA	Private ownership	
Sheba (Rural)	ISL (Bangladesh), Telecom Malaysia	51%, 49%
Mobile		
Grameen Phone	Telenor (Norway); Grameen Telecom (fully owned by Grameen Bank, Bangladesh); Marubeni; Gonofone; IFC, ADB, CDC.	51%, 35%, 9.5%, 4.5%, 3%, 3%, 3%
PBTL	Pacific Motors, Far East Telecom (Hong Kong), AIDEC (Singapore), Fujitsu (Japan)	40%, 30%, 20%, 10%
TMIB (AkTel)	Telekom Malaysia (Malaysia); A K Khan Group (Bangladesh)	70%, 30%
Sheba	ISL (Bangladesh), Telekom Malaysia	51%, 49%

Relationship between TRE and Investment

Any investment is dependent upon its risk-reward structure: the higher the risk, higher the expected reward (because of a higher potential loss). The risks in telecom investments are made up of the general macro or country risk, the TRE and commercial risk.

There is no one-to-one relationship between the TRE and investments in telecom. Even under the best TRE, investments may not be forthcoming if the macro risk and or the commercial risk parameters are not sound under risk-averse conditions, or it may be the other way around if the appetite for risk is high. Examples of large telecom investments in countries like Congo and Somalia illustrate this point (Samarajiva and Dokeniya 2004).

Sources of Investment Funds

Investment in telecom infrastructure outstripped demand in the late 1990s. After the bubble burst, however, gaining access to capital has become difficult for operators. Suppliers of capital have become more discriminating and some operators are finding it increasingly difficult to sustain their operations at a time when internally generated cash is also being squeezed by market forces. This is particularly true for

developing countries like Bangladesh, particularly in terms of international long-distance revenues being lost due to technological developments and illegal bypass.

Major sources of investment funds for operators to improve their infrastructure are as follows.

Retained Profit (Reinvestment)

Retained profits or internally generated funds are a significant contributor to telecom investment. While the distinction of retained profit is not too clear in state-owned incumbent operators their investments are almost always sanctioned by state budget allocations immaterial of whether the quantum reflects the profits of the operator transferred to the consolidated fund. For private operators, this amount is normally clearly identified and is related to the macro variables inside the country as well as to tax structures. For example, lower interest rates and lower corporate tax structures have generally resulted in greater profitability and in turn greater investment. For this study, it has not been possible to obtain these figures.

Equipment Manufacturers

Suppliers' credit is also an important contributor of investment funds particularly in developing countries. In the case of Bangladesh, this is a key source. Shanghai Bell of China arranged for USD 213 million supplier's credit in 1999 for a PSTN switch to supply 216,000 lines with transmission and cabling.

New Equity

Issuing of new equity is another significant source of investment. This has been mostly the case in partial or complete divestiture of state-owned operators. In all telecom investment during the last decade, one-third was accounted for by such transactions. In Bangladesh, however, no privatisation in the sector has taken place, thus equity investments have come only to the new entrants. For many countries, telecom initial public offerings (IPOs) have been very successful in raising investment funds. Bangladesh has no listed telecom companies on its bourse. The Securities and Exchange Commission had recently placed a formal proposal for BTRC to take steps so that new telecom companies are bound to have IPOs within a certain period of time after obtaining licences in order to avoid penalties. It is worth noting, however, that timing of IPOs depend on many parameters beyond the need of government to boost its capital market.

Debt

Long-term and short-term debt, local and foreign, are significant sources of investment funds. Common among debt securities are debentures and telecom companies' bonds that are subsequently traded on an exchange. The Bangladesh debt securities market is in its infancy and all publicly issued and listed (on the Dhaka Stock Exchange) corporate paper are trading at steep discounts due to public disillusionment: nine out

of a total of 17 listed companies are defaulting on their payments. There seems to be serious problems with trustees unable to take any action against the issuers due to conflicts of interest. Thus, it will be a while before the public is willing to participate in any new debt issue, including those of telecom operators.

3. Methodology and Data

Methodology

Samarajiva et al. (this volume) introduce a methodology for assessing the TRE of a country from a representative and informed group of respondents among the various stakeholders, after agreement is reached on the various dimensions of TRE, scales, weights and assessment periods, etc. While the above would be an ideal methodology to obtain the perceptions of the various groups to determine the TRE, the methodology of current case study is limited to the methodology as described in the Annexes to Samarajiva et al. (this volume).

For this case study, available secondary data from Khan (2001, 2003)[10] as well as some interviews have been used to assess the TRE in terms of five dimensions: market entry, scarce resources, interconnection, tariffs, and anti-competitive practices with respect to fixed and mobile sectors. However, unlike the study for Sri Lanka, in which periods of regulation were compared, only one period is analysed for Bangladesh against regional best practises.

Data

Timeframe

This chapter covers the period starting from 1989 and up to mid-2004, if and when data is available. When not, the most recent period for which data is available is considered. Liberalisation of the Bangladesh telecom sector, regardless of its imperfections, began in 1989 and therefore is the ideal starting point. The end point is set at mid 2004 to ensure that as much as possible of current developments are addressed in the chapter.

Data Limitations

The two reports (Khan 2001, 2003) had been compiled for a totally different purpose and provide only basic information necessary for this chapter. The authors therefore have complemented the same as much as possible. As far as possible the data obtained from the many sources have been cross-checked against company-specific information where available. Concerns and qualifications are provided in endnotes. It was very difficult to obtain information on operators' investments and projected investment, not even annual reports have been published by most.

4. Telecom Regulatory Environment and Investment

Fixed Sector TRE

The TRE for the fixed telephone sector of Bangladesh is assessed in terms of market entry, scarce resources, interconnection, tariff, and anti-competitive practices as introduced in the methodology section. The regulatory activity is not segmented to pre-post BRTA establishment as no difference in the regulatory regime has taken place.

Market Entry

The first fixed sector license was issued to HBTL (later PBTL) in 1989 to operate fixed wireless (and also mobile) applications for 20 years, covering all of Bangladesh. Later in the same year, BRTA was granted a fixed wireless license to operate across the southern half of rural Bangladesh for 25 years. In 1991, Sheba Telecom was also granted a licence for the same region. The issuing of these licences lacked any sort of transparency. No network rollout obligations were specified. The licences however included an annual royalty fee to be paid to BTTB (and later to BTRC) based on the number of connections and monthly rental fees.

While BTTB was already a player in both the urban and rural market segments, the objective was to create competition between the incumbent and the new entrants. However, fifteen years since opening up entry, the benefits of competition are yet to materialize as PBTL has no fixed customers, BRTA's coverage remains limited to some high-yield rural markets, and Sheba Telecom's rural network rollout has been insignificant. Both new entrants account for only 26,000 connections.

The regulator has neither opened up the domestic long-distance nor the international long-distance market and BTTB continues to enjoy monopoly status with unfair advantage over the other operators. Despite having finally obtained an operating license in mid-2004, BTTB continues functioning as a government department.

Overall, there does not seem to be any policy for market entry. There is no evidence to suggest that any market entry policy existed when licences were first issued in 1989 and this lack of policy persists today. Licences are issued on an *ad hoc* basis with varying terms and conditions. For example, on 12 July 2001, four days after the Government established BTRC by gazette with exclusive powers *inter alia*, to issue telecom licences, MoPT (not BTRC) issued a four-year exclusive build-own-operate license to WorldTel[11] for 300,000 fixed-line telephones in Dhaka for an undisclosed fee.[12] Interestingly, the licence issued to PBTL allows it to offer fixed-line telephony in the same Dhaka City region for which WorldTel had been given exclusivity.[13]

In another instance, in spite of the ongoing exclusivity issue, BTRC issued a nationwide fixed-telephone operating licence to Bashundara Group for a BDT 80 million 'entry fee' in addition to BDT 20 million annual licence fee in May 2004, exclusive

of Dhaka. To operate in Dhaka, it has been asked to pay additional fees of BDT 50 million for entry and BDT 10 million for annual licensing.

Most recently (since April 2004), BTRC has invited investors to submit applications for PSTN franchises on an open license basis. Under this new policy, the country has been divided into five regions, excluding Dhaka City, which is embroiled in an 'exclusivity' conflict. For these licenses, BTRC has set BDT 50 million as a minimum fee in addition to demonstrable technical competence and financial backing requirements.[14] Annex 1 provides a list of the new licenses issued and those being issued.

Another controversial decision of the government has also helped to shatter investor confidence. In April 2001, the MoPT licensed five companies (Omnicom Ltd, Coronet Corporation, Cosmos Telecom, Uttara Telecom and Formula One International) through competitive bidding to operate prepaid calling card services (PCCS). The PCCS were promised nationwide and international phone calls from any fixed telephone. Formula One signed an operating agreement with BTTB in June 2001 and installed prepaid equipment at the BTTB exchange in Dhaka, paying BDT 3.25 million to interconnect. They also paid BDT 0.5 million annual license fees twice, first to the MoPT and then to BTRC. Additionally, they submitted a bank guarantee of BDT 5 million as a deposit with the MoPT. In March 2002, BTTB tested the prepaid equipment and gave the green signal to Formula One. But the authority has yet to allow Formula One to launch its PCCS business. The BTTB chairman told the press that his department would have no control over the sales of prepaid cards by the five PCCS operators. He was apprehensive that an operator "might sell millions of taka worth of cards and close down the business. Then how would BTTB recover that bill?" he asked while interviewed by *The Daily Star*. He also blamed Formula One for not providing the toll-free while providing access to its network for reverse billing features.

In October 2002, BTRC requested that BTTB allow Formula One to launch its prepaid service within the next seven working days. In response, BTTB denied compliance with BTRC and requested the regulator to cancel its 'inappropriate' decision in favour of Formula One. BTRC, despite its authority, has not taken any measure against BTTB's arrogance and non-compliance with its order. Formula One has now gone under and its fate has sent alarm signals to the other four PCCS licensees –none of which has yet come forward to launch their service.

It is quite apparent that market entry without effective, clear policy and regulatory parameters has resulted in serious regulatory risk. This has impacted on the country's already appalling telecom infrastructure by discouraging investment. To make matters worse, it has caused discontent among investors who have invested large amounts of money but are unable to compete on a level playing field.

Scarce Resources

BTTB being a wire line operator does not need WLL spectrum. Therefore only the two new fixed sector entrants, BRTA and Sheba, using WLL licenses have requirements for scare spectrum resources. PBTL mobile license also provides for WLL operation and thus the need for spectrum. PBTL already has 20 MHz. spectrum in the 800 MHz. band, which far exceeds the needs for its operations. However, BTRC has not taken any steps to recover the surplus spectrum from PBTL.

Although a rational and effective spectrum management system was identified as essential for an orderly and competitive market, the regulator under MoPT was unable to effectively manage radio spectrum or reap fiscal benefits from the optimal use of this scarce national resource. Headed by a mid-level official, the spectrum allocation committee engaged in a haphazard assignment of spectrum. During that time, spectrum was allocated without any formal band plan.

With the establishment of BTRC, the industry expected an effective spectrum management regime as opposed to existing practices. The telecom law provided for the creation of an efficient Spectrum Management Committee, headed by a BTRC Commissioner for this specific purpose. However, BTRC ended up forming a gigantic 21-member committee with eight members from the army, navy, air force, police, para-militia and civil and military intelligence; four deputy secretaries each from the ministries of Telecom, Home, Information and Foreign Affairs; and others from government radio and television, the Civil Aviation Authority, the Shipping Department, the Engineering University, BTTB and one each from the Federation of Chambers of Commerce and from the mobile operators.

The unnecessarily large committee has not been conducive to the spectrum management mechanism. On the one hand, this BTRC committee has not been able to allocate spectrum for licenses issued by the BTRC itself, and on the other, it has not been able to encourage smart wireless solutions that are increasingly and critically important for providing access to rural underserved areas. Instead, allegations of gross irregularities have been looming over the institutional sanctity of BTRC. There are numerous complaints that applications for spectrum either get lost or remain pending for indefinite periods although the telecom law specifies that the committee has to reply within 30 days along with its recommendations.

The need for an explicit spectrum policy is becoming acute, as the new PSTN operators (not yet in operation) have already requested WLL frequency to deploy their wireless solutions. BTRC is unable to effectively and rationally deal with these requests in the 21-member committee.

Recently, BTRC received a technical assistance grant from the World Bank to establish a frequency monitoring and management capability. It hopes to rationalize its allocation plan and develop a scheme for efficiently distributing frequencies to the market via a spectrum pricing policy. It will also support much needed human resource devel-

opment, and procure and implement a Spectrum Management and Monitoring System so that it has the necessary tools to effectively manage the radio spectrum. Zita (2004) posits that after management capabilities are in place, perhaps in early 2005, BRTC will undertake its spectrum rationalization programme. In the meantime, operators are subjected to the current *ad hoc* allocation.

Interconnection

Absence of a conducive interconnection regime is a major bottleneck for growth in the fixed line sector in Bangladesh. Service providers are prone to predatory pricing and to refusal of access to competitor operators. Interconnection with BTTB is consistently identified by private operators as one of the top issues to be resolved in the sector.

Today all interconnection agreements are arranged on a bilateral basis, with no performance, service quality, network availability or pricing obligations imposed by BTRC. The non-existent interconnection regime has become the biggest roadblock for the newly issued PSTN operators' business plan implementation.

Against this backdrop, the business of bypassing the BTTB international gateway is thriving, substantially affecting the incumbent's international settlement account. However, the regulatory response to this issue has been one of confusion. Recently BTTB started disconnecting ISP phone lines indiscriminately, for alleged VoIP based bypass, sparking widespread controversy. It is argued that BTTB is using arbitrary methods to detect allegedly illegal bypass when in fact the issue concerns VoIP calls that are unregulated. Besides the 'culprits', this witch-hunt has also punished the innocents and the latter have strongly protested and demanded the legalization of VoIP. While the issue of opening up the international voice gateway service is the real concern, the regulator and national ICT intellectuals are demanding the Prime Minister legalise VoIP technology.[15] BTRC has taken this confusion another step forward by deciding to establish an internet exchange where the ISPs with VoIP license would be interconnected and their overseas calls monitored from that hub. Apparently the regulator prefers being dictated by the political considerations of the government on reform issues rather than independently determining what is beneficial for the country.

Tariff Regulation

As monopoly service provider, BTTB tariffs were fixed arbitrarily on the basis of how much revenue the government needed to collect instead of on the basis of appropriate cost based calculations.

BTTB has continued to violate the Telecom Act in arbitrarily changing tariffs. A case in point is during February 2002 when BTTB unilaterally announced that flat tariff of local calls would be replaced by charging a five-minute peak unit and an eight-minute off-peak unit. Instead of first obtaining the regulator's approval, BTTB enforced its multi-metered tariff, violating Section 48 of the Act, which mandates submission of any tariff plan to the BTRC prior to its implementation. BTTB and the government

have been ignoring the law while BTRC has not taken any action against such discrepancy. Further, BTTB has launched budget international call charges early this year by using VoIP technology. But it had not obtained the mandatory regulatory endorsement prior to launching this package.

Regulation of Anti-competitive Practices

BTRC has not taken any measures against BTTB for its historical anti-competitive behaviour of refusing adequate interconnection, particularly after compelling the private operators to invest USD 2 million on a tandem switch at BTTB's network.

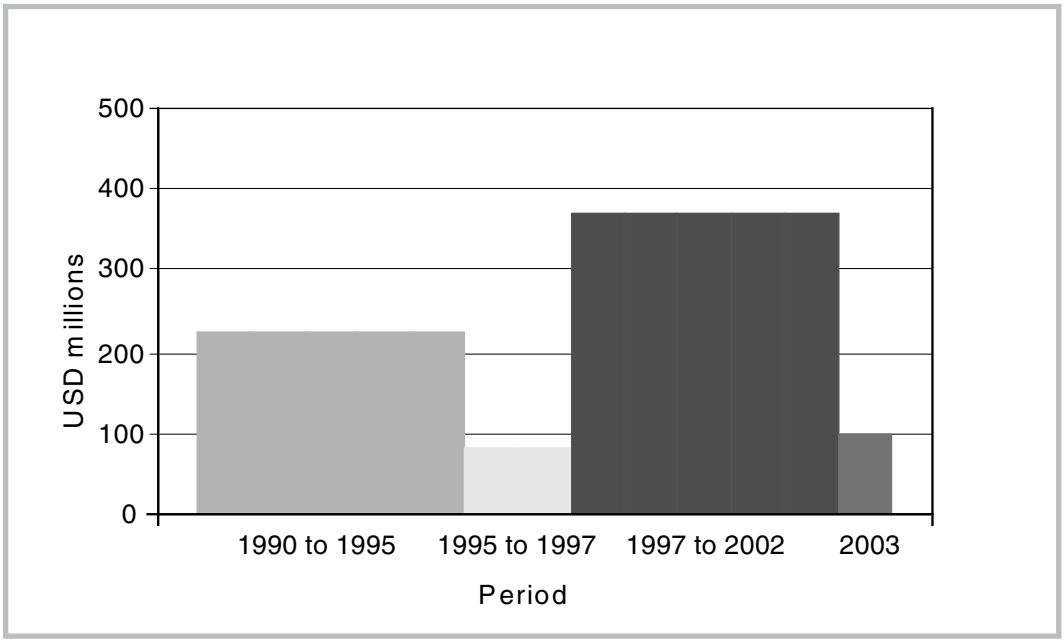
In a different example, GrameenPhone acquired 30% equity of a company by the name of X-Net, a licensee to sell long-distance transmission capacity. Through this deal, the country was divided in to four zones and users are charged very high prices without explanation.[16] Aside from its partnership with X-Net, GrameenPhone also independently sells transmission bandwidth via its Bangladesh Railway rights of way. But it does not have any license to do so. BTRC is silent on all these practices. The net result is that such unattractive pricing has prompted other mobile operators to build their respective microwave transmission backbones. In some cases operators have ended up duplicating transmission to common destinations.

Meanwhile, set up in 1996 as a functional unit under the Power Sector Reform Programme, the Power Grid Company Bangladesh Limited (PGCB), to oversee the operation, maintenance and expansion of high-voltage power transmission network that is about to start leasing its fibre optic cable network to the private sector. PGCB also has not obtained any license from BTRC for this capacity selling business and BTRC does not seem to consider the impending complexities.

Table 3 – **Fixed Sector TRE Summary Assessment**

Dimension	1989 – 2003
Market entry	Poor
Access to scarce resources	Poor
Interconnection	Poor
Tariff Regulation	Unsatisfactory
Regulation of anti-competitive practices	Poor

Figure 5 – **New investments in the fixed sector**



Source: AHM Shafiqul Islam, 2004.

In this section we present a summary of the TRE in terms of the five dimensions considered: market entry, scarce resources, interconnection, tariff, and anti-competitive practices with respect to the fixed sector. The five-point scale is: poor, unsatisfactory, neutral, satisfactory and excellent. The secondary author's views, as an independent analyst of the Bangladesh market, have taken precedence in this assessment.

Fixed Sector Investments

The fixed sector comprises BTTB (900,000 connections), BRTA (24,000 connections) and Sheba (2,000 connections). Given the difficulty in obtaining investment data for these companies, only investment data fro BTTB is analysed. In the case of BTTB also, no data was available on an annual basis and given below is the best possible analysis, aggregated into various different periods. These have not been averaged out, but presented in the aggregated format.

Figure 5 does not indicate any pattern for the total investments of the USD 851 million by BTTB over the last 13 years and cannot be compared in terms of regime changes in the TRE. However, in comparison with the investment of state-owned Sri Lanka Telecom, for no other reason but data availability, it is seen that this amount is even less than for Sri Lanka Telecom (USD 1,300 million in ten years).

BTTB, being a completely government owned entity, depends upon the annual government budget for its expansion expenditure, more specifically from the government's annual development programme (ADP) which allocates funds to all economic and social infrastructure projects (for 2003, the total ADP budget was USD 3,340 million). It is obvious that during times when the government is strapped for development funds, as has been the case throughout the country's history, BTTB investments also suffer. In fact, the government has on several occasions even issued special long-term treasury bonds (called T&T bonds) for specific BTTB projects, for instance to finance digital telephone lines, to meet BTTB investment needs. The government has stated that it would again issue bonds to the public to raise the investment funds for the launch of the BTTB mobile telephone project.

Another reason for the slow growth in investments in BTTB (even under tight budgetary conditions) has been, according to many, the inability to complete negotiations with vendors due to external pressures. Even the last major contract with Shanghai Bell is now under investigation for exceptionally high cost and also unsustainable foreign currency commitments.

Mobile Sector TRE

Again, the TRE in the mobile sector of Bangladesh is assessed in terms of market entry, scarce resources, interconnection, tariff, and anti-competitive practices as introduced in the methodology section.

Market Entry

The first mobile license was issued to HBTL (later PBTL) in 1989 along with its fixed wireless license. No fee was levied on HBTL for the license and the process lacked any sort of transparency. With the acquisition of HBTL by PBTL 1991, it became and continued to be the only mobile operator in Bangladesh (with some 3,000 AMPS customers), when the market was opened for competition to three GSM operators in November 1996. These licences were issued at no initial cost and selection was based on beauty-contest type marking scheme in which the experience of the promoters and joint venture partners were evaluated. Two options were given for annual fees; one was an annual amount equal to 15% of the gross call revenue and connection fees; the second was an amount equal to the sum of USD 400,000 and 1% of gross call revenue and connection fees from year 0 to year 5, USD 800,000 and 1% of gross call revenue and connection fees from year 6 to year 10 and USD 1.2 million and 1% of gross call revenue and connection fees from year 11 to year 15. Network rollout obligations were also mandated for the new GSM operators, but no such obligations were stipulated for the incumbent AMPS operator. Competition was kicked-off in the mobile market with this fundamental disparity between the incumbent and the new licensees. GrameenPhone and TMIB (AkTel) launched their GSM services in 1997, Sheba launched GSM services in 1998 and PBTL, who had a license anyway, launched a CDMA service, in addition to its existing AMPS service.

In an interesting development, BTTB (and thereby the government), accusing the existing mobile operators of forming a cartel and maintaining high tariffs, in June 2004 jointly contracted Siemens and Huawei of China to deploy USD 76 million in nationwide mobile infrastructure, initially to serve 250,000 customers. The government has said it will raise necessary funds by selling telecom bonds to the local market. (T&T bonds explained above). This appears to be a highly controversial and political deal.

Scarce Resources

With the rapid growth of mobile telephony in Bangladesh – from 3,000 phones at market opening in late 1996 to 3,150,000 at September 2004 – the need for spectrum has increased tremendously. In context of this exponential growth, a Spectrum Management Committee was created by BTRC to effectively manage spectrum allocation procedures to develop an efficient and competitive market. However, this huge 21-member committee has come under fire for inefficiency and irregularity.

PBTL currently operates on 20 MHz spectrum in the 800 MHz band, obtained from BTTB while acquiring its AMPS license in 1991. Each of the other three GSM operators operates on 5 MHz spectrum in the 900 MHz band, obtained from MoPT in 1996 while receiving their respective licenses.

However, with the recent development of BTTB's mobile phone project, BTRC allocated 5.2 MHz spectrum in the 900 MHz band to BTTB – before issuing the GSM license to BTTB. This was an act of double foul play in spectrum management, and the setting of BTRC refusing the incumbent GSM operators' hopes for spectrum in 900 MHz band.

In an interesting development, GrameenPhone signed a 20-year lease agreement with Bangladesh Railway (BR) to use its nationwide 1600 kilometre optical fibre network to carry its traffic. The transaction was handled transparently in an open bidding process in late 1997. GrameenPhone has agreed to pay USD 20 million to BR in leasing fees over the first ten years. Under the terms of this agreement, GrameenPhone claims it own the rights of way on the BR track and is also allowed to re-sell the surplus capacity of the optical fibre to other private operators and corporate customers. Under this deal, it would share 30% of that revenue with BR. Besides replacing 655 kilometres of fibre, GrameenPhone has deployed 1,050 kilometres of new cable in the BR network. Since then, BTRC has issued six domestic long haul transmissions as well as last mile connectivity provider's licenses without also bringing GrameenPhone under the licensing regime. GrameenPhone continues to exploit the regulatory concession with exorbitant pricing which are not even vetted by BTRC, a mandatory legal obligation.

Interconnection

Interconnection between mobile and BTTB is undoubtedly the biggest issue in the telecom market in Bangladesh. In fact, Bangladesh is perhaps the only country in the world where one cannot call a PSTN from a mobile phone. Close to 90% of all mobile

phone users are confined to a mobile-to-mobile network. The others can call a PSTN, but one needs 'influence' to be able to obtain this facility from mobile networks, particularly GrameenPhone.

With BTRC's failure to solve this fundamental problem, a unique mobile-to-mobile market has grown by leaps and bounds with more and more people realizing that their friends and relations are also on mobile, particularly GrameenPhone customers, and that it is not really necessary to interconnect with BTTB. With the GrameenPhone customer base now twice as large as BTTB's, the state-owned incumbent is becoming increasingly isolated. Further, the mobile operators are allegedly terminating and originating international traffic, freely bypassing the BTTB gateway, causing tremendous pressure on the bottom line of the incumbent.

While GrameenPhone succeeded in spreading its footprint by leasing BR fibre capacity, interconnection difficulties impede the business of the other mobile operators. It is widely believed that BTTB's non-compliance with this fundamental regulatory issue and the absolute inability of BTRC to take action to solve this problem is the biggest discourager of investments in the mobile market.

In a desperate bid to expand their market into Dhaka (where more than 70% of the market is concentrated), the mobile operators agreed to finance a turnkey project to expand BTTB switches for interconnection. BTTB then obtained an estimate from Alcatel to expand its infrastructure through the mobile operators. This document indicated the mobile operators could sufficiently interconnect at USD 1.2 million. But BTTB arbitrarily added USD 2.5 million for items which the operators argued were not relevant to the interconnection project. Meanwhile, Nortel submitted an alternate bid of USD 2.2 million. In April, the mobile operators reached agreement with Nortel to implement this project. The operators engaged Nortel to maintain this switch for an initial five-year term and subsequent hand over to BTTB.

Currently, the mobile operators are negotiating with BTRC for an exemption from paying BTTB the standard interconnection charges. In addition to paying the standard tariff, mobile operators are still required to pay the interconnection fees for terminating their traffic at their self-financed switch in BTTB's network – whereas BTTB does not pay anything for terminating its traffic to the mobile networks. The mobile operators originally (and reluctantly) accepted such an uneven provision in the interconnection agreement with BTTB in 1998. They hoped it would make PSTN interconnection available on demand. But that expectation was never fulfilled and it compelled the mobile operators to invest in BTTB network to get their deserved interconnection.

Another interconnection controversy is looming among the mobile operators themselves. A 'sender keeps all' policy has been followed in the inter-operator interconnection regime. As GrameenPhone has the widest coverage and largest clientele in the market its three competitors send more traffic than receiving from them. As GrameenPhone network grows, its network carries more 'free calls' from the competitors. Now GrameenPhone is threatening to charge other operators to pay for using its network,

which its competitors do not accept and in turn are accusing GrameenPhone for blocking calls from PBTL, TMIB and Sheba. It is alleged that while the call completion rate among the three operators is up to 40%, it is only 8% while being terminated on the GrameenPhone network. GrameenPhone has been pushing for cost-based revenue sharing while its three competitors seem reluctant to comply. It is expected that some kind of accounting method will become applicable soon, with or without the involvement of BTRC.

The above provides clear examples of regulatory inefficiency, inaction and political pressure in interconnection, and how these have increased regulatory risk and slowed investment in to the Bangladesh telecom sector.

Tariff Regulation

There was no tariff regulation prior to the commencement of BTRC in January 2002. The new telecom law mandates that every operator must have its tariff vetted by BTRC. The law also specifies that proposed tariffs will be approved or rejected within 60 days. Operators are arguing against having to obtain BTRC consent prior to reducing tariffs. They believe the regulatory endorsement for tariff reduction is an unnecessary bureaucratic exercise, delaying consumer benefit. In fact, there have been numerous tariff adjustments, mainly reductions, over the last year or so for numerous 'packages'.

However, when BTTB slashed its nationwide dialling (NWD) and international subscriber dialling (ISD) tariffs up 55% from 1 May 2004, mobile operators deferred implementing BTTB's reduced call rates by two weeks. In fact, mobile operators had requested BTTB and BTRC to defer the commencement of long-distance tariff reduction by two weeks to enable the mobile operators to make 'necessary changes' in their own billing systems.[17] BTRC turned down that request.

Thus, every prepaid and post-paid mobile user accessing BTTB's PSTN paid more than double in extra tariffs on NWD or ISD calls until 15 May. The operators never informed subscribers how this extra amount would be reconciled. BTRC did not take any action either.[18]

Regulation of Anti-competitive Practices

Clearly, BTTB's refusal to interconnect mobile operators, in contradiction to the National Telecom Policy and the telecom law, is the most serious anti-competitive practice. BTTB has extended this access divide among the mobile users having access to the PSTN. BTTB has started originating international traffic using VoIP technology. Subscribers can dial a particular code to make budget international calls. Yet the state-owned monopoly refuses the mobile operators access to this facility. Hence, budget overseas phone calls are an exclusive privilege of BTTB customers. The regulator has been insensitive to BTTB's such deliberate discrimination. It is feared that the BTTB launch of GSM services in December 2004 will create a huge disadvantage for the private mobile operators. It is expected that BTTB will bundle this option of

making cheaper international calls to its mobile customers. Not making this feature available with the incumbent mobile operators, however, will destabilise the level playing field and be grossly discriminatory.

The three GSM operators signed a revenue sharing agreement with BTTB in April 1998. Along with PBTL, they pay interconnection fees to BTTB for accessing the PSTN. They also pay the retail tariff for local, long-distance and international calls. BTTB, however, pays nothing to terminate its traffic to the GSM networks. The GSM operators signed such unilateral provision to obtain more PSTN interconnections. According to a PricewaterhouseCoopers (PWC) study, the inadequacy of these agreements far exceeded what was expected, the main discrepancy being that they are grossly one-sided in BTTB's favour. Discussions between PWC and the three cellular service providers suggest that they were "forced to sign the agreements, or not get connected at all to BTTB's system."[19] To make matters worse, the telecom minister has been recently quoted as saying that once the BTTB mobile service is launched, its tariffs would be lower than the private operators while having full interconnectivity with the PSTN. Again, BTRC seem to be powerless to deal with such grossly anti-competitive activity across the board.

In yet another complicated deal, MoPT issued a license in November 1999 to the Bangladesh Broadcasting Telephone & Technology (BBTT – a Japan-Bangladesh joint venture) to operate 200,000 lines of Personal Handy-phone Systems (PHS) in Dhaka; a technology no longer in use. There was no transparency in this licence. The government made BTTB the 51% stakeholder in the PHS venture with half the license fees as GSM operators. The bigger issue is that while each GSM operator has been allocated 5 MHz spectrum in the 900 MHz. band, the PHS operator has been allocated 22.5 MHz in the 1800 MHz frequency. The present government is investigating the PHS license, which was issued by the previous regime. But market watchers anticipate that diplomatic pressure is mounting from the Japanese and US governments in favour of the PHS project.

In a very intriguing development, the government termed mobile phones as "tools of coordinated poll rigging and civil disobedience" during elections, and suspended all mobile services for a total 161 hours since coming to power in October 2001. It is not too difficult to assess the operators' financial losses. But measuring millions of mobile users' individual loss is truly a daunting task. Nobody knows the enormity of economic damages caused by such administrative practices. Neither the government nor BTRC appears concerned about such a critical public interest issue.

Telecom Regulatory Environment Summary: Mobile Sector

In this section, the TRE summary for the mobile sector is presented across the surveyed dimensions of market entry, scarce resources, interconnection, tariff, and anti-competitive practices with respect to the mobile sector. The five point scale is poor, unsatisfactory, neutral, satisfactory and excellent. The secondary author's views as an independent analyst of the Bangladesh market, has taken precedence in this assessment.

Table 4 – **Mobile Sector TRE Summary Assessment**

Dimension	Entire period
Market entry	Poor
Access to scarce resources	Unsatisfactory
Interconnection	Poor
Tariff Regulation	Unsatisfactory
Regulation of anti-competitive practices	Poor

Mobile Sector Investments

Notwithstanding the developments in the TRE, Figure 6 indicates a positive development in mobile investments in Bangladesh since GSM licenses were issued, as per the data obtained directly from the companies concerned, except for Sheba (very small share of market and estimated total investment USD 50 million). Note, however, the figures here do not tally with the World Bank database of new private investments, according to which, GrameenPhone investments should have been significantly higher. Also, there is no disaggregation available of new investments and reinvestments.

The upward trend for the most part has been due to investments by GrameenPhone and more recently AkTel (Telekom Malaysia is 70% shareholder). The peaks and valleys are due to the initial licence and thereafter the periodic investments of the leader and AkTel, the emerging number two.

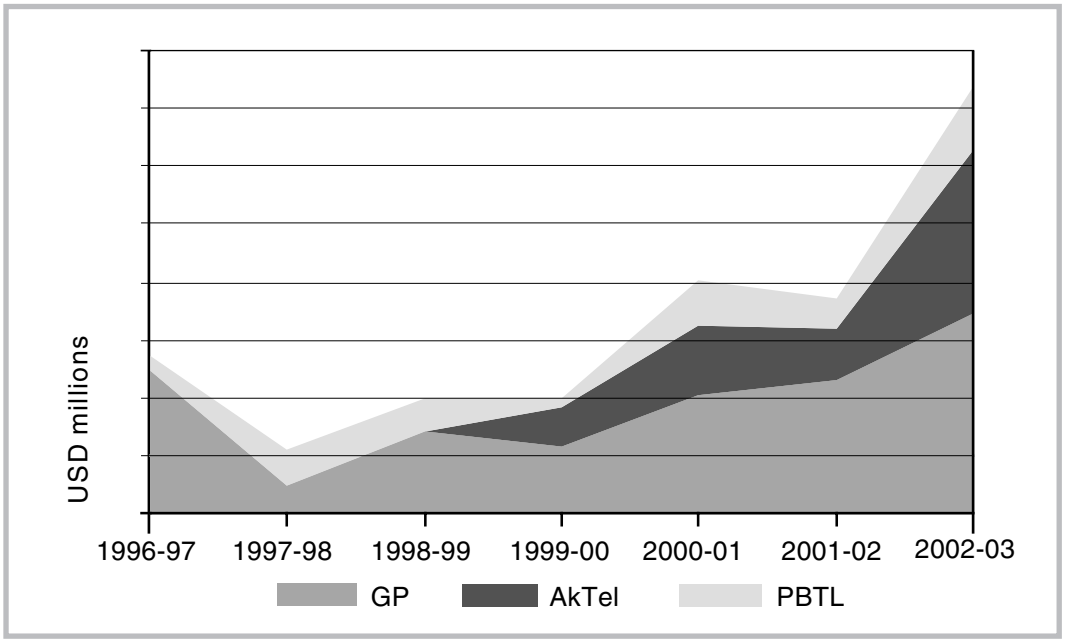
The overriding question is not about the shape of investments in the mobile sector during the last few years, but rather what the shape would have been if a conducive TRE existed.

According to internal sources, GrameenPhone is planning to invest USD 176 million and USD 110 million in 2004 and 2005 respectively, while AkTel is planning to invest approximately USD 100 million per year until 2007. Perhaps one of the main reasons for anticipated investments during the next few years may well be to grow market share and introduce new services as much as possible to compete with the expected launch of BTTB mobile, likely to operate on unfair terms, and with BTRC unable prevent this.

5. Concluding Comments

Unlike neighbouring India and Sri Lanka, where the TRE has undergone varying degrees of success during the last decade, the TRE in Bangladesh has been stagnant in a seriously inefficient manner.

Figure 6 – **Mobile sector investments, 1996-2003**



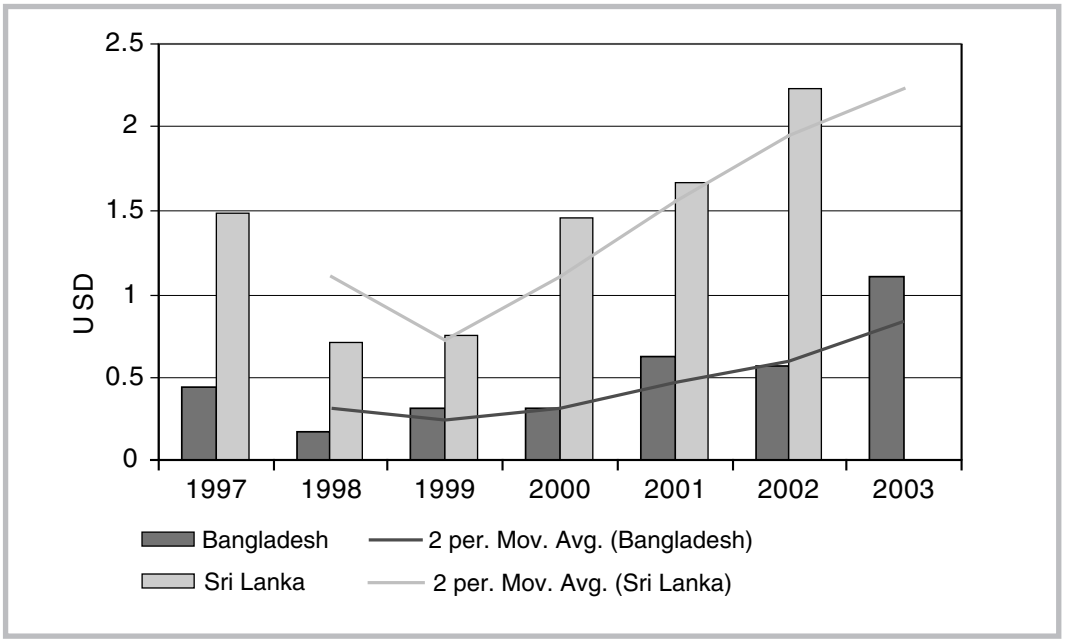
Sources: External Affairs Director GrameenPhone, Managing Director AKTEL and Finance Director PBTL.

Regulation, whether through the MoPT (which also owns BTTB) or the 'independent' BTRC, has been indistinguishable in practice. In the fixed sector, BTTB continues to go about its business with callous disregard for telecom law and the many regulations that exist on paper to create competition and a level playing field. The regulator appears powerless to force the incumbent to act within the specified regulations.

BTRC does not appear to have enforceable policy on any of the dimensions that constitute the TRE. For market access, BTRC seems to be dictated by the government for which *ad hoc* licensing is still prevalent in both the fixed and mobile sectors. The only rays of hope are in the recent transparent guidelines for WLL licenses for nationwide operation. But there again, previous exclusivities may hamper the ideal market based risk-reward allocation procedure. For access to scarce resources, the BTRC record has been one of inefficient allocation and failure. Spectrum has been granted to operators with no policy or procedures. While spectrum is being denied for companies in dire need, BTTB has been given spectrum for its non-existent mobile operations. The success of the new WLL operators will also depend upon their obtaining appropriate frequency spectrum from BTRC. However, going by its track record, that is questionable.

The biggest regulatory failure has been, and continues to be the lack of a meaningful interconnection agreement between BTTB and the other operators, both fixed and mobile. In absence of BTRC striving to obtain the best solution, even a second

Figure 7 – **Comparison of investments in mobile, Bangladesh vs. Sri Lanka**



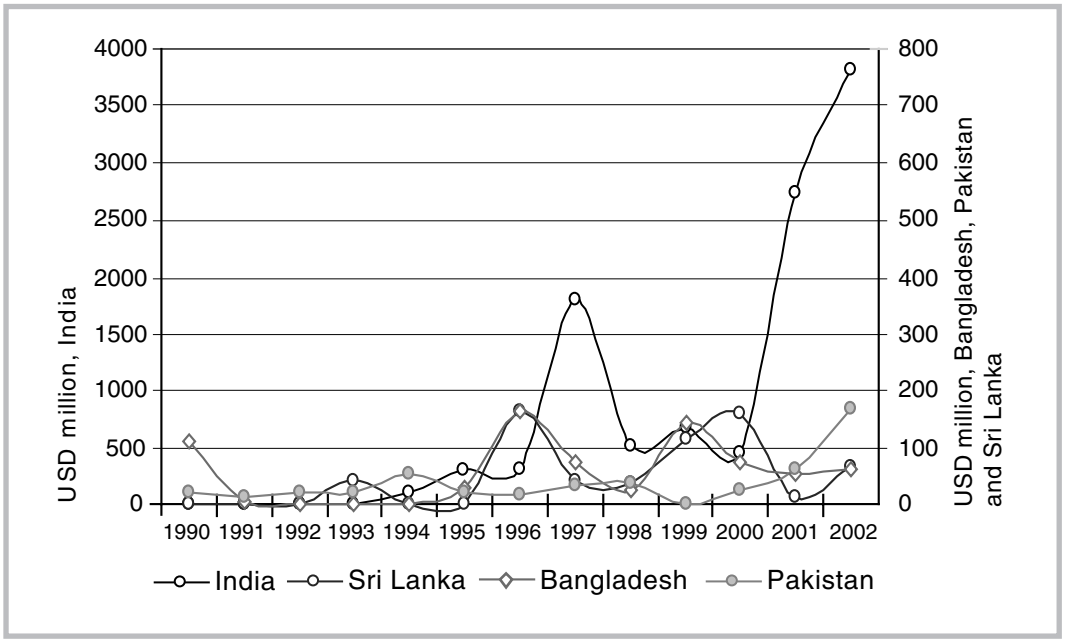
Sources: From Operators in Samarajiva and Dokeniya (2004) for Sri Lanka, Operators for Bangladesh.

or third best solution would suffice until a perfect (or better) solution is found. The outright refusal of BTTB to interconnect competitors and the inaction of BTRC to change this situation is perhaps a global first. The unique situation in which a person with a mobile phone is unable to call a fixed line phone is not only riotous, but seriously detrimental to the development of the industry in a balanced manner. While the GrameenPhone Village Phone programme is considered a global success story in terms of ICT for Development and even winner of the Petersburg Prize in 2004, a person who uses such a phone almost certainly cannot call the Bangladesh Police in an emergency.

Tariff regulation is perhaps the only area for which BTRC has been able to exert some control. Even in that case, however, the incumbent seems to violate regulations and unilaterally change pricing in certain instances without penalty. Against this backdrop, the regulator seems incapable of bringing to justice the operators, the incumbent in particular, for the many and serious anti-competitive practices being carried out in the market.

While there has been some amount of investments flowing in to the Bangladesh telecom industry, it does not appear that they have been made based on any serious evaluation of the market for possible unfavourable changes in the TRE. Instead most appear to be based on non-market based decisions. In any case, USD 740 million over twelve years is not a substantial quantity of private investments in a country with the potential of Bangladesh (population 140 million), compared with say, USD 656 million ins Sri Lanka (population 19 million) outside of divestiture proceeds.

Figure 8 – **Comparison of private investment in telecom in South Asia***



* Without divestiture.

Source: Calculated from The World Bank database on Private Participation in Infrastructure Projects.

During 1996-97 to 2003, Bangladesh was able to attract much more investment than Sri Lanka into its mobile sector. Once the data are standardized by considering per capita investments using comparable data from operators for Sri Lanka up to 2002 and from operators for Bangladesh up to 2003, as shown in Figure 7, two important points emerge. First, the trends in investment show a certain degree of correlation between the two countries in an environment for which investment in mobile telecom is growing rapidly in South Asia (see Figure 8 for India). Second, the level of investments per capita is comparatively low in Bangladesh.

It is plausible that investments in Bangladesh are growing as the region attracts large inflows, but the amount invested in Bangladesh itself is low perhaps due to the ineffective and even deteriorating TRE, which is possibly worse off than that in Sri Lanka (and India).

When the total private investment scenario is analysed (for fixed and mobile) it is clear that Sri Lanka has been able to attract almost as much as Bangladesh (India is far higher, as expected) in USD terms, let alone per capita (see Figure 8). We can speculate that had the TRE been different and market entry possible in the fixed sector, either through partial privatisation and/or opening for new entrants, Bangladesh would have attracted much more investment into the telecom sector. Access to spectrum, interconnection, tariff regulation and regulation of anti-competitive practices would thereafter determine the rate of growth in investments during the coming years.

In this context, a change for the better in the TRE, both for fixed and mobile, would certainly help increase investment in to the sector to develop the telecom market in Bangladesh.

Because long-term funds are scarce and the priority for government allocations for health and education far outstrip that for telecom, and in the midst of quickly changing world in which telecom led development is helping bridge the rich poor gap between nations, Bangladesh needs to re-examine its stand on creating a more favourable TRE to attract the needed level of investment. It is not too late. Notwithstanding the Grameen VillagePhone project, a better overall TRE would help Bangladesh join the growing number of nations (particularly its neighbour India) to take advantage of the power of telecoms.

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[1] The World Bank database on Private Participation in Infrastructure Projects includes private investments in the telecommunication infrastructure under management and lease contracts, concessions, greenfield projects and divestitures. However, in case of Bangladesh, all investments have been for greenfield projects. <http://ppi.worldbank.org>

[2] Bangladeshi analysts feel that this figure is exaggerated.

[3] There were significant investments during 2003-04, it is possible that some reinvestments are unaccounted for in the sources used.

[4] These figures exclude reinvestments for all countries. In Bangladesh, Grameen Phone has stated it reinvested USD 256 million during its entire operations period 1996-2004.

[5] See recent paper by Zita (2004).

[6] Detailed explanation available in Samarajiva et. al (this volume).

[7] Khan, Abu Saeed (2003). Through the assistance of The World Bank, Matheson Ormsby Prentice Solicitor, an Irish law firm was hired to prepare the amended Telecommunications Act to create an independent telecom regulator. The Consultant finalized the draft in 1998 with the provision of five full-time Commissioners. The President of Bangladesh in consultation with the Speaker, the Chief Justice, the Prime Minister and the Leader of the Opposition were to appoint the Commissioners for five-year renewable terms. The president was to appoint a Chairman from the Commissioners, who would be the chief executive of the Commission. Rank of the Chairman was to be equivalent to a Minister and the Commissioners' status would be similar to a Deputy Minister. Their' remuneration was to be minimum BDT 100,000 per month and they would be reporting to the minister for MoPT. A review session was organized in December 1998 to fine-tune the Irish lawyer's draft. All private operators, the entire hierarchy of BTTB and concerned government bodies including the civil and military intelligence attended that session. The attendees observed that the Commission should be independent of government control in order to be properly functional. They strongly opposed the Commission reporting to MoPT. Given the Chairman and the Minister for MoPT would be holding similar rank and status, it was suggested that the Commission be accountable to the President as well as to the Parliamentary Committee of the Ministry of Posts and Telecommunications. That session

also recommended increasing the Commissioners' monthly salary in order to attract more competent expertise from Bangladeshi expatriates. It took the government nine months to evaluate these recommendations. In its weekly meeting on September 13, 1999, the Cabinet neither accepted the Consultant's draft nor approved the suggested revisions. Instead, the Government reduced each Commissioner's tenure from five years to three years; the President's active role in appointing the Commissioners was revoked; and ministerial status of the Chairman was abolished. The government decided that the Commissioners would be appointed by the government and reporting to the Minister of MOPT while their proposed monthly remuneration be reduced to BDT 17,000 from the proposed minimum of BDT 100,000. (USD1 = BDT 60).

[8] Ken Zita (2004) points out that several significant initiatives have been initiated by BTRC as of early 2004: (a) establishing asymmetric carrier interconnection regime, (b) opening fixed line network to competition, (c) definition of a policy for spectrum and (d) introduction of two new mobile licenses.

[9] Muhammad Omar Farooq, Asia Pacific Forum on Telecommunications Policy and Regulation, May 2002 Kuala Lumpur, Malaysia (emphasis added).

[10] Particularly "Information Technology and Telecommunication Opportunities in Bangladesh", Abu Saeed Khan, 2003 and "Telecom and IT in Bangladesh: Status, Potential and Constraints", Abu Saeed Khan, 2001. The author is an ICT journalist and had interviewed a number of stakeholders in the course of writing the above reports as well as complementing the same subsequently.

[11] Interestingly, an unspecified 'golden share' of ITU in WorldTel makes available a seat for its Secretary General on the WorldTel Board.

[12] When the government's outright violation of the newly enacted telecom law was sharply criticized, the government retrospectively deferred the commencement of BTRC by five months.

[13] According to Zita (2004) WorldTel has served legal notice on the Government in January 2004 in effort to preserve the "exclusivity" proscribed in its license. BTRC maintains that the exclusivity contravenes its efforts to introduce greater competition. In the near term, at least, BTRC is not likely to include central Dhaka in the local loop market liberalization effort.

[14] BTRC has issued 16 new PSTN licenses during the last few months, 16 more have been approved and 12 more are being evaluated. All these license applicants have identified WLL as their choice of technology. But BTRC is yet to issue any spectrum to any of these new entrants.

[15] BTTB itself offers cheaper international call rates using VoIP.

[16] Source: Grameen Telecom. 20% discount applies for all telecom operators.

GrameenPhone's monthly tariff of long-distance transmission capacity (USD)				
Each 2 Mbps link	1 ~ 2	3 ~ 4	5 ~ 9	10+
Inter Zonal	400,000	325,000	275,000	250,000
Zonal	350,000	275,000	225,000	200,000

[17] *The Daily Star*, May 7, 2004

[18] Analysts point out that while BTTB took only 62 hours to update its countrywide 172 digital telephone exchanges with the reduced billing data, it is unclear why the mobile operators could not do the same job in 72 hours.

[19] PricewaterhouseCoopers; Bangladesh Telecommunications Sector Reform Project, April 1999.

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Annex 1

List of new PSTN licenses issued by BTRC

License issued for PSTN (Zone-Wise) – As at 8 September 2004						
License already issued						
		NE	NW	SE	SW	Total
1	Bushundara Communication & Networks Ltd	1	1	1	1	4
2	Ranks Telecom Ltd.	1		1		2
3	Bangla Phone Ltd.	1				1
4	Jalalabad Telecom Ltd.	1				1
5	Westec Telecom Ltd.			1		1
6	Tele Barta Ltd.	1	1	1	1	4
7	GEP Telecom Ltd.	1		1		1
8	Dominox Technologies Ltd.			1		1
9	OneTel Communications Ltd.		1			1
	Total	6	3	6	2	16
Approved, but not yet issued						
1	QC Telecommunication Consortium Ltd.	1		1		2
2	Keari Telecom Ltd.		1		1	2
3	National Telecom Ltd. (BRTA)	1	1	1	1	4
4	Dhaka Telephone Company Ltd.	1	1	1	1	4
5	Peoples Telecomm. & Information Services Ltd. (BRTA)	1	1	1	1	4
	Total	4	4	4	4	16
Application being processed						
1	M Tel Chittagong and Sylhet Ltd.	1		1		2
2	City Phone Ltd			1		1
3	Starport Telecommunications Ltd.			1		1
4	S.A. Telecom System			1		1
5	Square Informatix Ltd.	1	1	1	1	4
6	Bangla Phone				1	1
7	Ranks Telecom		1		1	2
	Total	2	2	5	3	12

12. Stimulating Investment in Network Extension: The Case of South Africa

Alison Gillwald[1]

1. Introduction

The shift from the buoyant investment environment in telecoms globally at the end of the last decade to the declining state of global investments during the last few years, precisely at a time that many developing countries were opening up their telecoms sectors, makes South Africa an interesting case study.

Despite its political isolation, as far back as the late 1980s, the technological and economic drivers of digitisation and liberalisation compelled the South African state to acknowledge that the monopoly telecom utility, Telkom, was not meeting the needs of a modern economy. To do so would require significant levels of investment in the network that the state could no longer provide. Besides servicing less than 10% of the population, despite waiting lists going back years, uneven and inefficient internal investments – even after corporatisation in 1991 – had produced a gold-plated, highly indebted network. In line with global trends at the time, towards the introduction of facilities-based competition aimed at shifting the financial demands on the state for the provision of telecoms on to the private sector, South Africa began to pry open its market in the early 1990s.

Heavily overlaid by the politics of transformation, the telecom sector became one of the primary areas of contestation during the 1990s. Intentions by the apartheid state of privatising state assets prior to the first democratic elections in 1994 were fiercely resisted. Such actions were viewed as asset-stripping prior to the inevitable entry of a new government. While undoubtedly politically motivated, such actions were in line with early moves towards privatisation and liberalisation. In a final act of power, but also on the grounds of attracting domestic and foreign private capital and indeed shifting the risk of new, untested network technologies such as GSM onto the private sector, two new mobile networks were controversially licensed in 1993, in the dying days of the apartheid regime.

Of the two, Vodacom, was half-owned by the incumbent. The other, MTN, was intended to include black South Africans in the telecoms sector for the first time, and

deal with the commercial aspirations of the South African state transport company's communications network, Transnet. These licences were to bring in the first foreign investment in the sector, netting ZAR 100 million (USD 31 million at 1993 rates) in licence fees, which laid the ground for extensive mobile network expansion, not only in South Africa but, in time, throughout the continent.

Having secured formal power in the 1994 elections, the Government of National Unity led by the African National Congress, confronted by the realities of government and global governance, increasingly aligned its emerging policies and approaches to economic growth and governance with those espoused by multilateral agencies responsible for international trade and financing. For telecoms, South Africa adopted the prevailing multilateral model of the mid-1990s to extend and modernise the network and to provide services to the unserviced majority of the population through a strategy of network rollout through privatisation, complemented by a universal service fund.

Corresponding to a key aspect of the reform model and in compliance with World Trade Organization (WTO) requirements, a sector regulator was established with the passing of the Telecommunications Act in 1996. This authority subsequently merged with the broadcasting authority to become the Independent Communications Authority of South Africa (ICASA). The rationale for the merger was the increasing convergence of the telecoms and broadcasting sectors, as well as the efficiency and cost benefits of a single entity and the creation of a one-stop shop for all ICT investors, operators and service providers.

In 1997 the government partially privatised Telkom through the sale of a 30% stake to a consortium, Thintana, consisting of the US conglomerate Southwestern Bell Company (SBC) and Telekom Malaysia. In line with prevailing wisdom espoused by international agencies at the time, to attract a serious bidder and decent revenues for the Treasury, the licence came with a five-year exclusivity on public switch network services. At ZAR 5.6 billion (USD 1.22 billion at 1997 rates), this transaction reflected the most significant investment in Africa that year, and the continent's biggest-ever investment in telecoms. As the dominant owner of this newly-financed entity, the state pursued a policy of managed liberalisation that would protect Telkom's revenues during the expansion of the network and allow it time to prepare for competition.

An assessment of the impact of this investment and the conditionalities that accompanied it, on other investments in the sector during the exclusivity period, and the contributions the investment made to achieving national policy objectives, are considered below. Suffice to say here that the strategy failed to deliver on fundamental national policy objectives. Although the network was comprehensively digitised, and new technologies such as ADSL reticently deployed and quality standards improved, at the end of the exclusivity period close to two million subscribers had come off the network, largely due the lack of affordability of basic services. In addition, growth of open segments of the market that had to compete against Telkom during the exclu-

sivity period lagged growth rates in similar-size markets over the same period (Gillwald and Kane 2003: 35).

Subsequent efforts to induce investment through facilities-based competition have been all-but scuttled by the lack of administrative capacity, convoluted licensing process and accusations of political interference. In the case of the third mobile licence, these factors resulted in a court challenge following the announcement of the winning consortium led by Saudi Oger and local consortium Cellsaf. The licensing process was drawn out for 18 months, crippling smaller players, particularly empowerment groupings that had been earmarked as beneficiaries of this process. It drained the liquidity of applicants and ultimately escalated the start-up costs of the business to untenable levels, thus undermining strategies to enter the market by undercutting the GSM incumbents' rates.

Table 1 – **Comparison of largest telecom investments in Africa**

	Description of Licence	Licence Fee, USD
Morocco	35% of incumbent	2,300,000,000
	2nd GSM Licence	1,100,000,000
South Africa	30% of incumbent	1,220,000,000
Nigeria	49% of incumbent	285,000,000
	2nd GSM Licence	285,000,000
Tanzania	5th GSM Licence	90,000,000
Mozambique	2nd GSM Licence	15,000,000
Uganda	2nd GSM Licence	200,000

Sources: ITU, Communications Week International, Tanzanian Ministerial statement by Minister for Communication and Transport, Cellular.co.za and MTN Annual Report 2003.

The unintended positive consequence of this threat of competition to the duopoly mobile incumbents was that they began investing extensively in prepaid services, as indicated in the Table 2. Previously regarded as unviable by the incumbents due to low per capita incomes and associated average revenue per user (ARPU) estimates, such services were promised by bidders for the third licence as the key to their success long before the bidding process had even begun. As the operational dates in the bidders' business plans were steadily eroded so was their potential market share. The duopoly incumbents began rachetting up their prepaid subscribers at such a rate that by the time the third cellular licence was granted in 2001 the incumbents between them had acquired an additional 500,000 subscribers.

One of the reasons offered for the success of the mobile market, which collectively has tripled the number of subscribes on the fixed network, is the relatively low regulatory transaction costs since its inception in 1993. Based on estimates of a couple of hundred thousand subscribers each in their first five years, rather than the millions they reached, the duopoly mobile licences were sold in 1993 for a mere ZAR 100 million (USD 31 million at 1993 rates). For the third mobile licence, Cell C paid nothing up-front but ZAR 100 million (USD 14.7 million[2]) over 12 equal instalments beginning in the third year of commercial operations or the equivalent of USD 2.2 per capita – and a licence at USD 0.01 per capita – a relatively small licence fee per capita compared to Morocco's second mobile licence which sold at USD 39.47 per capita, and more in line with either smaller markets or where regulatory risk is generally perceived to be higher. A per capita price of USD 2.44 was paid for the MTN's mobile licence in Nigeria, USD 0.01 per capita by MTN in Uganda (MTN 2002) and Vodacom's USD 2.74 per capita by Vodacom in Tanzania.[3]

Table 2 – **Comparison of capital investment in network expansion in mobile sector**

Operator	Billions of Rand[a]
Cell C	2.5 (USD 370 million)
Vodacom[b]	15,987 (USD 2,351 billion)
MTN[c]	8,671 (USD 1,275 billion)

Sources: ITWeb, Vodacom Annual Reports, MTN Annual Reports

[a] Conversions, in this table only, into USD are using an average exchange rate of 6.8 for the 2004 year.

[b] Calculation based on cumulative network capital expenditure per customer multiplied by total number of customers. Vodacom Group Interim Results, September 2003, p. 12.

[c] Same method as with Vodacom, MTN Annual Report 2003 p. 30.

The value-added network services (VANS) providers, including internet service providers (ISPs), however, have not been as fortunate. Required by the law to obtain all their facilities from the incumbent Telkom, which competes with them in this competitive segment of the market, the VANS providers have seen the VANS market, excluding Telkom's share, shrink during the period of the exclusivity, with the period characterised by a litany of complaints to the regulator and the Competition Commission, charging Telkom with anti-competitive behaviour.

South Africa, like other governments, both in the developed and developing world, has tended to focus on initial up-front payments rather than longer-term contributions to the economy and Treasury, such as longer-term tax revenues. The fiscal impact of licences granted already is sizeable, with taxes paid by telecoms licensees to the Treasury in the 2003 financial year amounting to ZAR 1.922 billion[4] (USD 254.57 million[5]). These would have also been further supplemented by taxes paid by the

ZAR 5 billion (USD 662 million) VANS industry of an estimated ZAR 1.5 billion (USD 199 million).

The focus on the maximisation of state assets has compelled the state to pursue a policy of managed liberalisation. In the first phase, there was the focus on securing the optimal price in the partial privatisation of Telkom in exchange for rights and exclusivities that allowed the strategic equity partner to milk its investment. During the second phase of managed liberalisation, the state's preoccupation with Telkom shifted to the initial public offering (IPO) and the creation of conditions that would maximise its share price.

After much delay, the final offer valued Telkom at ZAR 15.6 billion (USD 1.486 billion[6]), considerably lower than its ZAR 100 billion (USD 9.5 billion) valuation a few years previously, before the steep fall in the industry's stock market value. In the year ending March 2002, Telkom had revenue of ZAR 34 billion (USD 3.24 billion), and posted a net profit of ZAR 1.2 billion (USD 110 million). At ZAR 28 (USD 2.67) per share, the initial share price that was finally settled on earned ZAR 3.9 billion (USD 370 million). This was less than half the ZAR 10 billion (USD 950 million) the government previously had planned to raise per year from its major privatisations.

The IPO also represented South Africa's biggest attempt to spread share ownership amongst the black majority in an economy still dominated by whites nine years after apartheid. Historically disadvantaged individuals were offered a 20% discount to the offering price on the shares in a scheme referred to as Khulisa. In addition, if these individuals hold on to their shares for two years, they will qualify for a loyalty bonus of one extra Telkom share for every five shares they own. All other South African citizens were allowed to buy shares at a 5% discount to the offering price (Gush and Ginsberg 2003).

However, the Khulisa offer was rejected by the biggest trade union coalition, COSATU, which contended:

> [F]or working people, the costs of the commercialisation and privatisation of Telkom far outweigh the largely illusionary benefits of a discounted share offer. Put bluntly, the vast majority of people earning under ZAR 5,000 (USD 662[7]) a month simply cannot afford any part of the Khulisa offering. ... At the same time, commercialisation and privatisation have greatly increased the cost of living for working people. In telecommunications, in particular, the commercialisation of Telkom has led to soaring costs for low-income households, although rich consumers enjoy better services and lower tariffs (COSATU Press Release 2003).

This did not deter the government, which has hailed the IPO as a triumph as the share price has soared to over ZAR 70 (USD 10.29[8]) a share in 2004, allaying fears ahead of the impending 2004 election of a loss in the share price. The IPO raised about ZAR 3,828 billion (at 2003 rates USD 500 million) for the South African government, which sold 25% of Telkom's shares. SBC and Telekom Malaysia paid ZAR 5.6 billion (USD 1.22 billion) in 1997 for 30%.

However, the benefits of this have come too late for empowerment consortium Ucingo, who were meant to be the beneficiaries of a 3% shareholding in the initial privatisation. They raised ZAR 565 million (USD 65.55 million[9]) from funders to pay ZAR 33.90 (USD 3.93) per share for the 3% holding in 2001 anticipating the price would soar when the company was listed. With the collapse of the telecom sector globally and the resultant delays in the listing, the value of the stock plummeted and the share price was finally set at around ZAR 28.00 (USD 2.67) for the listing. Highlighting the dangers of borrowing to acquire equity, Ucingo, unable to service its soaring debt, had to withdraw, negatively impacting on a string of pension investment funds which had been guaranteed returns of 30% (*Mail and Guardian,* 12-18 March 2004).

A further 5% of Telkom that was supposed to be warehoused by the National Empowerment Fund with the initial privatisation has also not materialised.

The determination to keep Telkom's monopoly power intact to improve the immediate budget balance occurred even at the expense of other state entities. The broader policy intention to open up the sector – and particularly to provide lower-cost broadband capacity for internet service providers (ISPs) – through the preferential granting of international gateway and multimedia licences to the publicly-owned signal distributor, Sentech (by the Telecommunications Amendment Act in 2001), was undermined by the lobbying of the Ministry and Parliamentary Portfolio Committee to protect the incumbents' revenues, and particularly Telkom. Telkom, argued that the favourable conditions proposed for Sentech would result in it effectively becoming a third public switch network operator. The resulting legislation severely compromised the ability of the regulator to licence Sentech effectively and Sentech's ability therefore to be competitive. Its attempts to become operational have consequently been severely delayed by legislative amendments, court challenges and regulatory clarification.

Investment implications of this preferential Sentech licence relate more to stimulating internal investment at this stage than securing foreign investment. However, one assumes that the purpose of granting this licence, uncompetitively and by statute, is to increase the value of this rather neglected state asset for privatisation at some point.

Two major investment opportunities in the country's telecom sector have been severely impacted by not only the downturn in the global economy and the sector, but also by the negative perceptions of political and regulatory risk arising from the controversies of the licensing process for the third cellular operator. None of the licences that were supposed to come into play at the formal end of Telkom's exclusivity period in May 2002 are yet operational. Hampered by the kind of licensing delays that plagued the third cellular licence, the Second National (fixed-network) Operator (SNO) licence has now been granted to consortia that will bring in very little capital, since 25% of the equity has been warehoused by the government until a suitable investor can be found.

The size of the investment in the SNO was limited from the start by the set-aside of 30% to be shared by the state-owned power utility's communication arm, Eskom

Enterprises, and the state-owned transport company's communications network, Transtel. A further 19% was set aside for empowerment purposes and was licensed to a grouping called Nexus in a separate process. The terms of the award to Nexus require an investment of approximately one billion rand in the Second National Operator. The SNO has also been a victim of the complex co-jurisdictional nature of the licensing process for major network licences in South Africa, where licences are called for by the Communications Ministry on conditions set by it, then evaluated by the regulator ICASA, which recommends a successful bidder or bidders to the Minister, who then grants the licence, with the final licence then issued by the regulator. In two separate licensing rounds for the SNO, the regulator on both occasions declined the bids of the bidding consortia on the basis of their failure to meet the minimum requirements set out by the Ministry. This resulted in the Minister establishing a committee led by the Department of Communications to negotiate a licence with the various parties. In late 2003 the Ministry announced that both bidding parties in the final round – both of which had been rejected by the regulator – would share 26% of the remaining equity, with 25% being warehoused by the government until a suitable player could be found. The terms of the SNO licence are currently being finalised, but to-date Transtel and Eskom Enterprises have invested between ZAR 1.2 and ZAR 1.6 billion (USD 176.5 and USD 235 million[10]) in the fibre optic network infrastructure that has been installed.

The focus on the SNO licensing process has happened at the expense of the initial ten Under-Serviced Area Licences (USALs), which are intended to provide services to areas with less than 5% teledensity. Initially unable to tap into the Universal Service Fund, these licences have now received a promised grant of ZAR 5 million (USD 0.74 million) upon licencing and promises of interest-free loans of up to ZAR 10 million (USD 1.5 million) over the first three years The basic capital needs of a single local USAL network are estimated to be ZAR 20 million (USD 2.9 million), based on an international average cost per fixed line of USD 1000 (currently ZAR 650). This figure could be reduced significantly if USALs were able to share satellite platforms, software for services and billing, etc. But despite these belated funding arrangements put forward by the Universal Service Agency, the business cases of the USALs may still be doomed, not just by the delays to market, but also by ICASA's withdrawal of the proposed asymmetrical termination rates. An independent consultant proposed to ICASA at its public hearings on USALs that without a termination rate as high as 50-70% and the ability to share facilities, the USAL licensees would not be viable and therefore would be unlikely to attract sufficient investment.[11]

The remaining significant investment opportunity arising from the current law is the requirement that the regulator investigate the feasibility of the introduction of a fourth cellular licence before the 2005 financial year. With some luck this process will take place under the new proposed convergence legislation, which goes some way to ameliorating the currently inhibiting arrangements for new entrants and is aimed, amongst other objectives, at stimulating the rather poor investment record in South Africa's telecom sector.

2. The South African Telecoms Market

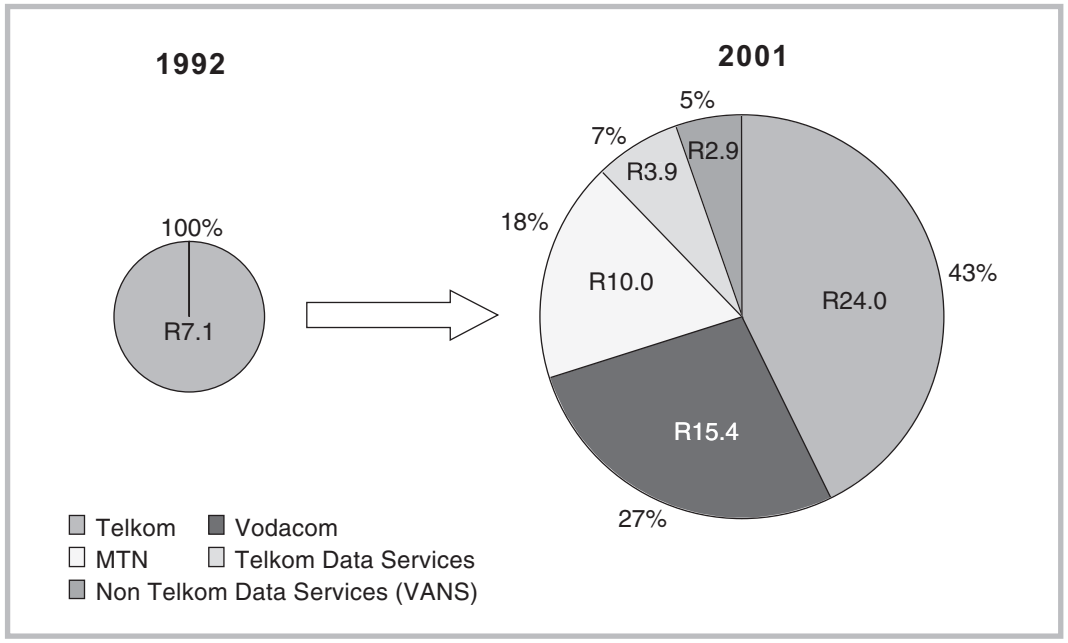
During the ten-year period between 1992 and 2001, revenue generated by the sector grew from ZAR 7 billion to ZAR 56 billion (ITU 2002; BMI-T 2002: LINK Centre Analysis). In the process, it grew from representing 1.9% of South Africa's GDP to 5.8%. Such figures are often used to demonstrate the success of telecom reform in South Africa. Even international comparison suggests that this growth is significant. For example, in South Korea, a shining example of ICT growth, telecoms only represented 4.3% of GDP in 2001. However, disaggregation of the data may paint a different picture, including the reality that the increased contribution to GDP may reflect the high cost of telecoms. That there has been increased activity and expansion in the sector is nevertheless obvious.

The partially privatised public switched telecoms network (PSTN) incumbent, Telkom, has made impressive gains during the period of its extended monopoly from 1997 to 2003, growing its activities from ZAR 7 billion in 1992 to ZAR 43 billion in 2001 and retaining a significant 43% of total market share.

Meanwhile, the mobile cellular market has grown beyond all expectations, with over 30% of the total voice telephony market share by 2001, and more than three times the number of subscribers than the fixed network. Prepaid services have been a key driver. According to market research firm BMI-TechKnowledge, today the prepaid market in South Africa makes up 75% of cellular subscribers, and more than 90% of new connections are prepaid. Indeed, new entrant Cell C estimates that 98% of its subscribers are prepaid users. These figures are in line with the experience throughout Africa where BMI-T estimates that between 90% and 95% of cellular customers are prepaid. However, while contract customers only make up 25% of subscribers in South Africa, they still generate around 70% of revenues due to their much higher ARPU. Vodacom's financials are fairly typical for South Africa in this respect, with post-paid ARPU standing at ZAR 547 per month, over five times the prepaid ARPU of ZAR 93.

This disparity has required mobile operators in South Africa to develop a very particular business model, which has since been exported to the rest of Africa through MTN's and Vodacom's international operations. The model is quite different from the Northern Hemisphere model where such marginal customers are not generally brought on to the network, and certainly not as quickly after launch or in such large numbers as have been seen in Africa. Understanding this model, in terms of effective regulation and ensuring continued investment in network expansion, is critical to the sustainability and growth of mobile operations in South Africa and Africa more generally, where there is pressure on operators both to reduce retail and wholesale rates. Operators argue that the current relatively low retail rates can only be sustained by the relatively high termination charges on the mobile networks. The success of the mobile market in South Africa has provided the two dominant mobile companies with a launch pad to the rest of the continent, as evidenced by Table 3. South African telecoms investment across the continent must be the most significant investment by

Figure 1 – **Size of South African telecommunications sector, billions of rands, 1992-2001**



* 2001 estimate reached by utilising Telkom and MTN fiscal year 2002 data which runs from April 2001 to March 2002.

Sources: ITU World Telecommunications Indicators Database (2002);

Telkom IPO Prospectus; MTN Annual Report (2002);

BMI-TechKnowledge Communications Handbook (2002).

any single country in Africa. This position will be consolidated by the recent announcement by Altech that it will set up a joint venture worth ZAR 500 million with Econet Wireless Group, the Zimbabwean-initiated African operator that has mobile interests across the continent.

Figure 1 breaks down the contribution of the various parts of the South African telecoms sector to the total revenue generated by the sector. As can be seen, both the size and the composition of the sector have changed dramatically over the past ten years as Vodacom, MTN and the competitive VANS providers have entered the market. The composition of the sector continues to change, as Cell C entered the market in late 2001 (and was therefore not included here), and will change further, following licensing delays, when the SNO is licensed, in the final quarter of 2004. Data services, which include leased lines, internet, corporate networks and virtual private networks, continue to grow and now represent 12% of the sector, or just under ZAR 7 billion per year – an amount equal to the size of the entire sector in 1992.

Moreover, these figures only measure the direct contribution of telecoms to the economy. Through its enabling indirect effects, telecoms may be the most important sector

of the future economy. The sector reflects the application of continuously improving technologies emanating from the telecom equipment, computing hardware, software and consumer electronics industries. Integration of these technologies into the telecom network, and in terminal devices connected to the network such as personal computers and mobile phones, has provided the foundation for the continuous development of new electronic information and communication services, including the internet, referred to in Figure 1 under VANS, which are being applied throughout the entire economy.

Table 3 – **Comparison of Cumulative Capital Expenditure by South African mobile operators**

Operator	Cumulative Capital Expenditure (rand) in South Africa	Total Cumulative Capital Expenditure (rand)	Cumulative Capital Expenditure (rand) Africa excluding South Africa
Cell C	2,500,000,000	2,500,000,000	0
Vodacom	15,900,000,000	18,300,000,000	2,400,000,000
MTN	8,700,000,000	14,400,000,000	5,700,000,000

Sources: ITWeb, MTN Annual Report, Vodacom Annual Report.

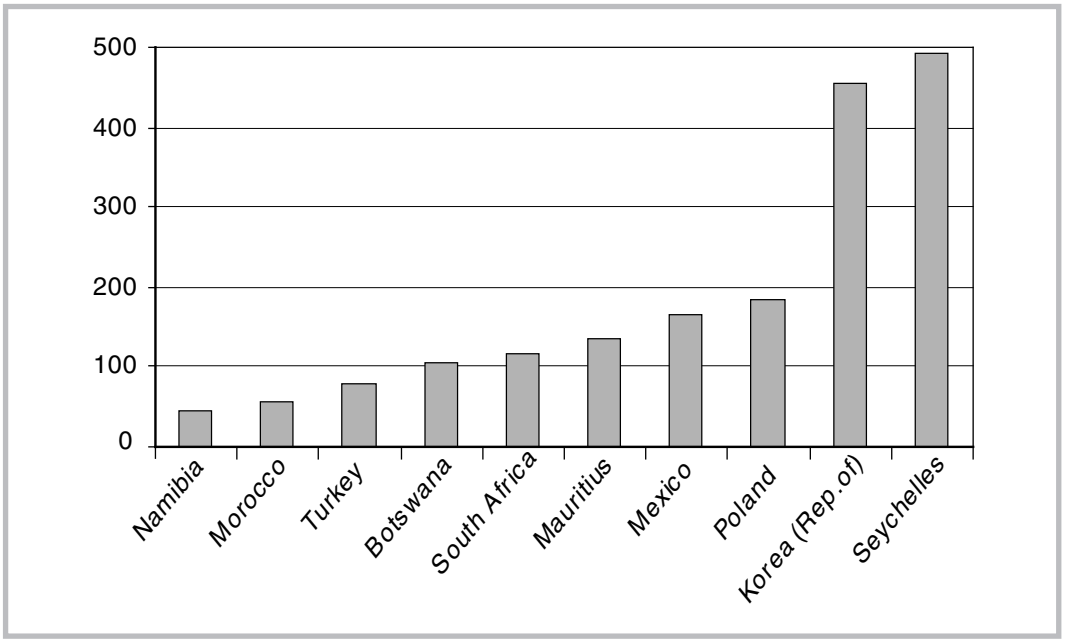
The value-added services market in South Africa is both large and varied, with market research firm BMI-TechKnowledge estimating that, not including Telkom, the South African data services market was worth ZAR 2.88 billion in 2001. Telkom's 2002 Annual Report states that its data business revenues were ZAR 3.9 billion, putting the total value of the data services market at a little under ZAR 7 billion – equal to the size of the total market in 1992 when the process of liberalisation began. While Telkom's data business line item in its Annual Report may not correlate exactly with its VANS activities, a 58% share of the revenues generated in the data services market would indicate that its value-added services market share is significant.

In terms of internet connectivity, the South African market has five Tier 1 ISPs; that is ISPs that manage at least some of their international bandwidth and fully manage their own national networks. There are also hundreds of Tier 2 ISPs (ISPs that purchase their bandwidth from a Tier 1 ISP) and Tier 3 ISPs (virtual ISPs that only handle the sales and marketing of their brands) in South Africa. There were estimated to be 250 ISPs providing digital leased-line services in 2003 (Goldstuck 2004).

3. Network Investment and Capacity

Traditionally, the amount of telecom revenue per capita of countries has been used to provide some indication of activity in the telecom sector. With the minimal penetration of fixed-line in developing countries, the telecom revenue per capita has been correspondingly low. While South Africa's telecom revenues per capita are relative-

Figure 2 – **Telecom revenue per inhabitant, USD, 2002**

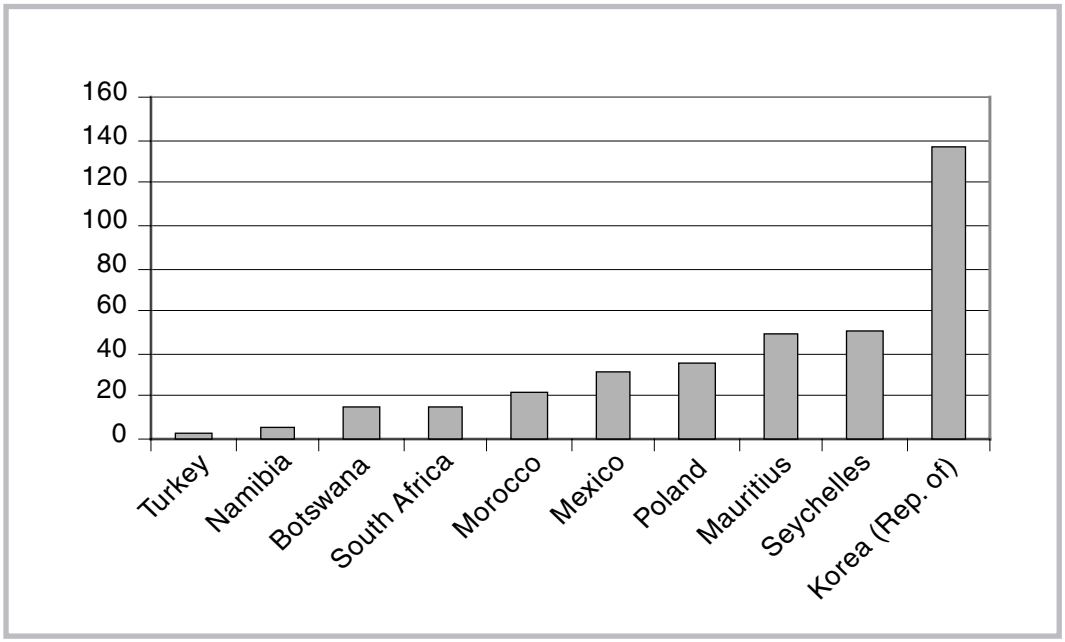


Source: ITU World Telecommunications Development Report (2003). ITU: Geneva.

ly high in comparison with other countries in the Southern African region. As a middle-income country according to UN classification, South Africa's comparative telecom spend per capita has been low. As can be seen from Figure 2, at USD 117.5 in 2002 South Africa had the highest telecoms revenue per capita among SADC countries (with the exception of the island states of Mauritius and the Seychelles) and was in the middle of the pack with regard to other middle-income countries (Poland, South Korea and Mexico having higher revenues; Morocco, and Turkey having lower). These five middle-income countries were chosen for comparison given their similarity to South Africa in terms of income levels and telecoms penetration in 1996, when the Telecommunications Act was passed, and as such their performance over the last six years can then be compared with that of South Africa. Morocco was chosen because the execution of its reform and liberalisation process is often held up as an example of an African success story in the telecoms sector.

The reverse side of revenue generated by telecoms activities is of course the investments made in the network itself. While the level of telecoms investment per capita can fluctuate significantly from year-to-year as major capital projects are begun or completed, the figures do provide an idea of the commitment of respective countries to expanding their networks and joining the information society. Given the massive amounts that South Korea has invested in telecoms (see Figure 3), it is perhaps not surprising that it now leads the world in broadband and 3G deployment and, in the past six years, has rocketed up most ITU statistical tables.

Figure 3 – **Telecommunication investment per capita, USD, 2002**



Source: ITU World Telecommunications Development Report (2003), Geneva: ITU.

The rise and fall of the South African level of investment reflects the capital expenses associated with the 2.8 million lines that Telkom was required to rollout during its exclusivity. This totalled nearly ZAR 50 billion during the exclusivity period. The decline in these figures in recent years reflects the completion of this exercise and Telkom's stated intentions in its 2002 Annual Report:

> As we reach the end of our licence obligations, we have changed our capital spending decision process to ensure that adequate returns on investment are achieved. We are focused on reducing capital expenditure in our segment without impacting service levels. This year we started the process by reducing our capital spend to ZAR 6.9 billion, 25% of revenues, from ZAR 8.1 billion in 2001, 31% of revenues.

Telkom is, however, the dominant shareholder of the SAT 3 undersea cable, in which it has invested almost USD 85 million to secure a 16% shareholding and a right to 30% use of the cable. It also has the contract to manage the cable. This is not a very significant investment for a company of Telkom's size, but with further investments expected, including the intention to complete the African cable by connecting the outstanding African east coast countries, it is clear that Telkom sees the hubbing of African traffic as a significant portion of future business that it is willing to expand into while reducing national investments.

In line with its larger economy and higher GDP, current levels of investment indicate that South Africa is investing significantly more in its telecoms infrastructure than other

SADC countries for which data are available. In terms of middle-income countries internationally, however, South Africa invests less than Poland, Mexico, and South Korea but more than Morocco and Turkey, both of which have lower GDPs. With the exception of Mexico and Morocco, South Africa has significantly fewer total telephone subscribers per capita than the other middle-income comparison countries, and one would therefore expect to see higher investment rates if this gap were to be narrowed. The extent, quality and price of the backbone infrastructure is a significant consideration for investors wishing to offer services exploiting the backbone facilities and indeed for investors in other sectors requiring high-volume, low-cost, guaranteed services.

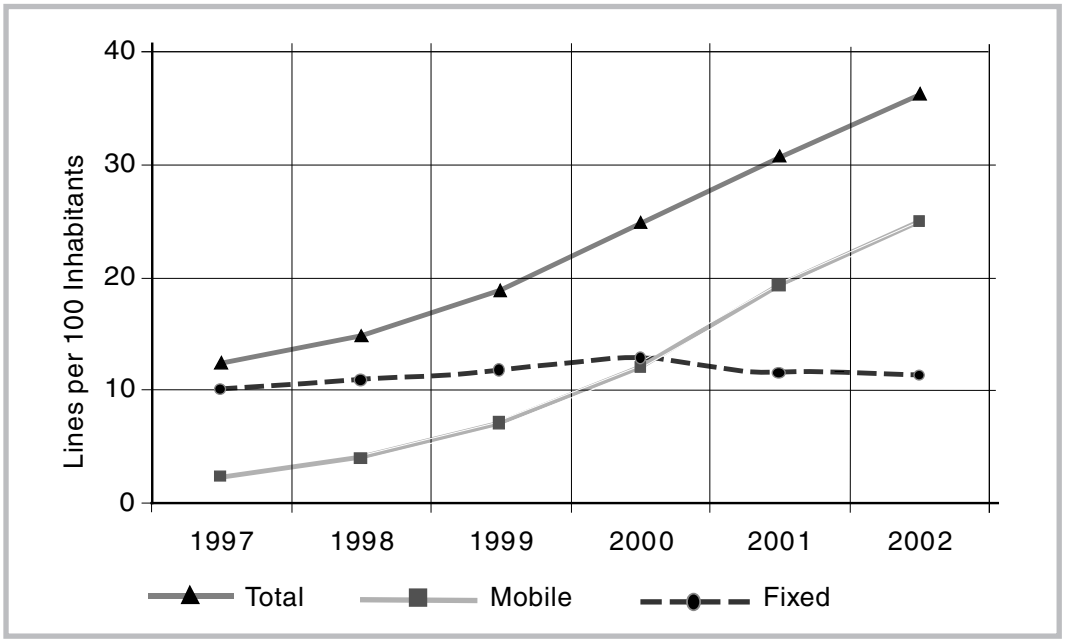
4. Network Coverage and Subscriber Numbers

In addition to GDP, a further factor for consideration of investment is the saturation levels that exist for the services being considered. The declining number of fixed-line subscribers over the last two years is concomitant with the exponential rise of mobile service in South Africa, and indeed throughout the continent. While figures across the Southern African region are impressive, in terms of global comparisons they are still behind Asia, which is taking over from Europe as the region with the most rapid growth in mobile market penetration (Melody et al. 2002)

By the end of 2001, the ITU estimated that 28 African countries, representing more than half of the countries in the region, had more mobile users than fixed-line users. Sometime during 2002, mobile subscribers were expected to pass the one billion user mark globally, and to pass the total number of fixed-line subscribers not only in Africa but also worldwide. While the difficulties of accurately measuring mobile take-up are numerous, especially with regard to active and non-active prepaid user accounts, the ITU strongly recommends that "policy-makers and regulators must overcome their fixation with fixed-lines and look to mobile as a way of achieving social policy goals" (ITU 2002: 8). The ITU has found that in developing countries, mobile penetration, due to the mechanism of prepaid accounts, is not as heavily dependent on income as are other types of telephony. This conclusion, supported by the phenomenal growth rates, yields hope that mobile can address some aspects of the digital divide, which is largely income-based. However, despite the achievements of mobile it is also clear that fixed lines will continue to be an important developmental measure.

This is especially true in terms of access to the internet, which is not yet feasible through the GSM technology that has thus far been the *de facto* standard of the global mobile boom. To gain a more accurate figure of the changes in teledensity in South Africa over the last six years, fixed, mobile, and total teledensity are presented in Figure 4. When fixed and mobile growth is combined, South Africa's figures show impressive annual growth during this period, although 95% of this growth was generated by the increase in mobile subscribers.

Figure 4 – **Total telephone density in South Africa, 1997-2002***



* - For the year ending in March

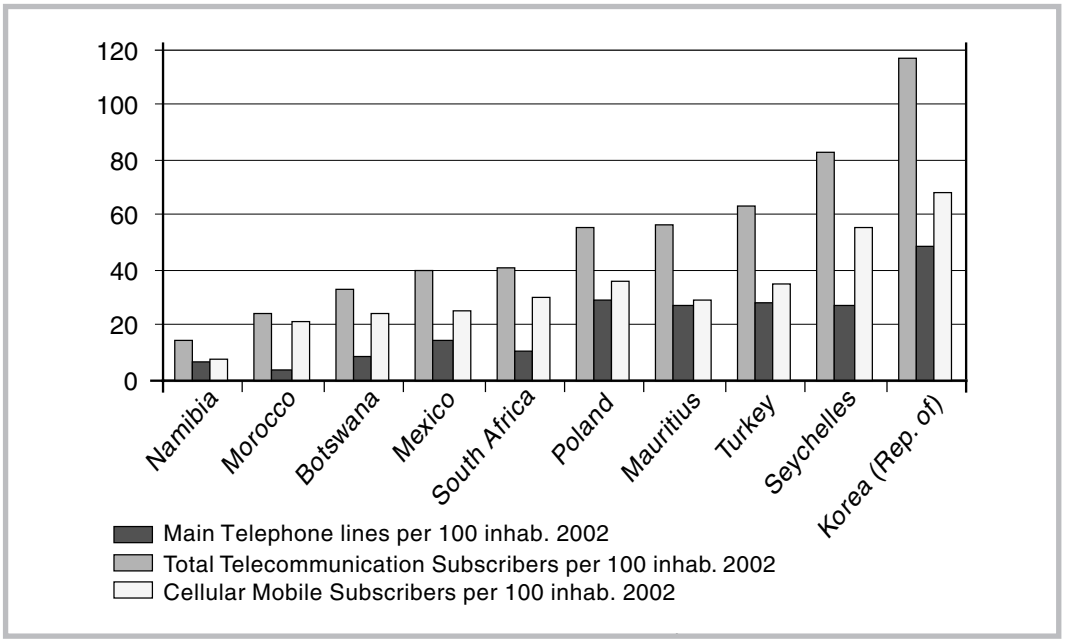
Source: 2002 Telkom Annual Report.

Internationally, the figures tell a similar story, with the majority of universal service growth achieved in Africa during the latter half of the 1990s coming as a result of the growth in mobile penetration. In terms of fixed-line growth in SADC and the middle-income comparison countries, as can be seen in Figure 5, only Morocco, Zambia and the war-torn Democratic Republic of Congo have worse performance than South Africa in terms of annual growth over the past six years.

Around the world, the performance of mobile over the past six years has been nothing short of extraordinary, with many countries achieving subscriber increases in excess of 100%. While South Africa's growth rate is lower than this, it is nonetheless impressive given the relatively large initial base of 2.35 million subscribers from which it was achieved. Compared to middle-income countries, South Africa performs well, having slightly fewer mobile subscribers per capita than Poland, slightly more than Mexico, and significantly more than Morocco and Turkey. Once again South Korea ranks significantly further ahead of all the other middle-income countries.

In terms of overall subscriber growth, South Africa performed relatively well compared to other SADC countries when factoring in its large user base. However, the performance of the fixed-line sector has put a drag on this growth, with countries such as Botswana, and the island states of Mauritius and the Seychelles recording growth rates significantly higher than those of South Africa. While South Africa's growth rate is also in line with other middle-income countries, its current growth trajectory would

Figure 5 – **Fixed, mobile and total telecommunications subscribers per 100 inhabitants, 2002**



Note: Botswana CAGR only calculated for 1996-2000.

Source: ITU World Telecommunications Development Report (2003), ITU, Geneva.

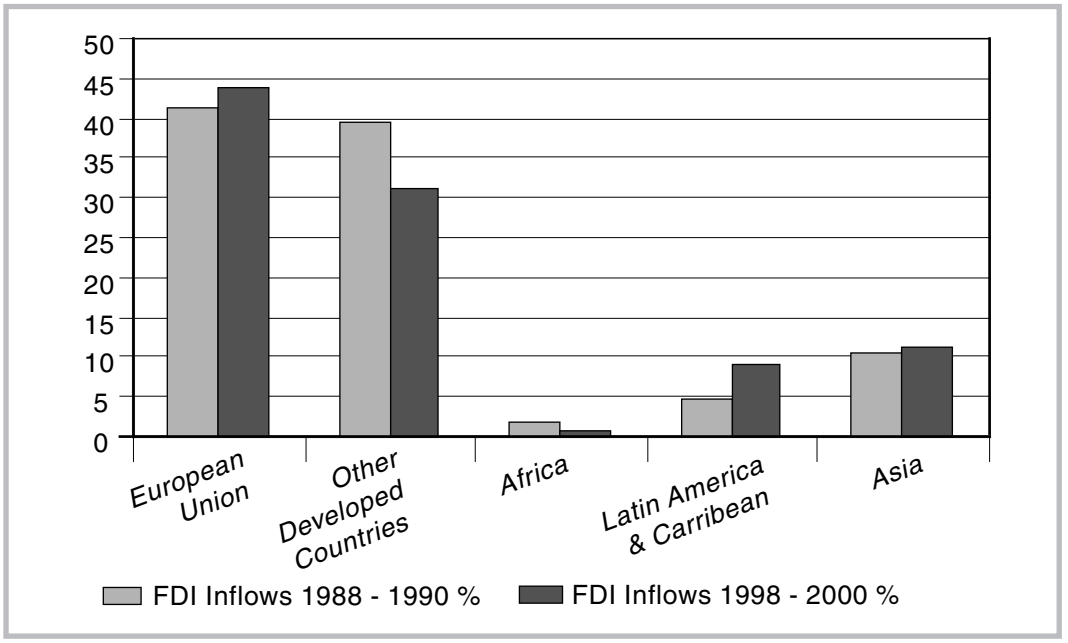
not seem to allow it to narrow the teledensity gap between it and the best performing middle-income countries of South Korea, Turkey, and Poland. It is also increasingly apparent that the presence of strong national information infrastructures and knowledge and skills bases are in and of themselves a central criterion that decides where capital is invested.

5. Investment Purpose, Risk and Opportunity

While a host of factors, including overall macroeconomic and political stability, are obviously important in attracting private investment in telecoms, the 2001 World Development Report claims that in order to encourage private investment in the telecoms sector, two factors in developing countries need special attention: political reform and the establishment of independent regulators as part of efforts to enhance the credibility in the government's regulatory frameworks. Policies that allow for full cost recovery and that ensure the investor a reasonable rate of return without government contributions are the preferred alternative for expanding private investment. Often, governments have failed to adopt such policies, or to implement them through credible regulatory arrangements, thus actually deterring private investment.

Unfortunately, South Africa has been an example of this trend, with irregularities in the third cell phone operator licensing process leading one observer to comment that

Figure 6 – **World FDI inflows (%)**



Source: UNCTAD World Investment Report 2001.

"there is not more than one foreign investor that would be happy to recommend South Africa as an investment destination after this process" (*ITWEB* 30 June 2000), while US trade representative Robert Zoellick has questioned South Africa's "commitment to a competitive telecommunications market and its long-term ability to attract foreign participation in its high-technology sector" as a result of changes planned under the amended Telecommunications Act (*Business Day* 4 April 2002).

The types of activity proposed in the UN Trade and Development Report (2002), if undertaken in South Africa, would increase the competitiveness and ICT capacity base of local firms, thus making the national economy more attractive to future investors. There is a clear role for government to play in supporting sustainable investment by MNCs beyond privatisation. First, it can help to overcome potential MNC-supplier information gaps by making sure that multi-nationals are aware of the presence and capabilities of prospective local partners. For example, in promoting South Africa as an investment destination, Trade and Investment South Africa (TISA) could make relevant telecoms and ICT infrastructure statistics and reports available on an annual basis. Secondly, as a condition of investment, governments can require MNCs to engage in supplier development programmes that include technology transfer, training, information-sharing, and the provision of finance.

The latter conditionality is a particularly important one for middle-income countries, such as South Africa, as they seek to move away from basing their competitiveness

for attracting FDI primarily on the basis of cheap labour, a production factor which is readily available in numerous other developing countries.

Political and Economic Stability and Opportunity

The unsaturated markets in Africa have been identified as a major attraction for investors on the continent, but this has historically been offset by the poor political and economic conditions in many African countries, particularly the low per capita incomes. For Africa, the perception of high-risk investment conditions have pushed up rates of return on investment in the telecoms sector and resulted in demands for guarantees on returns even where actual risks are relatively low.

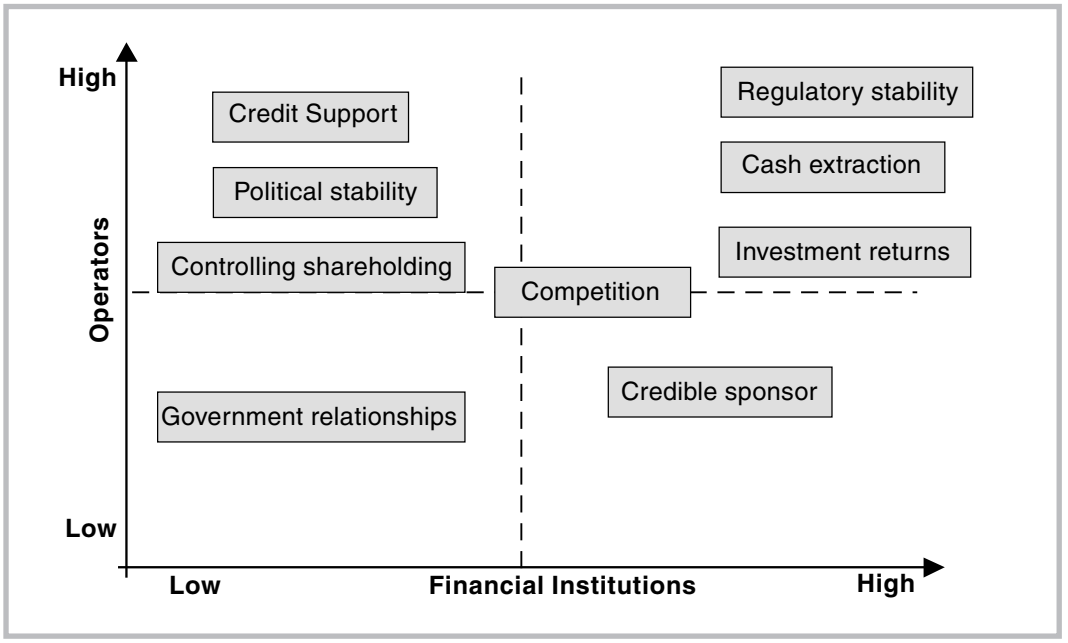
Despite high, often guaranteed returns offered by African countries and the pressure on them to improve market access, there has been very little foreign direct investment (FDI) in the continent. Only 0.8% of total world FDI was in Africa between 1998 and 2000, which represented a slump compared to the 1.8% of FDI between 1988 and 1990.

In this regard, South Africa should be a relatively attractive investment destination. It has by far the continent's highest per capita income at USD 2293 (2002), and compares favourably with other lower-middle-income countries. Now in its tenth year of democracy, it is also politically stable. Its network and services markets remain largely untapped, other than for mobile, which is still far from saturated, and it has the most advanced backbone on the continent. The backbone connects to all the major undersea cable routes and can thus been seen as a gateway to Africa. However, investment expectations in the telecoms sector in South Africa have not been fulfilled.

A SADC investment report prepared for the region in 2003 lists factors identified by both operators and financial institutions as contributing to patterns of investment in the region:

- Adequate return on investment;
- Government relationship, particularly the strength of relationships between operator management and specific country government officials;
- Market demand and knowledge;
- Level of competition – market potential;
- Regulatory stability;
- Possibility of majority shareholding or control;
- Economic and political stability;
- Ability to extract earning; and
- Public and institutional financial support.

Figure 7 – **Factors contributing to investment in the SADC region**



Source: SATCC (2003) Policy and Regulatory Harmonisation in the SADC Region, PPIAF and World Bank.

Studies for other parts of the world confirm similar investor patterns and preferences. Among these are the opportunities offered by the policy; the obligatory costs that accompany that opportunity; the certainty of the regulatory environment under which the firm will have to operate; and the effectiveness of the regulator to ensure a fair competitive environment if the firm is a new entrant. While many developing countries have complied with the WTO Basic Agreement on Telecommunications requirement of establishing an independent regulator, a lack of capacity within the regulatory agency together often with a lack of political will to ensure the effectiveness of the regulator, have often led to a failure to reduce investment risk. The policy and regulatory sections below seek to explain how market structure and the resulting regulatory framework emerging from privatisation practices, and other privileged investment arrangements, make the reduction of regulatory risk very challenging, especially when combined with the dearth of human capital in the regulatory agency in most developing countries.

Policy

Reform mechanisms of privatisation, competition, and independent regulation – evidence of which comes largely from OECD countries – have been hailed as resulting in network investment; faster rollout of infrastructure and new-technology price decreases; improvement in service quality; and more choice for consumers. On the basis of these successes telecom reform has been sold to cash-strapped African countries as

a mechanism to transform their debilitated communication infrastructures and integrate their countries into the global economy. The outcomes of the first phase of telecom reform in South Africa have had far more mixed outcomes.

Institutional Arrangements

In line with international trends and in compliance with WTO commitments, the highly consultative first phase of policy reform in South Africa identified the need for a sector regulator to implement policy; to create a transparent and certain regulatory environment for investors and consumers; and to contribute to building a stable and well-functioning market.

However, the resulting legislation reflected the need of the Ministry to retain control of the terms of agreement with the incumbent's strategic equity partner, Thintana. The Ministry had to establish its credibility with the international investment community by ensuring protection of the biggest investment on the continent at the time (the Thintana 30% stake in Telkom), and of course at the same time protect its own asset. The Act as a result permitted the Ministry to retain core regulatory powers, which seriously undermined the authority of the regulator and its ability to create an attractive environment for further investors.

The requirement that regulations be approved by the Ministry created a serious regulatory bottleneck, with regulations vital to the development of the sector – most particularly the critical interconnections and facilities-leasing framework and the rate regime review for the incumbent – being delayed in the Ministry for months and even years. This has allowed various interests to lobby the Minister after decisions have already been reached by the regulator in accordance with the public processes required by law, creating uncertainty in the industry and often resulting in time-consuming and costly court challenges to gain clarity. Most significantly it has impacted negatively on the investment environment, with several major investors vowing publicly, after the controversial licensing of the third mobile cellular operator, to never become financially involved in the telecoms sector.

The need for a further mechanism to ensure universal access was identified in the policy and in accordance with this the 1996 Act established a Universal Service Agency to manage the Universal Service Fund. Suffering from staffing problems, budget constraints and some overlap with the consumer affairs portfolio of the regulator, this agency was brought closer to the Department of Communications in the 2001 amendments to the principal Telecommunications Act. The Agency has largely failed to deliver on its mandate to ensure access to services by needy people or to support the extension in network rollout into under-serviced areas.

With its fourth CEO in six years, the Agency has recently provided some indication of an awareness of its ability to stimulate activity within the sector, which may reduce resistance to the Agency and Fund from operators. Recent proposals by the Agency that USAL licensees will qualify for a ZAR 25 million grant and ZAR 2.5 million loan

scheme at 5% interest payable over ten years, with an additional guarantee up to ZAR 10 million, if adopted may go some distance toward contributing to viable business operations which up until now have not received any financial or regulatory support. This development may be even more important than originally thought, as the regulator has backtracked on its proposed interconnection regime for USALs – which included asymmetrical termination rates. At public hearings on the terms of the licences, aspirant USALs argued these favourable interconnection terms were a critical component of most of their business plans.

Privatisation

Common to countries where the gains of reform are not evident appears to be the privatisation of the incumbent through an extension of the fixed-line monopoly. The rationale for extending the monopoly was that the indebted monopolies needed the injection of capital and skills and the technology transfer, to meet the challenges of expanding and modernising the usually minimal and outmoded network, and to prepare for competition by introducing cost efficiencies into the company. But the anticipated benefits of network expansion, improved efficiency and cost-based prices are not evident in South Africa.

While formally concerned with policies to achieve affordable access, the reform models in themselves represented a compromise between the market access desires of multilateral agencies, their member countries and multinational operators, and the reluctance of developing countries to lose a major source of income generation – ineffectual as the incumbents might have been in providing public services. As these reform processes have played themselves out in licence negotiations in South Africa and elsewhere, they have tended to focus on the optimisation of the value of the state asset in exchange for the granting of increased rights and opportunities to generate revenues to the privatised entity, rather than focussing on the broader policy objectives of affordable access and sector development.

This has often resulted in incumbents securing the rights to the other areas of restricted competition – either mobile, VANS or ISPs. Very often, to further protect the revenues of the privatised incumbent – ostensibly to rollout services – players in the competitive market segments have also been required to acquire their facilities from the incumbent.

The resulting vertically-integrated dominant operator provides the basis for what has become the standard market structure that has accompanied the opening up of developing country markets. It is also at the core of the failure of the reform project in developing countries. The anti-competitive incentives that arise in a market structured around a vertically-integrated national company – with a monopoly on its upstream activities while competing downstream against rival firms – are impossible to counter without constant checking and adjusting of the integrated entity's behaviour by the regulator. This problem is compounded where rival firms are required to acquire their non-competitive facilities from the vertically-integrated

monopoly in order to operate, as required in South Africa and many other developing countries.

Similar structural forces come into play for other networks having to interconnect in order for their customers to access the historically larger number of subscribers on the incumbent's network. This creates anti-competitive incentives for the incumbent to deny access to its network to rival firms, whether through delays or pricing strategies. While largely anecdotal, stories abound of the driving away of direct investment in the competitive segments of the market by the unrestrained anti-competitive behaviour of the incumbent, despite an official interconnection framework. Investment in other high communication usage sectors, location of regional offices, and call centre development have all been identified as suffering from the high costs of communication.

The second phase of privatisation, which typically focuses on the IPO of shares in the incumbent, has exacerbated this situation with little consideration of how a longer-term policy and regulatory vision might improve the state's budget balance and compensate for any immediate negative impact on sale proceeds from privatisation.

Regulation

Historically, the regulatory response to the market structure that tends to arise wherever a former public utility enters into a competitive market is access regulation. At its broadest, this can include retail tariff regulation, either through a Price Cap Model or through a rate- of-return regime, to ensure affordable access to the service by end-users. On the wholesale side, this type of regulation focuses on ensuring access through the setting of wholesale tariffs for facilities and compelling cost-based interconnection. All of these regulatory mechanisms depend on relatively complex costing models that are particularly onerous to enforce, especially when the former public utility's accounts are not clearly separated and there is not a sense of what constitutes real costs. Even once costs are realistically allocated, there are inherent information asymmetries that disadvantage the regulator, as the incumbent operator will always have better knowledge of its own costs than does the regulator.

This resource-intensive regulatory approach arising from the vertically-integrated nature of the incumbent places an enormous regulatory burden on any country seeking to ensure affordable access through the creation of a fair competitive environment. It requires experienced and skilled regulatory staff to apply the access regulation regime effectively. Countries with far more experience in regulation, and with far greater skills and finances than South Africa, continue to struggle to implement access regulation successfully. Expecting newly-established, under-resourced regulators, often established in the absence of political will, to fulfil this task would appear to be setting them up for failure – and regulatory failure in such a highly interventionist regime means system failure. High levels of regulatory risk are therefore endemic to such markets, leading to the associated negative investment decisions.

6. Policy and Regulatory Challenges

At the core of the challenge for developing countries such as South Africa lies an understanding of the changing circumstances of global investment and the need to stimulate investment in network rollout rather than laying down terms and obligations that may no longer be feasible in a recessionary environment. Certainly the welfare gains of liberalising service sectors such as telecoms needs to be more fully appreciated and demonstrated in more integrated policy frameworks. Konan and Maskus (2002) quantify how service liberalisation differs from that of goods liberalisation – in terms of welfare, the levels and composition of output, and factor prices – within developing countries. They find that goods trade liberalisation yields a gain in aggregate welfare but re-orients production toward sectors of comparative advantage, while increasing FDI through reducing services barriers and increasing competition generates larger welfare gains.

Moreover, service liberalisation tends to increase economic activity in all sectors and raise the real returns to both capital and labour. Overall welfare gains of comprehensive service liberalisation amount to over 5% of initial consumption. The bulk of these gains comes from opening markets for finance, business services and telecoms. Because these are key inputs into all sectors of the economy, their liberalisation cuts costs and drives large efficiency gains overall (Konan and Maskus 2002: 1).

It is essential that a more enabling policy environment is accompanied by a perceived reduction in regulatory risk. This will include demonstrating that investors will receive a fair return on investment, particularly at the time when they are required to re-invest in the expansion of the network.

These new circumstances require not only a more strategic response from investors and policymakers, but also particularly from regulators. While independent regulation may be a necessary condition of policy success in order to create the transparency and certainty required for sector investment, it is no longer a sufficient condition. In order to deal with the extraordinary developmental challenges facing Africa, regulators will additionally need to regulate innovatively, strategically and in a manner appropriate to the very different conditions that exist in African markets.

Price Regulation

Price regulation, traditionally identified as a determinant of investment, provides a case in point. One of the most critical issues in regulating a developing country market with a dominant incumbent, as is usually the case, is getting services to be efficiently delivered and cost-based. A complex political and economic process in any regime, the regulatory rationale for price regulation can be quite different in developed and developing economies, and uncritically adopting the rationale of developed markets may not contribute to achieving national objectives in a developing nation.

Regulation in developed countries tends to focus primarily on the consumer and keeping tariffs as low as possible. The public interest rationale in developing countries focuses primarily on securing access for those citizens who do not receive services at all. This often requires increased tariffs – to cost-based levels – for those that already have services, to allow for getting services out to those who do not. In most developing countries, those who already receive services tend to represent a small and influential elite, which has usually been the beneficiary of subsidised local services. Without regulatory clarity, the effect of their resistance to cost-based price increases could result in reduced infrastructure expansion, either due to lack of investment because of the inability of investors to receive a reasonable rate of return, or because of telephone companies already invested in the country not being able to generate sufficient revenues to invest internally in network expansion.[12] Establishing real costs is extraordinarily difficult in most monopolies, where typically there has historically been little cost allocation between different services, even after corporatisation. Transparent allocation of costs is, of course, central to ensuring an effective interconnection regime, which is, in turn, a critical determinant of investment by new entrants.

As a result of new technologies, new services, competition and efficiencies in network management, the costs and prices of telecom services have been declining for several years. In contrast, Melody points out that South Africa's incumbent Telkom has been increasing prices annually by substantial margins. Between 1997 and 2002, residential connection charges were increased by 56%, monthly subscriptions by 53%, and peak rate local calls by more than 3.5 times (ZAR 0.31 to ZAR 1.11 for 3 minutes). The 2003 price increase was 9.5% overall and 12.5% for residential services. As Melody observes, a disconnection of more than two million subscriber fixed lines is associated with these price increases (Melody 2003).

Melody notes that Telkom announced excellent financial results during the last quarter of 2003. Net profit increased 158% while earnings per share increased 171%. The number of employees has decreased by over a third since the start of the privatisation. Fixed-line operating cost reductions of ZAR 536 million (USD 71 million[13]) and cash flow of ZAR 4 billion (USD 530 million) have allowed for debt reduction of ZAR 3.5 billion (USD 464 million) and a 90c (USD 0.12) per share dividend. The stock price has more than doubled since the public offering in March 2003. But only about 30% of households remain connected to Telkom's fixed network.

> The government may be happy about its highly profitable investment in Telkom, but surely it must realize that these results are those of an ineffectively regulated monopolist exploiting its power in providing an essential public service to citizens, businesses, government agencies, schools and other organisations. Short run monopoly profit to a few is being purchased at the expense of long-term development of South Africa's information society. This is both inefficient and inequitable. As a government sanctioned practice, this is mercantilism, not economic development (Melody 2003).

The protection of the Telkom share price continues to impact on the sector and to be applauded by government with apparently little acknowledgement of the negative impacts on consumers, users and potential investors.

Interconnection

Of course, while charges for access services remain high, ICT diffusion will be constrained. Currently, between 70 and 80% of all ISP and VANS costs are incurred through the obligatory acquisition (from Telkom) of the facilities required for them to operate. For this reason consumer tariffs and interconnection charges must be brought in line with costs. This is a key to the efficient allocation of resources within the market and to creating the conditions for fair competition that will stimulate both internal investment by the incumbent and investment by new entrants.

Particularly in anticipation of the new licensing opportunities mentioned above, South Africa set about establishing a cost-based interconnection regime, with the ultimate goal of adopting a Long Run Incremental Cost framework. The law, however, allowed Telkom the entire period of exclusivity to develop a chart of accounts (COA) and cost accounting manual (CAM), which rendered long run incremental cost (LRIC), or any other cost accounting method for that matter, redundant. Even with the COA and CAM in place, as mentioned above, the information asymmetries together with the complexities of the method and lack of capacity within the regulator to apply it have thus far made it relatively unworkable. Without an accurate measure of real costs, attempts to ensure the efficient investment in incumbent and new entrant networks become impossible.

From the point of view of assessing regulatory risk, this is a critical issue. Most rulings made by the regulator in terms of this framework have been taken on review by the incumbent, paralysing new entrants or those wishing to secure mission-critical facilities. This has resulted in a spate of disputes that have tied up the regulator and Competition Commission for years, and in the interregnum, potential investors in the competitive segments of the market have turned to other markets that offer greater clarity. Following a two-year delay, the Competition Commission ruled in 2004 against Telkom's anti-competitive behaviour, in a dispute brought by the Value-Added Network Service providers, and recommended to the Competition Tribunal a fine of 10% of total revenues – amounting to ZAR 3.7 billion (USD 540 million).[14] This now has to be heard by the Tribunal, which could take years and the pressures not to do anything that will reduce the share price of Telkom will be strong. Still, the definitiveness of the Competition Commission ruling and the recommendation of such a large fine are significant.

A further problem relates to the apparent disjuncture between official regulations and their implementation. Several investor surveys highlight the problem of regulatory policy and practice not being aligned, so that while the rhetoric might sound attractive to investors, failure to implement investor-friendly regulations or the perpetual challenging of regulations, may frighten investors off.

When an interconnection regime is applied in a developing country context with a history of a single provider it is also likely to challenge certain practices and indeed myths about costs and where they are incurred. Traditionally, largely due to monopoly provi-

sion and the sender and receiver being on the same network, costs have failed to recognise both origination and termination costs. However, as markets have been opened up and calling and access charges have become more cost-based, the reality of the differential costs in the provision of services has become apparent. An interconnection regime that recognises the asymmetry between the cost of terminating calls in high-density, low-cost urban areas and terminating them in low-density, high-cost rural areas, together with the incorporation of cost-effective new technologies, can make rural services viable and draw investments into areas traditionally regarded as unviable. In most African countries, however, these innovative mechanisms of reaching rural areas cannot be introduced due to the existence of state or private monopolies on basic services.

Access to Resources

In recognition of the need for access to resources, including rights of way, spectrum and numbering, pro-competitive regulatory measures were introduced in the South African amendment legislation in 2001, specifically number portability and carrier preselection. These measures reflect an understanding of the need to enable competition and attract investment in the new opportunities created by the 2001 Amendment Act, such as the SNO and USALs. However, to be effective this strategy requires a highly skilled and resourced regulator to ensure a level playing field and, in turn, to instil confidence in investors. Telkom, having unsuccessfully lobbied for the removal of such mechanisms from the law and achieved certain delays, has already indicated that it will not be able to comply with certain requirements as the exercise would be too costly for it (ITWeb April 2001).

There is evidence, however, that the government is aware that new entrants should not pay too high a price for spectrum and should be guaranteed access to existing spectrum. After some excitement around the value of 3G licences in Europe, the initially proposed price of 1800 Mhz spectrum to be determined by the Ministry was apparently very high, but the negative impact the high licence fees in Europe had on the liquidity in the sector there – and the inhibitions on network development and the high cost of services if the network was rolled out – appear to have resulted in more favourable terms being granted to South African mobile operators.

This followed negotiations with the government, during which the mobile operators agreed to put four million free SIM cards, over a period of five years, into the market as a contribution to universal access. In addition, the mobile operators would pay ZAR 100,000 in access fees per year, plus a ZAR 5 million annual radio frequency spectrum fee plus 5% of net operating income. The Under-Serviced Areas Licences Group, representing bidders, believes this to be the final straw, on top of the delays in getting to market, that have left the aspirant bidders cash strapped.

Attempts to innovatively allocate scarce resources and rights, in order to stimulate investment and encourage new entrants, have largely been undermined by overriding policy or licensing processes, as the country struggles with the balance of stimulating timely and efficient investment both in incumbents and new entrants and securing social

returns on investment. It had been the intention of the regulator to licence Cell C with 1800MHz rights, to provide it with some leverage to enter into commercial negotiations with the duopoly over the acquisition of access to its lower cost 900MHz spectrum. This attempt to create a leg up for the new entrant appears to have been overtaken by bidders' intentions not to build out their networks significantly in the first instance but rather to roam on the existing networks.

Obligations and Levies

In terms of the Telecommunications Act of 1996, every licence holder operating in South Africa is required to pay prescribed annual contributions to the Universal Service Fund, which currently stands at a maximum of 0.5%[15] of annual turnover. The money in the fund is intended to exclusively subsidise telecoms services in underserved areas, and to assist needy persons to access services. This, however, has not transpired. The failure of decision-makers to see the benefits for the sector of increased calling opportunities created by subsidising either users or network expansion has been a major frustration for operators who have called for the introduction of a 'pay-or-play' principle, rather than requiring them to both meet rollout targets and pay levies.

At hearings to determine the USF rate following the lifting of the ZAR 20 million ceiling that had been set on the fund annually during the 1997-2002 Telkom exclusivity, the industry indicated that they would take on review the increased maximum levy of 0.5% allowed by law if it was introduced, on the grounds that the Universal Service Agency had failed to fulfil its mandate and had provided no indication by way of business plans of how it would do so in future. The industry was clear that they wished the fund to be used to generate growth within the sector and would support the use of the fund to support USAL licences or even user subsidies.

Levies such as the USF levy, especially where they are perceived as not contributing to the viability of the industry or providing effective social welfare, can add to a sense of regulatory risk among potential investors.

7. Conclusions

Policy and regulatory interventions have long been utilised to induce network investment, often with unintended consequences. Traditionally, investment in the network has been secured through regulatory mechanisms that guaranteed a rate of return on investment, which reduced the risk for the investor, sometimes entirely, in order to attract the investor into high-risk markets. Information asymmetries generally made the application of mechanisms to ensure efficiency gains impossible, as network operators sought to extend the terms of their guarantees.

The trend away from rate of return regulation to price caps on wholesale and retail tariffs reflects the desire to shift the investment risk from the state to the private sector through privatisation and liberalisation strategies. One of the primary motivations

for the liberalisation of the telecoms sector in developing countries has been to secure the necessary investment in network development to meet the needs of modernising economies to deliver affordable services to the citizenry, and to integrate national economies into the global economy.

This has often compelled developing countries to attract investment by privatising the monopoly incumbent and offering a guaranteed rate of return on investment or a favourable wholesale and retail rate regime. South African has adopted such strategies, reflected in the managed liberalisation policy adopted by South Africa nearly a decade ago, to reform the telecoms sector in the country. Despite the international acclaim that accompanied the first reform stage, the sector is currently not well-placed to meet the needs of a modern economy.

The increased contribution of telecoms to the economy, from less than 2% of the Gross Domestic Product in the early 1990s to just under 6% currently, conceals several policy failures and market inefficiencies that have inhibited even better sector growth. State policies to induce investment in the sector through privatisation appear to have been short-sighted and attempts to induce investment in greenfield licences have been marred by a lack of transparency and by contradictory licensing processes. Most significantly, the strategy of privatisation of the incumbent monopoly coupled with a period of exclusivity and restrictions on liberalisation of market segments have not delivered on national objectives. These objectives included the extension of the network to provide affordable services to unserviced citizens and the acceleration of the development of the network to provide enhanced services required in a network economy.

All of the licensing activity might suggest that there has been significant investment in the telecoms sector over the last decade, but in comparison to other lower-middle-income countries the investment has been relatively low. Again, while there are serious concerns to be raised about fixed-line network investment and the under-utilisation of network capacity, mobile investment and network expansion look very positive. While the eye of the government and regulator have been focussed on the incumbent, the mobile operators have responded to market demand by making considerable investments in network expansion in South Africa, and increasingly across the continent.

The restructuring of the sector and granting of effectively three public network licences – to Telkom, the SNO and Sentech – will result in competition between three state-owned entities with the potential to collude and inhibit innovation in the sector. While the ownership of some of these has been diluted with strategic equity and public ownership, historical legacies in some cases, and policy and regulatory constraints in others, mean that we are unlikely to see the relatively high risk investment and market responsiveness in the fixed market that has been witnessed in the mobile sector.

All this suggests a need to review the policy framework and its impact on investment behaviour. The proposed Convergence Act clearly has such intentions but serious question marks hang over its ability to do so as currently framed in the Bill. There appears to have been little adjustment to the licensing or regulatory framework from the

heady days of the dot.com bubble – during which Telkom was licensed with a set of stringent demands from government – to the currently more austere investment environment. Longer-term public interest views of the strategic need for investment in knowledge infrastructure continue to be overridden by shorter-term maximisation of value on licence fees and sector levies, monopoly profits, and high share prices – resulting from a lack of regulatory restraint combined with unsustainable social goals.

The current frameworks have left Telkom with significant residual market power and the access regime has not resulted in the development of alternative networks or effectively competitive services in the market. This has significant implications for the development of a network economy, where the opportunity to provide critical new services such as broadband – which the incumbent has been slow to provide or has charged monopoly prices on – have been denied or delayed. Privatisation of Telkom without regulatory reform has simply entrenched its dominant position. The introduction of weak, primarily state-controlled, competitors is likely to result in oligopoly with a sharing of rents between ineffective competitors, which will allow Telkom to extract monopoly rents at the expense of the telecom sector and the economy. This is likely to result in few efficiency gains for the country.

The alternative is to ensure that competitors can use Telkom's network at efficient prices and on an equal competitive basis to Telkom's own retail services. However, as indicated, this requires a high level of regulatory competence and this is unlikely to be available in South Africa, as in most developing countries, for some time.

Therefore, the option of structurally separating out the market needs to be considered – a move that would allow retail competition to develop on the back of an efficient wholesale market for interconnection services. Telkom's profitability would be driven by its ability to efficiently utilise its network irrespective of which services were operating off it. Such a market structure would require a far less onerous regulatory or competitive framework.

The terms under which market access is most likely to occur has been tacitly set by the WTO. But compliance with these are a necessary but not sufficient condition for creating investor confidence in the new, stringent investment environment the sector finds itself in globally. South Africa will need to induce investment through the creation of a policy and regulatory framework that is effectively and unequivocally implemented and which creates opportunity for investment in the critical network expansion required by the country to meet the needs of the network economy.

This will require not only an enabling policy and regulatory framework – even with the less-resource-intensive regulatory framework proposed above – but also the human capacity to implement it strategically and innovatively. Investment in the development of human capital will be as critical as investment in the knowledge infrastructure.

Invariably for countries that have successfully attracted significant investment in network development and services through the creation of conditions conducive to

investment, there has been some commitment by the state or its agencies to create this human capacity. This has not been the case in South Africa. There has been relatively little budget allocation and training for regulators or policymakers, with shortfalls in capacity being fulfilled by external consultants – consultants who have not focussed on formal skills transfer. This reliance on consultants has often resulted not only in inappropriate regulation, but also a stripping of the regulator's ability to develop the capacity and understanding needed to effect reform.

The reform model as implemented, with its focus on privatisation at the expense of liberalisation, and the short-term optimisation of state assets at the expense of longer-term sector development (and revenues for the state), together with the severe lack of regulatory capacity that is evident in most developing countries in Africa, make these markets inherently risky for investors.

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[1] Research assistance provided by Stephen Esselaar, Researcher, Witwatersrand University LINK Centre.

[2] Using an average exchange rate for the 2004 year of 6.8 rands to the US dollar.

[3] At the time of purchasing the license (for $90 million), Vodacom owned 55% of the license, while 45% of the license was held by Tanzanian shareholders. Vodacom would therefore only have paid $49.5 million.

[4] Vodacom's South African taxes (2003): 1.231 billion rands – Vodacom Annual Report 2003, p. 84. MTN's South African taxes (2003): 691 million Rand – MTN Annual Report 2003, p. 84.

[5] Using an average exchange rate for the 2003 year of 7.55 rands to the US dollar.

[6] Using an average exchange rate for the 2002 year of 10.5 rands to the US dollar.

[7] Using an average exchange rate for the 2003 year of 7.55 rands to the US dollar.

[8] Using an average exchange rate for the 2004 year of 6.8 rands to the US dollar.

[9] Using an average exchange rate for the 2001 year of 8.62 rands to the US dollar.

[10] Using an average exchange rate for the 2004 year of 6.8 rands to the US dollar.

[11] For detailed cost study see African Ventures Financial Assessment of USAL, commissioned by IDRC 2002.

[12] For more detailed argument of this positions see Samarajiva (2001) 'Making Regulation Pro-Poor', <www.itu.int/TELECOM>.

[13] Using an average exchange rate for the 2003 year of 7.55 rands to the US dollar.

[14] Using an average exchange rate for the months of January and February 2004 of 6.8 rands to the US dollar.

[15] Section 27 of the Telecommunications Amendment Act, 2001.

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13. Telecom Development and Investment in Ghana

Godfred Frempong & Anders Henten

1. Introduction

Since 1994, the number of fixed line telephone subscribers in Ghana has grown from 50,000 to 275,000. During the same period, mobile subscribers increased from a couple of thousand to more than 300,000. Although having the appearance of a success story, the goals set by government have only partly been met – especially with respect to development in rural areas – and quality of service is still low and has even deteriorated for some indicators. There is a widespread dissatisfaction with the general telecom development in Ghana among users as well as policy decision-makers and administrators. This chapter analyses the Ghanian telecoms environment and development, and discusses the reasons behind the successes and failures experienced, in particular with respect to investments.

Following independence from the British in 1957, a new dynamism emerged in the telecom sector. However, this positive development faded and the telephone penetration rate lingered around 0.3% for many years, with small decreases in certain periods. This situation persisted until around 1994, when an actual expansion of the number of subscribers began. There were previously two major development projects for the telecom system in Ghana. Although these projects did not result in any major immediate growth in the number of users, they provided the basis for relative improvements in the sector.

The aim of the two telecom development projects was to build and improve the telecom system in Ghana in terms of infrastructure and services delivered, as well as for organisational aspects and administrative procedures. Because the telecom system until the beginning of the 1990s was a state monopoly and sufficient funds for infrastructure expansion were not generated internally in Ghana, both the First and Second Telecom Projects relied on external funding from multi- or bilateral development assistance sources. With the liberalisation of the telecom sector, from the mid-1990s, strategies for funding expansion and improvement put more emphasis on attracting foreign investment capital, both for the new operators and the incumbent. Mobile operators obtained permission to operate (Mobitel, Celltel [now Kasapa], Spacefon and later the incumbent

affiliate One Touch); a second national operator (Westel) and a rural operator (Capital Telecom) were licensed; and the incumbent, Ghana Telecom, was partly privatised with the sale of 30% to G-Com Limited, a consortium led by Telekom Malaysia.

Liberalisation resulted in the positive development of an increased number of subscribers. But many problems persist with demand for service far outstripping supply and quality of service remaining low. According to the government, Ghana Telecom needs about USD 500 million to achieve the objective of 400,000 telephone lines by 2005, as well to improve the quality of the service to an appreciable level.[1] This is the current situation, in which the cooperation in Ghana Telecom with the Malaysians in G-Com Limited has been brought to a halt in terms of their management role, and the Norwegian telecom operator Telenor has taken over the top management functions of the company.

2. Foreign Capital in the Monopoly Era

Over the years, Ghana has sought to attract foreign capital from bilateral and multilateral sources (grants or loans) to develop and expand its telecom services. The government embarked on two major rehabilitation projects in the 1970s and 1980s – referred to as the First Telecom Project (FTP) and the Second Telecom Project (STP).

The FTP, intended to resuscitate the telecom sector in the country, formed the first of Ghana's telecom development programmes for the sector with the objectives, among others, to:

- improve the quality of local, long-distance and international telecom services;
- extend local and long-distance services; and
- extend international telecom service.

The funding for the FTP came from multi- and bilateral sources with the World Bank being the largest contributor (USD 23 million) and EDC (Canada), the African Development Bank, OECF (Japan) and ECGD (UK) also other contributing.

Commenced in 1976, the FTP was scheduled for completion in 1980, and subsequently extended to 1987. Poor civil works, shortage of building materials, delays in raising counterpart funding and complicated procurement procedures all contributed to the delay of the project. Consequently, the FTP had to be incorporated in the Second Telecom Project, launched in 1987 to be completed in 1993, but which was delayed for three years. The objectives of the STP included:

- supporting the programme of institutional and management improvement for the telecom sector;

- improving the quality of services through the replacement of obsolete equipment; and
- improving Ghana Telecom's financial performance.

As shown in Table 1, the vast majority of funds for the STP were foreign (USD 150 million out of USD 172.7 million). The two projects (FTP and STP) served as the prelude to the reform in the sector. The completion of the STP provided much input for the sector's reform as it expanded the capacity of Ghana Telecom to provide the much needed backbone support for growth in the number of subscribers and expansion in the kinds of services that were to spring up after the reform.

Table 1 – **Sources of Funding for STP, in millions USD**

	Foreign	Local	Total
Government of Ghana	1.5	9.8	11.3
France (CCCE)	21.7	-	21.7
Netherlands (NKF)	18.8	-	18.8
Japanese grant (JICA)	9.2	-	9.2
Japan (EXIM)	7.0	-	7.0
Japan (OECF)	69.5	6.7	76.2
Ireland	1.7	-	1.7
IDA	18.3	0.7	19.0
Ghana P&T	2.3	5.5	7.8
Total	150.0	22.7	172.7

Source: P&T Corporation, 1993.

3. Sector Reform

Sector reform crept in with Mobitel (Millicom) offering mobile cellular services in 1991 in addition to a limited number of fixed network services offered by the incumbent (telephony, fax, telegraph and telex). The decisive move towards sector reform came in 1994 with the Accelerated Development Plan (ADP), aimed at improving and expanding the system by way, among others, of attracting foreign investment capital. Ghana was, furthermore, one of the few African countries to sign the final World Trade Organization (WTO) Agreement on Basic Telecommunications in 1997 (with some exemptions).

A driving force behind the liberalisation policy was in part external pressure from international organisations and donors, first and foremost the World Bank, to implement a sector reform. Equally significant was the obvious fact that the telecom sector was in bad shape and that something urgently had to be done to revamp it.

Pressure from the World Bank to reform the sector was exerted in context of Ghana's adoption of the Economic Recovery Programme (ERP) / Structural Adjustment Programme (SAP) in 1983. The ERP and SAP were general economic policies enunciated by the World Bank and its affiliates during the 1980s for developing countries with ailing economies and in need of financial support. Developing countries were to adopt these policies as a pre-condition for financial support from the Bank. The policies required that recipient governments divest themselves of direct participation in the economic activities of their respective countries – especially the operations of the state-owned enterprises (SOEs). Consequently, governments were to divest their interests in the SOEs through the sale of their shares to the private sector. The Ghana Posts and Telecommunication Corporation was included in the SOEs to be divested of, to enable Ghana's access to the financial packages that were urgently needed to resuscitate the economy, which was in serious crisis. The World Bank agreed to partly finance the Second Telecoms Project because of the commitment to reform the sector. However, the Bank's influence on the model Ghana adopted – partial liberalisation as opposed to other models of reform – was minimal if any, as the government adopted the partial liberalisation model based on a review of the experiences of countries that had taken the lead in telecom reform.

The measures to be taken to realise these objectives were:

- privatisation of Ghana Telecom through sale of a strategic stake to an international operating company;
- creation of a competitive duopoly by licensing a second national network operator with similar rights and obligations as Ghana Telecom;
- liberalisation of value-added services, mobile cellular telephone services, data transmission, paging and pay phones;
- establishment of a regulatory agency for the sector; and
- allowing large corporate users to develop their own private networks.

Rather than full-blown liberalisation, Ghana embarked on a strategy encompassing liberalisation, privatisation and the establishment of a regulatory framework and agency. For the fixed network, the development of a duopoly and a supplementary rural operator in the southern part of the country – and not full competition – was the preferred development mode. The idea was to give the licensees an exclusivity advantage, as has been done in many other countries in the belief that this was the only way to attract foreign investment and that public requirements for network extension are more easily made in this situation.

The regulatory authority – the National Communication Authority (NCA) – was established as an integral part of strategies to regulate and ensure the development of a competitive environment in the sector. The regulatory regime, however, was rather shaky and has not been able to resolve interconnection problems between the incumbent operator and the others in the sector.

In 2002, the five-year period of exclusivity for Ghana Telecom and Westel ran out, and with the decision by Parliament 2003, through a Legislative Instrument (LI 1719), the exclusivity period also formally ended. The extent to which this will result in new operators of basic services is uncertain. One Dial Communications Limited has announced its intention to invest over USD 400 million, but this still has yet to materialise. An important issue is the need for a robust regulatory regime and the regulatory agency's ability to effectively regulate the sector to give confidence to the would-be investors.

4. Investment in the Competition Era

Investment during the competition era is expected to derive more from foreign direct investment (FDI) by market stakeholders. However, bilateral or multilateral sources have continued to contribute to the funding of systems expansion (see Table 2, which provides a list of some of the loans that Ghana Telecom has contracted and the type projects involved).

For the two rehabilitation programmes, financial support has come from varying sources with major support coming from the World Bank, Japan, France and the Netherlands.

ITU statistics show great fluctuations in the level of investment over the years. However, the average investment percentage (investments divided by total income) is on the same level as telecom investments in, for instance, Europe. Figures are provided from 1984, however with big gaps especially for the first part of the 1990s (see Table 3). There were sizeable investments during the second part of the mid-1980s and considerable increases in investment after the sale of a 30% share of Ghana Telecom to G-Com Limited and the licensing of Westel. Both companies were granted exclusivity rights in 1997 for a period of five years, which expired in 2002.

Table 3 also shows that investment as a percentage of total income fluctuates strongly – from 7.3% in 1996 to 85.2% in 1997 and 51.2% in 1999. These fluctuations illustrate that investments have tended to come in lumps, but also that investment (especially earlier on) has been partly based on foreign development assistance and not primarily on income from the operational side.

Amongst political decision-makers, there is little confidence in the sector's ability to secure a stable level of investment. Pronouncements of ministers of state indicate that Ghana Telecom has not attracted sufficient foreign capital to enable the company

Table 2 – **Selected Investment Projects, 1995-98, in million USD**

Source	Year	Amount	Project
Marubeni Phase I	1995	16.9	Accra telecom network expansion project
AT&T	1995	8.5	Installation and commissioning of international, local and toll exchanges at Cantonments, Accra
Caisse Française de Development		21.6	Modernisation and expansion of telecom services in Tema
CIDA	1996	2.7	Supply of telecom equipment
Telecom Consultants India Limited	1996	11.7	
NKF	1997	16.1	Services for the installation of telecom networks in Sekondi Takoradi, Koforidua, Ho, Tamale and Sunyani
Marubeni Phase II	1997	10.7	Ghana Telecom expansion project
Marubeni Corporation	1998	9.3	Digital Microwave System Project

Current exchange rates used

Source: Ghana Telecom Annual Reports 1996 and 2000.

to improve its services. Ghana Telecom's inability to attract adequate resources for the expansion programme has caused the government to include telecom (ICTs in general) as one of the priority areas for foreign investment. Consequently, the government has guaranteed a loan of USD 150 million from the Chinese government for Ghana Telecom and is also negotiating with the International Finance Corporation (IFC) for a loan of USD 100 million for the company.

The second national operator, Westel, has also invested in the telecom sector. Since its inception in 1997, the company has invested about USD 26 million in network development. The network, however, is limited to the Accra and Tema metropolitan areas. It was supposed to have invested between USD 40 – 75 million for the first five years of operation but has not been able attract more investment. Ghana's experience, generally, has been characterised by the two national network operators failing to attract adequate foreign investment to propel a sufficiently high growth of the sector after it was reformed.

Table 3 – **Annual telecom investment in Ghana, 1990-2001, in million USD**

	Investments	Total income	Investment / total income
1984	0.79	7.23	10.9%
1986	38.59	10.74	27.8%
1987	10.15	11.92	85.2%
1988	3.23	30.55	10.6%
1989	3.55	29.82	11.9%
1990	6.18	39.09	15.8%
1991	8.59	49.66	17.3%
1996	7.32	99.91	7.3%
1997	41.29	132.93	31.1%
1998	23.96	138.26	17.3%
1999	86.78	169.54	51.2%
2001	37.55	127.20	29.5%

Source: ITU World Telecommunication Indicators 2003.

5. Developments of the Sector

From the mid-1990s, the number of fixed telephone subscribers began to increase considerably compared with the previous decades. However, the goals set by government in the licenses issued to Ghana Telecom and Westel were not entirely met – not by Ghana Telecom and not at all by Westel. Ghana Telecom was to rollout 255,000 new lines and Westel 50,000 new lines during the five-year exclusivity period (1997-2002). In Table 4, the actual number of subscribers is listed.

Table 4 shows that during the prescribed period, Ghana Telecom only attained 65% of the target figure. For Westel, the picture is even bleaker. Westel has obtained fewer than 3,000 subscribers (2,621 in March 2002) and Capital Telecom (the rural provider) 1,200 subscribers (March 2002) – which in the case of Westel is a mere 5% to 6% of the set goal.

Furthermore, the distribution of subscribers is skewed towards the capital Accra. In Table 5, the distribution of Ghana Telecom subscribers is depicted. The Greater Accra region has over 184,000 telephone lines with a teledensity of 6.0 with the rest of the regions below the national average of 1.4. In terms of population, Greater

Accra is the second-most populous region in the country. As at 2002, the region had 15.4% only of the projected national population. Although the Ashanti region is the most populous of the country, it has a teledensity of 0.7, which is very far below that of Greater Accra, and in terms of economic importance, the region is second after the Greater Accra.

Table 4 – **Fixed line telephone penetration, Ghana Telecom, 1990-2002, in thousands**

	1990	1991	1992	1993	1994	1995	1996
DELs	44.2	46.6	47.8	48.7	50.0	63.1	77.9
Payphones	-	-	-	0.025	0.026	0.027	0.453
Teledensity	0.3	0.3	0.3	0.3	0.3	0.4	0.4

	1997	1998	1999	2000	2001	2002
DELs	105.5	133.4	157.0	204.7	242.1	272.5
Payphones	0.483	1.815	3.044	3.163	3.140	4.998
Teledensity	0.6	0.7	0.9	1.2	1.3	1.4

Table 5 – **Regional distribution of Ghana Telecom subscribers, December 2002**

	Subscribers	Teledensity	% of country's population
Greater Accra	184,526	6.0	15.4
Ashanti	27,947	0.7	19.1
Western	17,009	0.8	10.2
Eastern	10,057	0.5	11.1
Central	8,621	0.5	8.4
Northern	5,438	0.3	9.6
Brong Ahafo	6,808	0.4	9.6
Volta	6,311	0.4	8.6
Upper West	1,728	0.3	3.0
Upper East	4,084	0.4	4.0

Source: Ghana Telecom.

With respect to payphones, there have been positive developments. In 1995, there were only 27 payphones – all in Accra. The number of payphones increased dramatically from 1996 onwards. At present, there are around 5,000 payphones, which is important for general access (universal service) to telephone services. Payphones are somewhat better distributed than private fixed lines: 43.9% are in the Greater Accra region, 18.9% in the Ashanti region (with Kumasi), 9.8% in Western (with Takoradi), and the remaining quarter in the rest of the regions.

Another means of access to telecom services is via telecentres.[2] The exact number of telecentres in Ghana is not known, but a rough estimate is that there are a couple of thousand with more sprouting up every day – the majority of telecentres are located in the larger urban areas.

An interesting aspect of telecentre development in Ghana is that it is strictly a private sector-led venture. That said, the government has recognised and adopted as part of the Accelerated Development for the telecom sector the concept of telecentres as one of the mechanisms to achieve universal access in Ghana.

Most entrepreneurs who have established telecentres have financed the business with their own resources, through support from relatives or friends, and to a lesser extent through established financial institutions in the country. A survey by Morten Falch and Amos Anyimadu describes the funding trends for the establishing of telecentres: 68% of the telecentre owners interviewed indicated that they established the business through their own funds; 15% from friends/relatives; 4% from the banks and 13% from other sources (Falch and Anyimadu 2003). Ghanaians domiciled in foreign countries or those who have returned from other countries provide sources of investment. These Ghanaians see the telecentres as one of the areas where they can invest some of their savings from their stay abroad. Surveys conducted have not delved into this issue but cursory observations emphasise this point.

Mobile telephony has recently overtaken fixed line telephony subscribership. Similar developments are occurring in many other developing countries, but also in economically advanced countries in Europe. In spite of mobile services being more expensive than fixed line, mobile services, especially prepaid, offer flexibility, and are actually available in contrast to fixed line services for which there are long waiting lists.

In 2002, the number of mobile subscribers reached 300,000 (see Table 6). GSM provider, Spacefon, has grown very quickly, and lately the Ghana Telecom subsidiary, One Touch, has also gained considerable market share based on GSM technology. This means that the penetration rate of mobile subscriptions is currently 1.5, and that the joint penetration (fixed and mobile) is almost 3 which is more than was expected a decade ago, when the ITU goal was a penetration rate of 1.[3] However, many mobile subscribers also have a fixed line, which lowers the overall rate of access.[4]

With respect to internet access, it is estimated that there are about 15,000 internet subscribers, but that over half a million have access through shared internet connections – through homes, offices, cyber cafes and friends. It has been estimated that there are about 150 internet cafes in the country with approximately 90% of these cafes located in Accra, and the rest in the other large cities such as Kumasi and Takoradi.

Table 6 – **Number of cellular mobile subscribers, 1993-2002, in thousands**

	1993	1994	1995	1996	1997
Mobitel	1.7	3.3	3.6	10.0	16.9
Kasapa	-	-	0.8	1.9	2.6
Spacefon	-	-	-	0.4	7.0
One Touch	-	-	-	-	-
Total	1.7	3.3	4.4	12.3	26.5

	1998	1999	2000	2001	2002
Mobitel	22.3	33.0	40.0	50.9	53.0
Kasapa	2.8	2.2	0.9	0.9	8.7
Spacefon	13.0	38.0	90.0	140.0	160.0
One Touch	-	-	-	30.0	78.2
Total	38.1	73.2	130.9	221.8	299.9

Source: Data collected from operators.

For quality of service, there have been smaller improvements on some indicators. However, on other indicators the situation has deteriorated (see Table 7). Fault clearance has improved, while call completion has developed negatively – and call completion, especially, is very important for customer satisfaction. As noted in the beginning of this chapter, there is a widespread dissatisfaction with the performance of the telecom system in Ghana among customers.

6. Analysis of Accomplishments

There has been a considerable increase in the number of fixed telephone subscribers since the part-privatisation of Ghana Telecom and the process of liberalisation started in Ghana. However, the subscriber goals set for the incumbent Ghana Telecom and

Table 7 – **Quality of service indications for Ghana telecom, 1998-2002, in percentages**

	NCA target	1998	1999	2000	2001	2002
Fault incidence rate *	4.8	5.2	6.1	5.0	3.9	4.0
Fault clearance rate in 48hrs	56.6	62.0	56.9	58.5	59.9	65.7
Local call completion rate	81.0	81.1	78.8	77.6	78.5	77.6
Long-distance call completion rate	71.1	63.4	54.7	47.0	59.8	55.2
International call completion rate	62.0	60.3	69.0	73.0	70.4	63.5

* The permissible number of faults within one month for 100 lines

Source: Ghana Telecom

the second operator Westel have not been met. In particular, Westel has not come anywhere near its targets. Furthermore, geographical distribution is heavily skewed, as more than two thirds of all fixed line subscribers are located in the capital area of Greater Accra. Mobile telephony has overtaken fixed line telephony as in so many other countries.

In comparison with other African countries, Ghana has been doing relatively well in fixed line telephony, but there are countries that have done better, i.e. Cote d'Ivoire and Senegal (see Table 8). Both of these countries were already in 1992 at a higher level with regard to fixed lines than Ghana and have kept the lead. However, Ghana has come from a very backward stage and has surpassed countries like Kenya and Cameroon. With respect to mobile telephony (see Table 9), Ghana's performance is not nearly as positive. Mobile telephony in Ghana started early within an African context. However, subsequent development has not been as fast as for many other African countries. Once again Senegal and Cote d'Ivoire outperform Ghana, but this also applies to other countries (see Table 9) such as Cameroon, Kenya, Tanzania and Uganda.

There is no simple explanation for this situation of Ghana doing relatively well in fixed telephony and not as well in the mobile area. In part, the relatively good performance in the fixed area is due to the part-privatisation of Ghana Telecom and the accompanying requirements on extending the number of subscribers. In terms of the less positive performance for mobile communications, an explanation might be the unclear regulatory situation in Ghana, especially for interconnection. All mobile operators and the second fixed network operator, Westel, (and the rural operator Capital Telecom) have had great problems with Ghana Telecom over interconnection. Nor has there been sufficient direction from regulation and the regulator. Although a regulatory agency

Table 8 – **Fixed line penetration in African countries, 1992-2002**

	1992	1993	1994	1995	1996	1997
Uganda	0.17	0.12	0.16	0.20	0.24	0.26
Tanzania	0.31	0.32	0.32	0.32	0.32	0.35
Nigeria	0.32	0.34	0.36	0.39	0.40	0.38
Burkina Faso	0.21	0.23	0.27	0.30	0.33	0.34
Cameroon	0.49	0.46	0.45	0.49	0.52	0.54
Kenya	0.89	0.89	0.92	1.00	1.02	1.00
Ghana	0.30	0.30	0.30	0.37	0.44	0.57
Cote d'Ivoire	0.66	0.68	0.77	0.86	0.95	1.03
Senegal	0.75	0.81	0.89	0.98	1.11	1.32

	1998	1999	2000	2001	2002
Uganda	0.27	0.26	0.27	0.24	0.22
Tanzania	0.39	0.47	0.53	0.44	NA
Nigeria	0.38	0.41	0.44	0.46	0.58
Burkina Faso	0.38	0.43	0.47	0.49	NA
Cameroon	0.66	0.64	0.63	0.66	NA
Kenya	2.03	1.06	1.04	1.04	1.03
Ghana	0.70	0.81	1.17	1.16	NA
Cote d'Ivoire	1.19	1.51	1.78	1.80	2.04
Senegal	1.55	1.79	2.16	2.45	2.29

Source: ITU World Telecommunication Indicators 2003.

Table 9 – **Mobile penetration in African countries, 1992-2002**

	1992	1993	1994	1995	1996	1997
Nigeria	-	0.01	0.01	0.01	0.01	0.01
Burkina Faso	-	-	-	-	0.01	0.01
Ghana	0.003	0.01	0.02	0.04	0.07	0.12
Uganda	-	-	-	0.01	0.02	0.02
Tanzania	-	-	0.001	0.01	0.03	0.07
Kenya	0.005	0.005	0.01	0.01	0.01	0.03
Cameroon	-	-	0.01	0.02	0.03	0,03
Senegal	-	-	0.001	0.001	0.02	0.08
Cote d'Ivoire	-	-	-	-	0.10	0.26

	1998	1999	2000	2001	2002
Nigeria	0.02	0.02	0.03	0.34	1.36
Burkina Faso	0.03	0.05	0.22	0.64	NA
Ghana	0.22	0.36	0.64	0.93	NA
Uganda	0.14	0.25	0.82	1.16	1.59
Tanzania	0.12	0.16	0.55	1.27	NA
Kenya	0.04	0.08	0.42	1.91	4.15
Cameroon	0.03	0.04	0.98	2.01	3.57
Senegal	0.30	0.95	2.62	3.12	5.65
Cote d'Ivoire	0.64	1.77	3.20	4.46	6.23

Source: ITU World Telecommunication Indicators 2003.

was created in conjunction with the overall change in the telecom environment in Ghana in 1997, it has never had the necessary strength to intervene in the market to create a more level playing field among the operators.

Another factor is that prices for mobile communications have been stable, at a high level from 1993-2000, during which time there was no real price competition between the mobile operators. Only lately has price competition begun.

Quality of service has been a recurring theme in discussions on telecom developments in Ghana. As shown in Table 7, call completion rates have deteriorated in recent years. A likely explanation for this is the increase in the number of subscribers, while core network facilities have not been expanded sufficiently. Not only has there been an increase in the number of fixed line subscribers, but a great percentage of traffic from mobile terminals also passes over the joint core network facilities. Ghana Telecom could, in the late 1990s, with its new management (G-Com Limited led by Telekom Malaysia) present high growth figures for fixed line customers. They could partly base this extension on the improvements of the core network facilities that had been made in connection with the First and Second Telecom Projects. However, they failed to expand central parts of the network at a sufficiently high-speed to service the increasing number of subscribers.

With respect to Westel, an underlying factor of failure to meet its obligations is the company's inability to attract necessary foreign capital. Westel blames the weak regulatory environment as contributing to its investment woes. Westel experienced a lot of interconnection problems with Ghana Telecom in the early stages of operation and this delayed the commencement of its business for sometime. According to Westel, initial interconnection problems encountered with Ghana Telecom and the inability of the NCA to resolve the impasse, negatively affected the sector in the capital market. Initial interconnection problems between Westel and Ghana Telecom were not strictly limited or related to the number of E1s that Ghana Telecom was prepared to release to Westel or interconnection rates, but to a system which Westel had wanted to introduce into the country. Westel had wanted to operate a prepaid system[5] that would have allowed users to access both its network as well as that of Ghana Telecom.

Ghana Telecom objected to the proposed system, arguing that Westel was to develop its own network as a second national network operator as stipulated in the license issued by the NCA and then interconnect with Ghana Telecom on that basis. The main rationale for Ghana Telecom's objection to the use of the prepaid system (calling card) was that it might give undue advantage to Westel to 'reap where they have not sown'. To sell calling cards, Westel did not need to build and expand its network since the buyers of the card could use the existing network belonging to Ghana Telecom to make their calls. Because Westel had wanted to use the calling card system at the time when it was about to commence operations and could not have a full-fledged network, Ghana Telecom saw the Westel plan as a move to attract business away from the existing network. This issue dragged-on interconnection negotiations until Westel backed down.

For Ghana Telecom, the problems between the government and Telecom Malaysia have affected the ability of the company to attract foreign investment. During the partial privatisation of Ghana Telecom, the Rawlings' government gave Telekom Malaysia (the minority shareholder) more seats on the management board than its ownership-share required and also signed a five-year management contract with the company.

When the Kufour's government assumed office in 2001, there were objections to the unfair composition of the management board and complaints regarding the performance of Telekom Malaysia as the managers of the company. Complaints were based on the poor performance of Ghana Telecom in terms of poor quality of service and inability to meet its obligations for rollout targets on fixed telephone lines. The government negotiated for a new composition of the management board, reflecting share holdings and refused to renew the management contract when it expired in 2002. As a result of these developments, Telekom Malaysia declared its disinterest to continue to hold shares in the company and has called on the government to buy back the 30% shares.[6]

The regulatory authority has been accused of being weak because it has been unable to provide a level playing field for all telecom operators to generate competitiveness. The apparent regulatory weakness is not wholly due to the inadequacy of the establishing law, but also to political interference and omissions.

The National Communication Authority (1996) Act 524, granted the authority wide ranging powers to regulate and manage the sector. Section 41(1) of the Act granted the NCA the authority to make regulations in relation to rules and guidelines on tariffs, international accounting system, terms and conditions for interconnectivity, technical standards in the provision of telecom services, and general regulations for the sector, among others.

However, developments in the sector have impeded the NCA from fully utilising its powers. Political interference has played a prominent role in sapping the energies of the Authority. The NCA Act made provisions for the establishment of a Board with the Minister acting in absence of a Board. Although stipulated in good faith to ensure that no power vacuum occurs, government has exploited this provision to take direct control of the ICT sector, thereby weakening the position of the NCA as an independent regulator.

The Board was only established in 2001, after almost four years of the NCA Act being in operation. As a result, matters that should have been dealt with by the Board were taken over by the Minister of Communication. The Minister handled all issues concerning license authorisation and even negotiations on tariffs and interconnection. The Minister was so entrenched in NCA operations that there was no settlement of disputes without ministerial intervention. It is likely that delays in the appointment of the NCA Board served the interests of government and politicians since the absence of the Board afforded some leverage to the political system to interfere in the work of the NCA.

In the same vein, the NCA operated for five years without a set of rules and regulations to manage and regulate the sector. These rules and regulations were to emerge in the form of a Legislative Instrument. Therefore, it was difficult for the NCA to sanction operators for non-performance, anti-competitive behaviour and non-compliance of directives, among others. In absence of the Legislative Instrument, the NCA could not sanction operators who disregarded its directives and that of consumers' interest. It was only in March 2003 that Parliament passed the Legislative Instrument (LI 1719) to help the NCA to manage the sector.

Given this state of affairs, the NCA lacked the real power to fully implement the provisions of the establishing Act. It has generally taken the Authority a long time to resolve problems in the sector and most of these problems have been resolved through ministerial interventions. This general weakness has not provided a good signal to foreign investors.

Recent developments, however, provide some positive signals about the re-assertiveness of NCA with regards to its legal powers. The government has reconstituted the NCA Board[7] and, for the first time, the NCA has been able to negotiate with the operators a new tariff regime without ministerial intervention.

7. Perspectives

Before liberalisation and privatisation, foreign capital (which was also essential in the earlier period) came by way of development assistance (loans and grants). A major reason for liberalising and privatising the telecom sector in Ghana was to attract foreign investments and competences and experiences in the field by joining up with a strategic partner.

As illustrated in Table 3, this strategy has partly worked, as investments in general have been higher since liberalisation and privatisation – but not high enough. Further, with the end of the exclusivity period for Ghana Telecom (and Westel), it has been made clear that cooperation with the Malaysians will not continue.

Presently, a management contract with the Norwegian incumbent operator, Telenor, has been established under which they will perform top management function in Ghana Telecom – without owning any shares in the company.[8] It is a pure management contract. Whether this new approach will succeed has yet to be shown. It is still a difficult period as international investment is still far below the boom period in the late 1990s. With the new set up, Ghana Telecom will, to a large extent, have to rely on foreign loans as for during the pre-liberalisation phase. The government has secured a loan of USD 150 million from China, but the investment requirements are very high if the telecom system is to expand and improve in quality. Figures mentioned lately by Ghana government representatives are between USD 500 and 800 million for the immediate goal of 400,000 fixed telephone lines in 2005 and for securing an infrastructure for the development of ICT-based businesses in Ghana.

The government of Ghana is, therefore, presently negotiating with the International Finance Corporation (IFC), a subsidiary of the Word Bank, regarding a loan of USD 100 million to invest in the telecom sector.[9] One can conclude that the model chosen by Ghana, as part of the reform process has not affected its relations with the World Bank. However, a clearer picture of the relationship will be provided by the outcome of the ongoing negotiations. The success or otherwise of the negotiations will clarify the IFC and World Bank position on the situation. Even if the loan is granted, the terms of the loan will shed more light on the concerns of the IFC and the World Bank.

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[1] The figure of USD 800 million has also been mentioned by the Minister of Communication in May 2003.

[2] The telecentres as they exist in Ghana are basically commercial ventures, reselling telephone services from a few number of telephone lines obtained largely from Ghana Telecom. The telecentres do not include internet cafés, however, some of the operators have made some arrangements with some of the Internet service provides, notably Africa Online to provide points where people can send and receive emails.

[3] The goal in the Accelerated Development Plan from 1994, was a penetration rate of 1.5-2.5.

[4] This is shown in a survey conducted by Frempong (2003). Half the respondents had both fixed and mobile subscriptions.

[5] The system was similar to a calling card in which the user can access either Ghana Telecom's or Westel's network with a distinct but separate code.

[6] The Telekom Malaysia offered to sell back its 30% share, bought at USD 38 million in 1996 to the government of Ghana at USD 100 million. The government has disagreed on the share value and the case is now before international arbitration for settlement.

[7] The first NCA Board established by the Kufour's government, however, had the Minister of Communications as its chairman.

[8] G-Com Limited still retains 30%. However, the government of Ghana is negotiating a buy out, but there is no agreement, at present, on the price.

[9] The negotiations were initiated by the former government but had to be suspended when the new government assumed office. They were reopened in 2003.

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14. Case Study on Somaliland, in the Framework of the WDR Project

Knud Erik Skouby & Reza Tadayoni

1. Introduction

Somaliland, formerly part of Somalia, located in the north-central region of the Horn of Africa, is one of the poorest places in Africa. On 18 May 1991, Somaliland declared its independence from Somalia. This has not been officially recognised by any other country, but Somaliland Republic became a *de facto* independent nation, corresponding to the territory of the former British Somaliland protectorate.[1] Contrary to the situation in regions of Somalia, there is a relatively well-functioning civil society and peace in Somaliland.

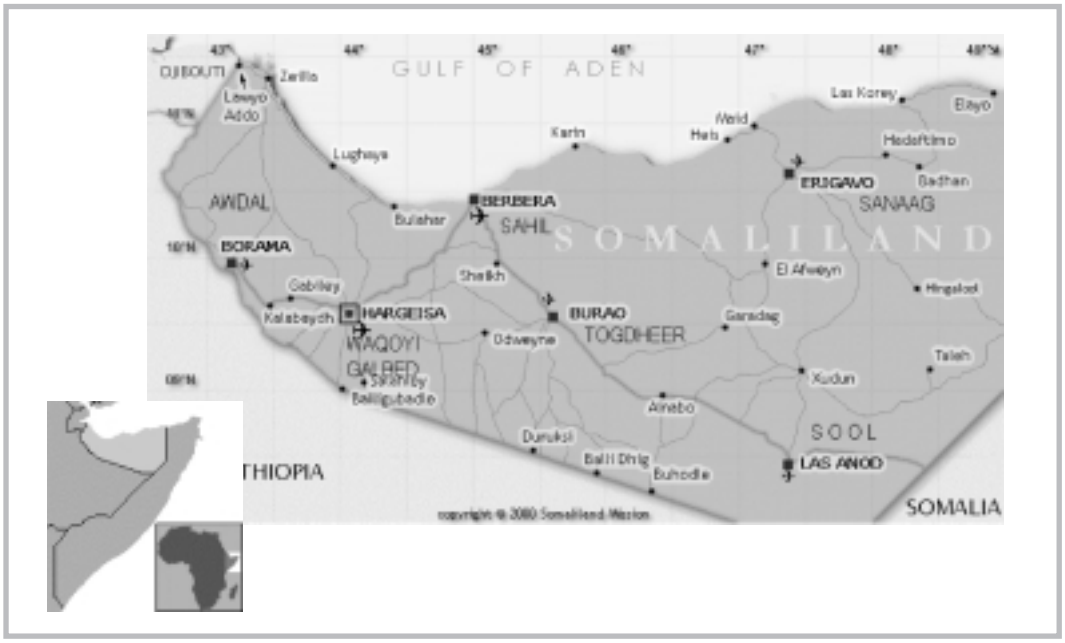
The level of ICT-usage in Somaliland is very low, but with clear development potential associated especially with presence of telecom companies from neighbouring countries and expatriates engaged in the universities and other sectors. The presence of five telecom operators and a number of VSAT operators also indicate demand for ICT services and networks.

Low income levels in the developing countries generally explain the low levels of development for ICT. To address this, foreign direct investment (FDI) is suggested as a method of promoting ICT development in developing countries (Zhu 2001). Another approach is to include development of ICT as a part of foreign assistance to developing countries – an approach that is generally considered to be relevant by different world organisations and cemented by establishment of the UN Task Force for ICT development in developing countries.

2. Background

Like all African states, the Somaliland Republic as British Somaliland, came into being during the European colonial period. To the north, Somaliland faces the Arabian Peninsula, to the west lies the Republic of Djibouti, while Ethiopia and Somalia are its southern and eastern neighbours. Located in the northern part of Somalia in East Africa, Somaliland is a small country with an area of 109,000 square kilometres and

Figure 1 – **Map of Somaliland**



a population estimated at close to three million. The average population growth rate is 3.1%. Population density is approximately 25 persons per square kilometre. About 55% of the population is either nomadic or semi-nomadic, while 45% live in urban centres or rural towns. Average life expectancy is 50 years for men and 55 for women.[2] Exact and extensive data for Somaliland are difficult to obtain, as the country is not recognised internationally (Table 1 provides some basic data).

Hargeisa is the declared capital of Somaliland with an estimated population of 0.3 million. The other main towns are Burao, Borama, Berbera, Erigabo and Las Anod.

Somaliland has established a republican form of government. The legislative assembly is composed of two chambers – an elected elder's chamber (clan representatives), and a house of representatives (members appointed by general elections). An elected president and vice-president head the government, and the president nominates the cabinet, which is approved by the legislature.[3]

There are 163 primary schools with a student population of 33,000. The number of primary education teachers for the same educational year 1996-97 was 954. Several private schools catering to primary, secondary and vocational training exist.[4] Two universities have been opened in Somaliland during the last few years: Hargeisa University and Ahmud University (situated outside Boroma approximately 120 km from Hargeisa).

Table 1 - **Basic Data for Somalia**

Population (millions):	7.06
Poverty (% of population below USD 1 per day):	43.2
Adult literacy rate (% ages 15 and over):	17.1
GNI per capita (Atlas method, USD):	678

Sources: Somalia Human Development Report 2001; UNDP Somalia/World Bank Somalia Watching Brief Somali Telecom Association, Dubai.

Economy

Somaliland is one of the world's least developed countries, with a very low average income. The country exhibits the typical features of a low-income African economy with a high ratio of foreign trade to gross domestic product, a low level of monetisation and urbanisation, and a dominant informal sector. Historically, its natural resources were listed as: "sun, sand and Somalis" (Rayne 1921). The current backbone of the economy is livestock, with an estimated 24 million heads. In 1996, three million heads of livestock were exported through Berbera to the Arabian Peninsula markets. Economic performance is heavily dependent on this export and the regional prices. On a smaller scale, the country also exports hides, skins, myrrh and frankincense. The vulnerability of this situation was demonstrated in 2000-02 when the Arab countries, and especially Saudi-Arabia, blocked the import of livestock from Somaliland because its exports were accused of being the source of a Rift Valley Fever outbreak,[5] causing exports to drop by almost 50%.

The fishing industry is still underdeveloped, but the country's 600 mile coastline has rich fishing grounds. Somaliland is strategically located at the cross-roads between Africa, Europe, the Middle East and South East Asia. In 1996 up to 846 vessels called upon the Berbera port on the Red Sea,[6] which has the potential to develop into a major commercial centre.

Finally, a very important source of income is, as for many developing countries with a large Diaspora, hard currency via remittances:

> Overall remittances are difficult to quantify. Net estimates for all of Somalia range from $140 million to $800 million annually. This overshadows the $115 million in donor assistance to all of Somalia in 2000, of which 42 percent went to Somaliland and Puntland. A private analyst ventures an estimate of $150 million annually for Somaliland. Somaliland's Ministry of Planning provides a more precise estimate of $97 million for remittances in 1997. Regardless of the precise figure, all of these estimates overshadow government budgets, which in 1999 stood at $26 million to provide for 6,000 civil employees. Remittances also compete with local returns from the export of livestock, which amounted to about $125 million in 2000 (Reno 2003).

General Investment Climate

In 1995, the Foreign Investments Law: Promotion, Protection and Guarantee of Investments was introduced.[7] The general aim was – and is – to attract foreign investment to priority areas specified in Article 4 of the law. The Law presents conditions that in principle are favourable. Conditioned by approval by the Foreign Investment Board, investments are, for example, guaranteed against expropriation measures and profits are tax free for a period of three years; profits and investments may freely be transferred after three years. The arbitration procedure for possible settlement of disputes does, however, clearly present a problem. Article 19 declares that procedures have to be agreed upon with the investor, or in the absence of such an agreement within the framework of the agreements in force between the Somaliland Republic and the investor's home country. As no state currently recognises Somaliland, such frameworks do not exist and this has to be seen as a high risk factor. This unclear procedure combined with the general indeterminate international situation may easily explain the limited foreign investment activity, which is largely confined to people related to the Somali Diaspora. This fully reflects the investment situation in the telecom sector.

3. ICT Development

Somaliland is one of the worlds least developed countries and this is also the case for ICT development. Table 2 provides an overall picture of ICT development in Somalia.

The impression of people working within the ICT sector in Somalia is that the level of development in Somaliland is higher than for Somalia but there is no available data to support this.

Table 2 – **Basic data on ICT development**

Telephone fixed mainlines:	105,000
Tele-density (per 100 people)	1.5
Mobile phones	36,000
Tele-density (per 100 people)	0.5
Personal Computers (per 1,000 people)	0.5
Internet users (per 1,000 people)	1.4
National ICT Strategy (yes / no)	No

Sources: Somalia Human Development Report 2001; UNDP Somalia/World Bank Somalia Watching Brief, Somali Telecom Association, Dubai.

Actors in the ICT Market

The following section describes the relevant actors in the Somaliland ICT market.

Telecom companies in Somaliland

Somaliland currently has five telecom companies: Aerolite, Barakat (now Telcom), Sitco, Soltelco and STC. All of the companies provide fixed line telephony and Barakat and Aerolite offer mobile services. The Barakat and Sitco companies started operating in 1999, while Aerolite is in the process of starting its operation.

The telecom market is a 'negotiated competition'. All telecom operators cooperate in Somaliland Telecom Operators Association where they agree on prices and give information on this to the Ministry. Prices are uniform and adjusted according to inflation and the exchange rate to the US dollar. The low prices for international calls may be seen as a combined result of real competition, a low economic level of development and no public intervention, i.e., no contribution to telecom development as in other developed countries. According to a UNDP report:

> In Somaliland, fierce competition between the private companies has driven consumer costs down, despite the fact that companies must rely on expensive satellite technology rather than fibre-optic cables. International calls on mobile phones cost USD 1 per minute or less, five or six times lower than in most African countries. The lack of a government has also helped keep costs down—there is no tax on telephones (UNDP 2003).

However, it is not possible to call directly between subscribers on different networks. Thus, you see several phones dedicated to different companies on desks in institutions and offices,

Regarding the cost structure of national and local calls, some specific characteristics can be identified in the Somali market:[8]

- local telephone calls within an area are free of charge if they belong to the same company;
- there is no direct interconnection between operators;
- each operator has its own physical infrastructure;
- local calls between two companies even within an area are treated as international calls;
- telephone calls between different areas within Somalia are charged between USD 0.5 – 0.8 per minute;
- for mobile taxes there is no differentiation between local and international calls – all calls are charged one US dollar per minute.

Table 3 – **Cost of international calls**

Telephone Company	Charges per Minute in USD
Aerolite	N/ A
Barakat (now Telcom)	1
Sitco	1
Soltelco	1.3
STC	1.3

Sources: Telecommunication companies in Hargeisa (2002).

Soltelco

According to their management, this company is a 100% Somali company and Somaliland's largest telco. Soltelco offers fixed line telephony and dial-up internet access via Telenor. They plan to introduce mobile services. They provide free telephony to, e.g., the university, schools and police.

Barakat (now Telcom)

Described by management as a 100% Somali company, operating in six regions including, e.g., Puntland and Mogadishu, with a general management in Dubai. Barakat offers fixed line, GSM900 and internet access services. Internet access is offered via an earth station in the United Arab Emirates where 'un-desired' services are filtered-out by a proxy server. Currently the access is a 64 kbit connection.

STC

According to the management, STC – Somali Telecommunications Company – is the country's leading company and the fastest growing. It provides services in all Somali regions via a number of sister companies. The services offered include fixed line, internet access and email. Mobile services will be introduced within a short period. Internet subscribers include six international organisations and approximately 30 other subscribers also including an internet café. STC is based on US capital and draws upon technical assistance from the US.

Governmental Institutions with Links to ICT

Two ministries are directly involved in ICT issues:

- Ministry of Planning; and
- Ministry of Telecommunications.

There is no telecom regulatory association in Somaliland. According to our interviews, there is a weak political pressure for regulation and consensus among actors that it is desirable. Contrary to many other countries that have an institutional structure in place and are going through institutional reform, Somaliland is at the beginning of institutional creation process.

Institutions with links to ICT and International ICT Development Partners

There are a number of national and international institutions that to different degrees are related to ICT development in Somaliland, including:

- Institute for Practical Research and Training;
- United Nations Educational, Scientific and Cultural Organization (UNESCO);
- Soyaal Training Institute;[9]
- United Nations Development Programme (UNDP).

International partners involved in ICT development programmes in Somaliland include:

- The Government of Denmark (through UNDP projects) – financial and technical assistance in the installation of a VSAT system in Hargeisa, Northwest Somalia (see below);
- The Government of Japan has awarded USD 60,000 from the ICT TTF (activities yet to be implemented);
- World Bank – through the Low Income Countries Under Stress (LICUS) initiative;
- World Bank Institute – through support to higher education.

Geographic Coverage and Competition

Exact information on geographical coverage is not available at this point in time, but all five operators are competing in Hargeisa. Soltelco and Barakat compete at least in Somaliland, Puntland and Mogadishu.

Barakat operates in six regions including Somaliland, Puntland and Mogadishu; Soltelco operates in most of Somalia; STC provides services in all Somali regions. There is no detailed information for Erolite or Sitco.

Regulation and Interconnection

There is open competition in the telecom market in Somaliland and no exclusive regulation –only acceptance by ruling political forces is needed to enter the market. There are no licenses, only mutual agreement in Somaliland Telecom Operators Association. Soltelco is a kind of incumbent or descendant of the incumbent.

Telecom operators in Somaliland have no agreed rules for interconnection. Among the reasons for not interconnecting is the problem of trust, as was raised both in our interviews and in other documents. The companies simply do not trust each other. As reported by UNDP:

> The lack of connections between the various companies grew out of a lack of trust …. In a pilot project to unify the telephone system in Mogadishu, the Telecom Association brought the local operators together to meet with international experts on the costs and benefits of interconnectivity. As a result, the companies contributed to the purchase of new equipment and the formation of a jointly owned company, and now telephone users in Mogadishu can talk to each other.

"Rebuilding trust wasn't easy," says Abdilghani Jama, Secretary General of the Somali Telecom Association. "But now we are trying to replicate the Mogadishu model in other areas."

Somaliland is still waiting for the private companies to connect with one another. "Every company runs its own business, we're not connected to each other. If you want to call someone with another company, you have to subscribe to that network," says Abdul Aziz, a network administrator for Telesom. "But we're trying to work that out so it's all one unified system" (UNDP 2003).

ICT Development Activities

Existing VSAT nodes include:

- Ministry of Planning, University of Hargeisa, UNDP compound – established 2002;
- Ministry of Relief, Rehabilitation and Reconstruction (RRR), Ministry of Foreign Affairs, President Palace – established 2003.

According to UNDP, some of the major ongoing ICT activities in Somaliland are:[10]

- development of a National ICT for Development Strategy (yet to be formulated);
- development of a regulatory framework for the telecom industry for Somalia (yet to be formulated);

- UNDP working to recruit a consultant to develop a suggestion for the ICT Strategy for Somalia / Regulatory Framework (planned for 2003-04);
- establishment of GIS facility within the municipality of Hargeisa (in collaboration with UN Habitat);
- connecting academic and public institutions to the internet via the installation of VSAT systems in Somalia (in collaboration with the World Bank and World Bank Institute);
  - planned for 2003 – VSAT for Amoud University
  - planned for 2003 – VSAT for UNDP compound in Garowe, Puntland
- establishing learning centres within the universities
- a case study on ICT development: Establishment of ICT connectivity to the university and governmental institutions.

This following describes a specific project of ICT development. It is included here to illustrate the required activities to create ICT connections up from scratch. Data gathered via this project also extends to indicate more general ICT demands.

4. Case Study on Establishing ICT Connectivity for University and Governmental Institutions in Somaliland

Background

One of the many areas in need of assistance in Somaliland is information and teaching infrastructure. On the basis of its many years of experience in Ghana, the Center for Tele-Information (CTI)[11] was asked to assist in developing a programme to establish electronic communication infrastructure especially tailored for the university environment. In this chapter, this case is described in more detail.

In response to a request from UNDP, in 2001 a representative from CTI participated in a mission to Somaliland. The primary purpose of the mission was to assist the UNDP in determining the state of readiness among universities, research and government institutions in Somaliland for internet connectivity and to assist in drawing up a plan for establishing such connectivity. This included an assessment of existing telecom facilities, additional investment that might have to be made to establish connectivity – as well as a preliminary assessment of the need to develop the regulatory structure for telecoms.

Demand for ICT Connectivity and Services (interviews)

To map ICT development and the needs in Somaliland, CTI conducted interviews with some of the main actors in the ICT market. The key issues that the interviewees were confronted with included demand for ICT and the necessity of a regulatory framework.

The data gathered in the interviews extend beyond this particular project and indicate general demand for ICTs. In the following the results of the interviews are given.

Ministry of Planning

With regards to improving ICT connectivity, the Director General (DG) expressed strong interest in development of the ICT sector and in obtaining access as well to electronic communication for the universities. The DG saw this as a way to enhance the quality of administration through better access to training and information.

Ministry of Telecommunications

The representatives expressed strong support for the proposed network facilities. Further, they expressed strong interest in assisting with the creation of a regulatory framework for the telecoms sector in Somaliland. A request for this had already been sent to UNDP in 1999.

Telecom Operators

The management of the telecom companies (Solteco, Barakat and STC) recognised the need and expressed support for the development of a regulatory framework for the sector.

The Institute for Practical Research and Training

The Director recognised the potential for enhancing teaching and research within the context of the proposed project. He had already been engaged in discussions about possibilities to establish similar facilities. He expressed strong support and interest in being connected to the network resulting from the proposed project.

UNESCO

The principal priority of UNESCO in Somaliland is training of teachers. UNESCO would like to introduce tele-training in their activities. It has been discussed, e.g., in relation to activities in Garowe. UNESCO would like to use the facilities of the proposed project and characterised the project as "just the right time for such an activity."

Soyaal Training Institute

The management recognised the potential in having access to the internet and welcomed the possibility of including this in their activities.

Project Plan

On the basis of interviews with government officials, universities and organisations and a general assessment of the situation in Somaliland it was concluded that:

- There was a need for an electronic network linking universities, government and research institutions in Somaliland, and a need for high-speed access to the internet;
- There was strong support for such a project among the relevant institutions;
- There was a relevant resource base (knowledge and personal computers) making such a project feasible;
- The telecom companies evidenced very positive attitudes towards the project.

Consequently, the Danish Embassy and the UNDP decided on a two-phased plan to realise a research and education network:

Phase 1 included establishing a basic high-speed internet connection giving access to three institutions in Hargeisa (the university, the Ministry of Planning and UNDP).

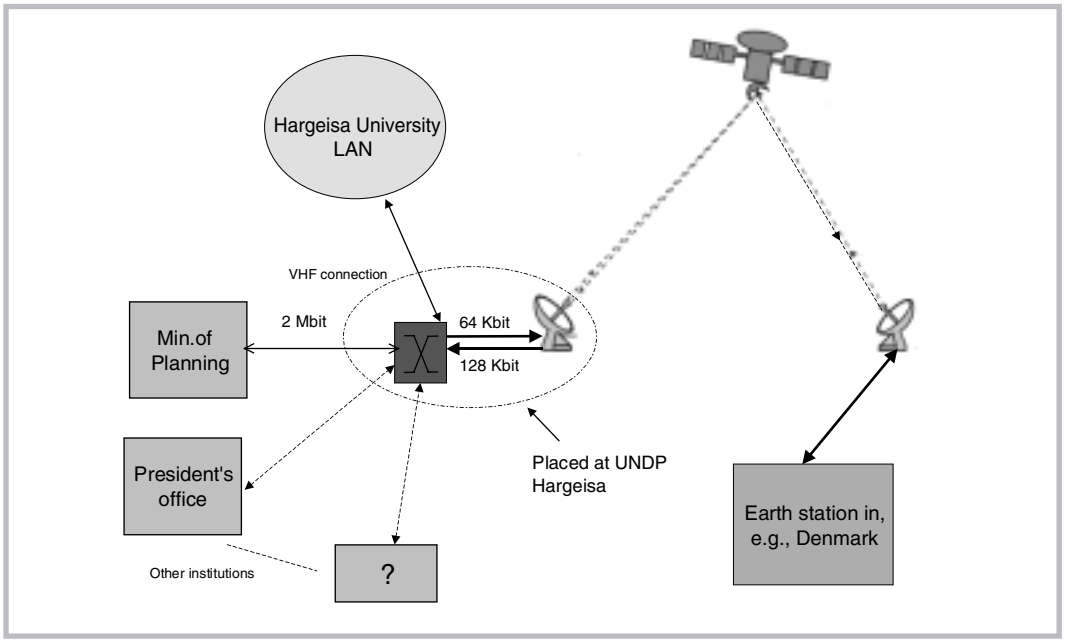
Phase 1 was implemented by CTI in October-November 2002. It included the installation of a VSAT at the UNDP compound and setting-up microwave connections to the Ministry of Planning and Hargeisa University. In June 2003, the President's office was also connected to this network.

Phase 2 planning focused on establishing links to sites such as the Ahmud University (situated outside Boroma approximately 120 kilometres from Hargeisa) and the Sheik Veterinary School (situated in Sheik approximately 75 kilometres from Hargeisa). Furthermore, there were plans for a project to develop the regulatory framework for the telecom sector, and to develop long-distance teaching systems using the electronic networks.

Concerning the *Phase 2* links, it was concluded that a VSAT solution would be the most efficient for the Ahmud University and that a VHF solution would be the most efficient solution for the Sheik Veterinary School.

It is considered vital that the project achieve long-term financial self-sustainability This may be assured by setting up payment schemes for different types of users including commitments from organisations willing and able to make contributions to cover the necessary costs. These will include not only the current communication costs, but also administration and technical maintenance and development of the system. Current international tension, however, engendered a postponing of activities following Phase 1.

Figure 2 – **Network Architecture**



Deployed Technology

The aim of the proposed project was to provide high-speed internet access to research, education and government institutions through a network. As depicted in Figure 2 the network consists of different research, education and government institutions in Somaliland:

- the connection between the network and outside world is a VSAT connection to Denmark;
- the connections to other institutions are 2 Mbit/s line-of-sight microwave connections.

Establishing ICT Connectivity

Based on cost estimates and experience from the case study project, we outline some realistic scenarios for establishing ICT connectivity in Somaliland.

Cost of VSAT Connectivity

In the following, the fixed and running cost of a VSAT system is given. The figures for an actual system will vary depending on the VSAT operator. The following figures are representative 2002 prices estimated by CTI.

Fixed Costs

Fixed costs include equipment such as modems, routers, transceivers, antenna, etc., needed to establish VSAT internet protocol (IP) connectivity. The cost for a system that can operate link speeds of up to 2 Mbit/s is estimated at USD 35,000.

Running Costs

Running costs depend on the link capacity. As an example, the cost of having 128/64 (128 Kbit/s down stream and 64 Kbit/s upstream) is estimated at USD 2000 per month.

Total Cost

Thus, the total cost of establishing an asymmetrical 128/64 connection in any given location in Somaliland is USD 30,000 per year and USD 2500 per month.

If the VSAT connection is used, 24-hours per day, seven days per week, then the minute charge (to cover the direct costs) is USD 0.058 per minute. The connection may be shared by several PCs and the 'per minute charge' can be lowered accordingly. However, there is a trade-off between the number of PCs and the perceived quality, as sharing a connection decreases the quality of services.

Tele-centre Scenario

In this section, the costs of using the system for establishing a telecentre in a city in Somaliland are explored. It is assumed that the telecentre will have 20 PCs and be open 24-hours per day. The cost of 20 PCs and additional networking equipment etc., is estimated at USD 30,000 and the rental of the location (including electricity) is estimated to be USD 500 per month. The centre will need to employ three staff, one in charge of accounting and two technical people. Their salary is estimated at USD 500 per month each, resulting in a running cost of USD 2000 per month.

The non-VSAT cost of establishing a telecentre will be around USD 2275 per month. The total cost (VSAT included) will be USD 4775 per month.

The per minute rate, per PC, will then be USD 0.005 to cover costs at full capacity use. If the centre is only used one-third of the time (eight hours per day) at half capacity (using ten PCs), then the per minute rate increases to USD 0.033.

The calculations indicate that if there is a willingness of paying USD 0.03-0.005 per minute,[12] it is realistic to establish VSAT connectivity to serve a telecentre.

Using Microwave Links

As illustrated above, it is not necessary to establish a VSAT for every site. When one VSAT is established, other sites can connect to it using wireless technologies such as microwave. The price of establishing a microwave link using WiFi technology is cur-

rently around USD 6000 per site. Consequently, it is economically reasonable to deploy microwave links to connect to an established VSAT system if the new sites are situated near enough (in a radius of about 20 kilometres[13]). If the distance is further away, a calculation is needed to determine if it is more efficient to use other far reaching wireless technologies such as VHF, radio chain, etc., or more logical to establish a new VSAT system.

5. Demand for ICT Development and Investment in Somaliland

Opportunities

According to UNDP there are two main needs for the Somaliland ICT market:[14]

- Technical assistance for the process of establishing a regulatory framework to define technical requirements, protocols, data standards, training and staffing needs;
- Establishment of networks (and enhancement of the current ones) to enable academic, research and public institutions to communicate, exchange information and better manage and deliver services to businesses and citizens.

A well-functioning regulatory framework is almost a precondition for the ICT market to function properly and for establishing conditions for foreign capital to invest in Somaliland. This task therefore has very high priority and both the telecom industry and governmental institutions recognise its importance.

> The lack of regulatory framework for the telecom market can be identified as one of the major barriers for development of ICT in Somaliland.

Establishing modern network infrastructure, also serving international aid agency activities is vital for Somaliland. The interviews and field research showed that users, both within and outside of government, emphasised the need for such activities and its importance in fulfilling their daily tasks. It is especially important to afford the research and education sector high priority as the gains obtained via ICTs are clearly so fundamental to this sector. The presence of highly qualified, returned expatriates makes a good case for potential efficient use of an up-to-date ICT environment.

> Somaliland is one of the least developed countries in the world and the development of ICT, e.g., in the governmental institutions need international donor organisations to give ICT development high priority.

As the cost of establishing VSAT connectivity decreases, it will become increasingly likely that local firms and organisations will implement ICT connectivity to gain effi-

ciency in production and distribution of their services and goods. A recent example of this is a Hargeisa hotel that has implemented its own VSAT to offer their guests the possibility of ICT connectivity.

As noted above, Somaliland's economy is based mainly on the export of livestock. ICT projects with the aim of implementing more efficient processes in the production, transport and export of livestock will have vital effects on the economy.

The fishing industry that is currently under development will also gain efficiency by implementing ICT solutions. For both of the traditional industries there are potential gains associated with ICT usage in training, production, transport and export.

> It is important to bring actors from the livestock, transport and fishing sectors together with actors from the ICT sector to investigate in new possibilities for production and identify new investment areas.

Threats

The problems of generating general economic and specific ICT development in Somaliland are immense. Since the onset of the civil war in 1988, Somaliland has experienced both economic dislocation and widespread social dislocation brought about by insecurity and military massacres. The civil war had also created a massive stream of refugees with an estimated one million fleeing to other countries.

Economic growth has historically been modest a fact that has been explained in terms of the neglect of post-colonial governments (and of the British colonial administration), the small size of the domestic market, the lack of raw materials, shortage of finance and management skills and investments deterred by political uncertainty.

A positive change for this economic environment depends very much on external economic relations, which are affected by the country's uncertain international status. Foreign assistance is necessary to realise economic development, but Somaliland is still externally recognised as being formally part of Somalia. The Somaliland government refuses to acknowledge this status. Somaliland is thus denied membership in international institutions, including postal and telecom agencies, and has difficulty in negotiating formal agreements with foreign governments. The lack of international recognition is a major vital problem for Somaliland with implications for both development aid and investment issues:

> Thus the absence of international recognition, observes an official of the Somaliland Chamber of Commerce, 'means we cannot enter into formal trade agreements; we cannot even contact the outside world through direct postal services, as we are not a member of the postal union'. The fact that Somaliland is not a *de jure* recognized state-in fact no state officially recognised Somaliland as of late 2002, eleven years after its declaration

of statehood-denies it and its business partner recourse to global basic commercial law infrastructure such as the 1958 Convention on the Recognition and Enforcement of Foreign Arbitration Awards. This convention provides the legal framework for transactions involving international agencies such as the World Bank. Most multilateral trade protection and regulation agreements, such as those protecting intellectual property rights and foreign investment insurance require contracts to conform to the principles of the 1958 Convention. (Reno 2003).

Somaliland has been able to obtain assistance from international organisations such as UNDP and UNESCO and several NGOs, but Somaliland's indeterminate international status is a severe threat to future assistance and development.

6. Conclusion

The telecom sector in Somaliland is characterised by the absence of formal regulation and the existence of a novel mode of open competition.

Unlike most other African states that have at least established an institutional structure and undertaken preparations for, or have even initiated, institutional reform, Somaliland is only in the beginning of an institutional creation process. This process is based on, for example, weak political pressure for telecom regulation from ruling political forces and actors on the telecom market.

The competition in the telecom market is a 'negotiated competition'. All telecom operators cooperate in the Somaliland Telecom Operators Association where they agree on prices and pass this information on to the Ministry. Prices are uniform and adjusted according to inflation and the exchange rate to the US-dollar. There are, however, no exclusive regulation and licensing procedures. To enter the market requires acceptance by the ruling political forces and market actors. Further there are no agreed rules for interconnection. The problem of lack of trust is a dominant factor; the companies simply do not trust each other – and this again is connected with the lack of formal institutions.

The rates for international mobile calls are among the lowest in the world and this may be seen as a combined result of real competition; low economic level development and no public intervention (i.e., no contribution to general telecom or company development as in other developing/developed countries). This illustrates that Somaliland has found its own way to develop, e.g., ICT, despite being cut-off to a large extent from international cooperation and assistance.

However, without a substantial economic surplus in traditional sectors, such as agriculture and fishery, it seems unlikely that the Somaliland economy can develop to support

a modern state apparatus. Further, this seems to require the introduction of an ICT infrastructure (and rehabilitation of health and transport structures – which have not been addressed here) and massive investment in development of education. These investments seem justified by their potential alone, but Somaliland's indeterminate international status is a severe threat to realisation of this potential.

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[1] No part of this paper should be interpreted as implying recognition of Somaliland's status as an independent state by the authors or WDR. Any reference to Somaliland as a country is only in the geographic sense of its self-declared borders.

[2] <www.somalilandgov.com/cprofile.htm>

[3] Local district elections and the first presidential election (for president and vice-president) were held in December 2002 and in May 2003 respectively. Both elections were peaceful and held with international assistance.

[4] <www.somalilandgov.com/cprofile.htm>

[5] Rift Valley fever (RVF) is an acute, fever-causing viral disease that affects domestic animals (such as cattle, buffalo, sheep, goats, and camels) and humans. RVF is generally found in regions of eastern and southern Africa, but in September 2000, a RVF outbreak was reported in Saudi Arabia and subsequently Yemen. These cases represent the first Rift Valley fever cases identified outside Africa. In early 2002 FAO acquitted Somaliland as the source of the fever, but the import ban was only lifted after long negotiations.

[6] <www.somalilandgov.com/cprofile.htm>

[7] <www.somalilandgov.com/investments_law.htm>

[8] These data are from late 2002.

[9] The Soyaal Training Institute is a facility run by the War Veteran's Association to train and re-integrate war veterans.

[10] UNDP, Laila Shamji, Head, Data and Information Unit.

[11] Located in Technical University of Denmark, now known as the Center for ICT (CICT).

[12] Of course the real charging scheme will depend on if people use the system during the day, evening or night.

[13] Intel has just introduced a new standard, 802.16 claimed a high speed reach of around 50 kms.

[14] UNDP, Laila Shamji, Head, Data and Information Unit.

List of Interviewed Persons

University

Hargeisa University

President of the University

Ahmud University

Prof. Suleiman Ahmed Gulaid, President of the University

Prof. Ahmed Hashi Abib, Vice-president of the University (Development Planning. Administration & Public Relations)

Eng. Abdirahman Haji Dahir

Government

Ministry of Planning

Ministry of Telecommunications

Eng. Mohammed Abdillahi Ehui, Technical Consultant of Minister

Eng. Hassan Jama Dualleh, Advisor of Minister

Telecommunication Companies

Soltelco

Barakat (now Telcom)

STC

Other Institutions

The Institute for Practical Research and Training, Director Ahmed H.Esa, Ph.D.

UNESCO, Director Ahmed A-Dáar, Somaliland Institute of Education & colleagues

Soyaal Training Institute

UNDP, Laila Shamji, Head, Data and Information Management Unit

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Links

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<www.somalilandtimes.net/>

<www.allafrica.com>

<www.somalilandnews.com/>

<www.somalilandgov.com/home.htm>

15. Telecoms in Denmark: Investment, Performance and Regulation[1]

Anders Henten

1. Introduction

The focus of this chapter is the development of the Danish telecom network and service provision market since liberalisation and the role of policy and regulation in shaping this development. More specifically, there is emphasis on investment. However, in order to present a sufficiently comprehensive picture, developments in financial performance, technology diffusion, price developments, and innovation are also included. Furthermore, the competitive situation in the Danish telecom market is examined, as the competitive environment affects the investment incentives of market players.[2]

The Danish telecom network and service provision market witnessed a slowly creeping liberalisation from the late 1980s and onwards, first with respect to the connection of terminal equipment to the networks, later with the introduction of a second mobile operator, and further on, with a liberalisation of value-added services, as the major steps.[3] The full telecom market liberalisation came into effect in mid 1996 – a year and a half before the EU deadline for liberalisation in January 1998. The overall goal of the telecom policy and regulation has been epitomised by the slogan, 'best and cheapest – by way of real competition'.[4] In 1999, more policy emphasis was put on developing 'many pipes to the home' (ITU 2002), and more recently there has been moves towards a policy of facilitating IT and telecom developments with a greater emphasis on demand side factors and a broader view on the converging ICT sector encompassing traditional telecom issues as well as new issues regarding, e.g., IT security and content development.[5]

The aim of this chapter, on the basis of these policy trends and the developments in the market, is to analyse the relationship between market developments and performance and the policy and regulatory initiatives taken and to discuss the general lessons with respect to initiatives fostering or limiting investment, innovation, and performance in general.

2. Policy and Regulation

There are, basically, four different ways in which public authorities can regulate and intervene in markets:

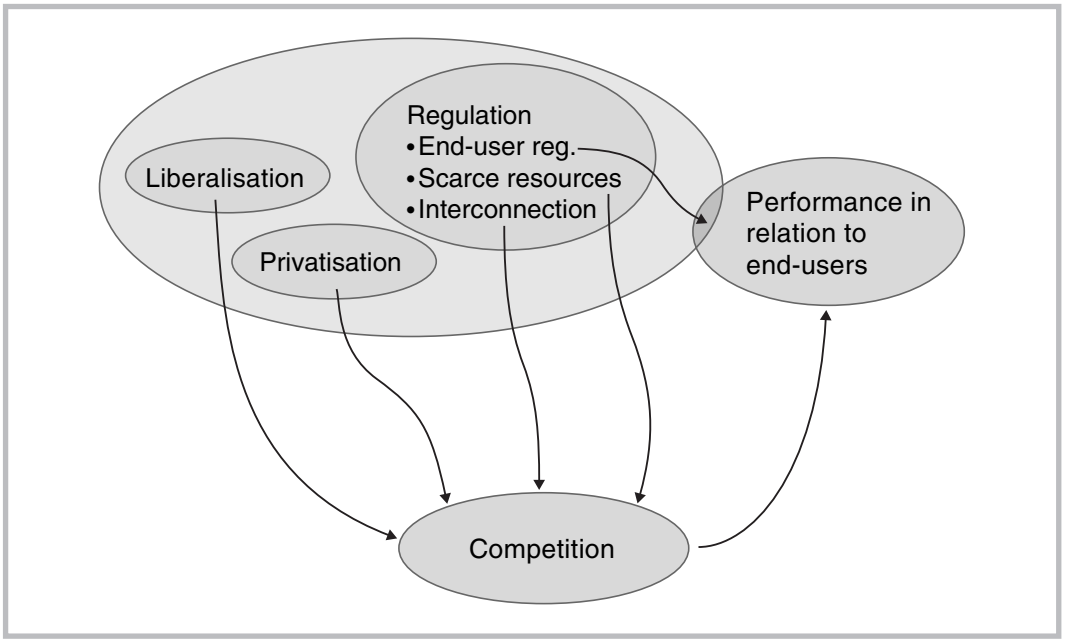
- direct governance via ownership of operators in the markets;
- public support for the supply side;
- public support for the demand side; and
- the regulatory framework .

Regulation via ownership has, in most countries, been (more or less) abandoned in the telecom area during the past five to ten years. In Denmark, the state does not any more own any part of the incumbent operator, TDC Tele Danmark. The last state-owned shares were sold to Ameritech in 1998 and later taken over by SBC Communications. The only public operator in Denmark in which the Danish state owns shares is Orange – the reason for this being that the state agency *Banestyrelsen* which oversees the running of the railway tracks in Denmark has ownership of optical fibres along the tracks, and owns a minority share (10.2%) of Orange in Denmark. But state ownership is no longer used as a means to govern the telecom market in Denmark.

Among the three other modes of market intervention and regulation, public support for supply in the telecom area is in Denmark mostly limited to educational initiatives and research cooperation. There is no public economic support for privately owned operators – but there is, of course, public money in closed networks, owned and used by municipalities or other public institutions. State support for network upgrading has been debated at times, especially in relation to broadband facilities – first and foremost access. The idea has also entered the policy arena via proposals to create a level playing field among the different operators by having a common (state-owned) infrastructure on the basis of which private service operators could compete. But this has been rejected by almost all political quarters with the argument that the telecom market has been liberalised and that the state should not intervene with economic support and, furthermore, that extensions of networks must be guided by the demand from users and not by state-supported supply side initiatives.

Demand side initiatives are seen as more appropriate. In this category, one finds initiatives such as demand from public institutions, but also initiatives to support private demand. An example of support for private demand is the recent decision to allow employers to pay for employees' home broadband access and deduct these expenses from the employees' salaries. As the marginal income taxes are high (up to approximately two-thirds), the state thus funds up to two-thirds of the expense of private users' broadband connections from home. A similar arrangement has been in force with respect to computers, contributing to the diffusion of home PCs in Denmark.

Figure 1 – **Policy and regulatory initiatives regarding competition and end-user conditions**



The last kind of public influence on market development is regulation, i.e. establishing a framework of rules to be followed by market players and enforced on a day-to-day basis by a regulatory agency. In contrast to the three other types of governance, regulation constitutes a more external type of governance, setting the rules for the activities of the market players. However, in the telecom area, sector specific regulation entails a number of direct market interventions regarding, e.g., interconnection, end-user prices and frequency band assignment.

The regulation type of public governance is by far the most important in the telecom area, where a sector specific regulatory structure has been established in most countries in connection with the liberalisation of the sector. The overall goal has been to set the framework for the creation of *real* competition (as it has been phrased in Danish telecom policy discourse) and not only to rely on the formal possibility established by liberalisation and privatisation. Another overall goal has been to ensure universal service at affordable prices and the protection of users' rights.

The different ways in which traditional sector specific telecom regulation affects market development and the performance of operators are illustrated in Figure 1. The figure includes the policy and regulatory initiatives, i.e. liberalisation, privatisation, and regulatory measures with respect to end-user regulation, scarce resources and interconnection, and the implications on competition and end-user conditions. Furthermore, it should be noted that these specific telecom relations are situated in a general soci-

etal context. The figure shows that most of the policy and regulatory initiatives are aimed at enhancing competition in the market (and thereby indirectly improving the conditions of end-users). End-user conditions are only directly addressed by universal service provisions and the protection of user rights.

Table 1 – **Investments in the Danish telecom sector (1992-2001, in millions DKK)**

	TDC	Other operators	Total
1992	2,694	0	2,694
1993	2,416	226	2,642
1994	2,601	392	2,993
1995	2,667	441	3,078
1996	3,923	813	4,734
1997	4,433	1,663	6,096
1998	3,657	3,120	6,777
1999	4,224	2,655	6,879
2000	4,539	4,476	9,015
2001*	5,330	5,506	10,836
2002*	approx. 4.2	approx. 3.4	7,652

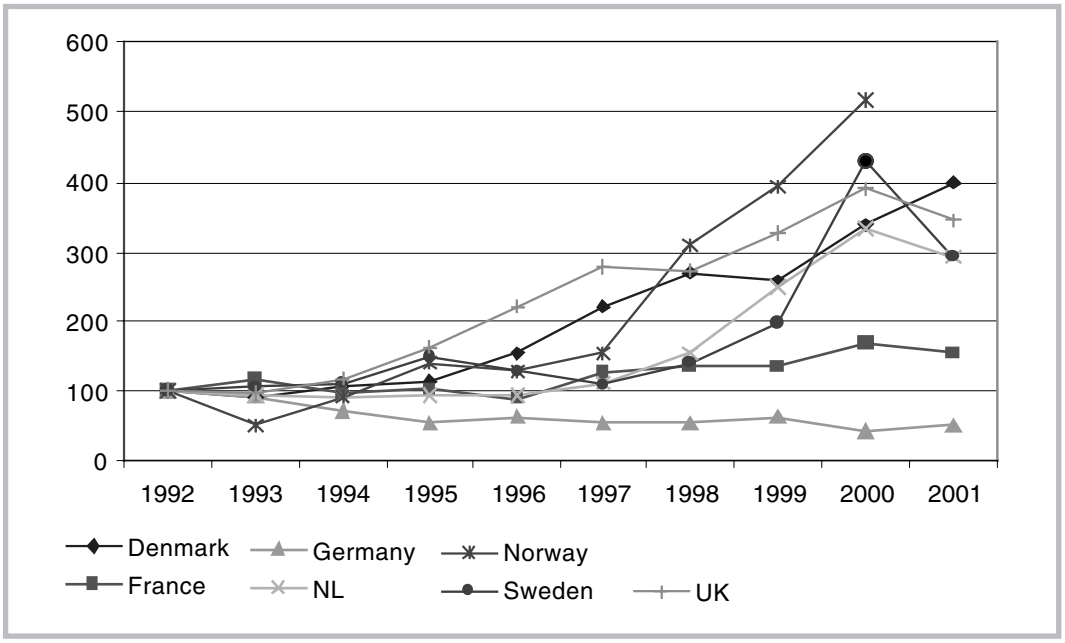
* Posted investments in UMTS licensees not included. Source: NITA, Jørgen Abild Andersen: 'Et velfungerende telemarked I Danmark', speech at Telecom 2003 in Copenhagen, 9 April 2003. Source for total 2002 figure is NITA: 'Tele Yearbook, Denmark 2002'. TDC and other operator figures for 2002 are approximations, as exactly comparable figures from previous years are not publicly available.

Sources: ITWeb, MTN Annual Report, Vodacom Annual Report.

3. Investment

The implications of the market opening initiatives especially since the mid-1990s is evidenced by the number of operators in the market and the increasing investment figures for the sector. Since liberalisation, the exact number of operators in the Danish telecom network and service provision market has not been registered by the telecom regulatory agency, as there are no licensing requirements in Denmark except for most wireless communications. However, numbers have been estimated and in 2000, at the peak of the telecom (and dot-com) bubble, there were approximately 45 operators offering fixed line voice telephony, by August 2003 this figure had decreased to approximately 30 (CEC 2002). In the mobile cellular area, there are four licensed GSM network operators, but there are also 16 mobile service providers (at August 2003). For internet

Figure 2 – **Index on developments in investment in a selection of European countries**



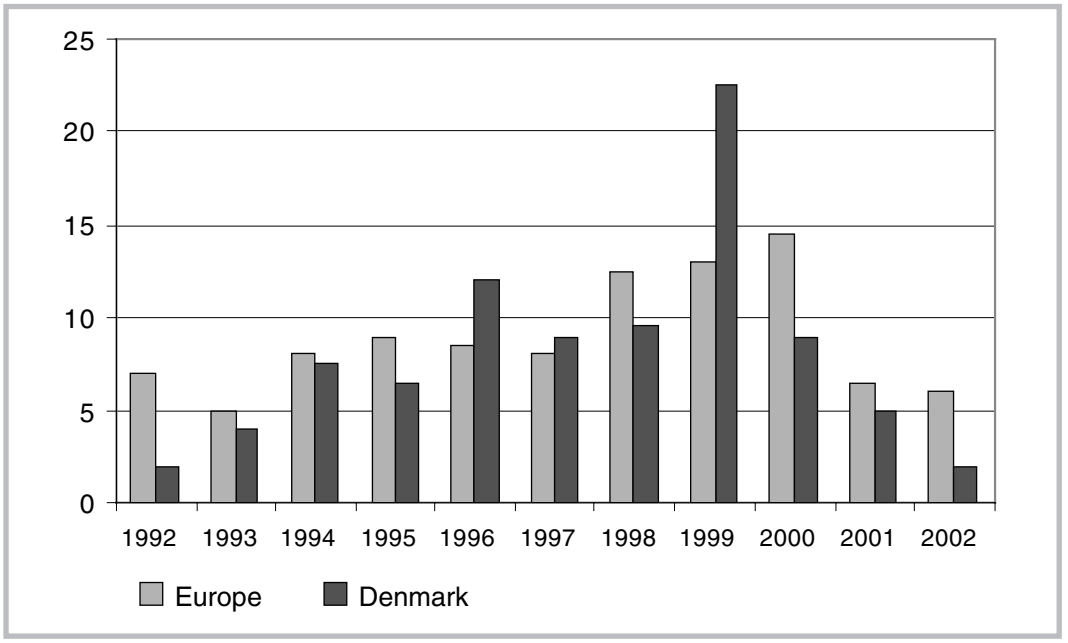
Source: ITU World Telecommunications Indicators (2003).
Note: 1992 = 100

service provision, there is, as in many countries, a handful of larger providers and a host of small ISPs (see ITU 2002).

In terms of investment, the liberalisation of the telecom market has had marked effects, see Table 1.

Tele Danmark (TDC) investments were at a stable level (around 2.6 billion DKK) prior to full-blown liberalisation in 1996. In 1996, TDC investments increased to 3.9 billion DKK, and in the consecutive years including 2001, investments have been steadily increasing. Other operators started investing in 1993; more specifically, it was the second mobile Sonofon, which started offering GSM services. As in the case of TDC, there was a jump in investment levels in 1996 when a number of new operators entered the market, and in the following years including 2001, investments have increased significantly except for 1999, when there was a temporary set-back. In 2002, investments have fallen substantially but are still above the 1999 level. Prospects are that investment in 2003 further decreased. The overall picture is thus that liberalisation not only led to investment by the new operators entering the market, but also to increasing investments by the incumbent. The incumbent had to react to competitors by improving its range of services. More recently, investments have decreased considerably in connection with the crisis in the telecom sector worldwide including Denmark. In 2001, TDC's investments in Denmark were approximately 4.2 billion DKK, while TDC

Figure 3 – **Growth in revenue in Europe and Denmark, annual growth in percentage, 1992-2002**



Source: NITA: Telekonkurrenceredeg¯relse 2003 ñ bilagssamling, p. 30.

investments were approximately 5.3 billion DKK. In 2003, investments have further decreased. For the first half year of 2003, TDC invested approximately 1.5 billion. DKK.[6] In 2002, the investment decrease for operators competing with TDC was even sharper, from approximately 5.6 billion to 3.4 billion DKK.

Telia, for instance – which operates in Denmark – has had decreasing investments in the fixed network area since 2000. If 2000 is set at index 100, investment in the fixed network area was below 80 in 2001 and just over 40 in 2002. The current level of investment (2003) of Telia in the fixed network area in Denmark is no more than 20% of what it was in 2000. The reason for this has much to do with the competitive situation in the Danish telecom market, where Telia has not been able to get a firm grip on a sufficiently large share of the market (see section 8 on competition).

Investment increases during the second part of the 1990s seem to be the general trend in most countries. Figure 2 illustrates the development of telecom investment in a selected number of European countries, and it shows that, except for Germany, other European countries have witnessed increasing investments with market liberalisation. The first liberalising country in Europe, the UK, has the biggest initial increase in investment. During the period until 1998, investments are relatively stable, but around 1998 something happens – especially in Norway, but also in Sweden and the Netherlands.

Unfortunately, internationally comparable figures for 2002 are not yet available. However, the expectation is that investments have decreased[7] primarily because of the crisis in the telecom sector – a crisis which is not purely financial but also a recession with respect to revenue in the sector, as shown in Figure 3. This figure illustrates the increasing growth in revenues of operators during the 1990s in Denmark and Europe in total. In 1999, growth was significantly higher in Denmark compared with Europe generally. However, during 2000-02 growth has been lower in Denmark than in other European countries in average.

Compared with other European countries, the ratio between investments and revenues in Denmark is in the higher end (see Table 2). In this table, the sum of investments for the years from 1998 to 2001 is compared with the sum of revenues, so that the effects of annual fluctuations are diminished. 1998-2001 represents the period in which telecom has been liberalised in all the countries concerned. It should be noted that the level of investment is extremely high in the telecom sector compared with other sectors because of the very capital intensive character of the telecom business.

4. Ownership

The telecom operator industry in Denmark, to a very large extent, is owned by foreign investors. The incumbent in Denmark, TDC, is, e.g., financially controlled by the US SBC Communications, which owns 42% of TDC shares. But, there are not only incoming investments – there are also outgoing investments. TDC derives more than half of its revenues from foreign engagements. The Danish telecom sector is thus part of the ownership web of telecom operators internationally (see Table 3).

Some investors are strategic in the sense that they have more than short-term financial goals for investing in Denmark. In some cases, it is even a very long-term investment with heavy present losses. Other investors are institutional investors, traditionally requiring more short-term returns on investment. In the case of TDC, the Danish state sought a strategic investor during the late 1990s and the US regional operator Ameritech bought 42% of the shares. Ameritech was later merged into SBC Communications, but the SBC Communications strategic interests in TDC are probably not very high. Telenor (Norway), Telia (Sweden) and Tele2 (Sweden) have the strategic interest of a presence in more Nordic markets than their respective national home markets. Telia, for instance, often emphasises that they consider the whole Nordic region as their home market. In the case of Orange (formerly Mobilix, owned by France Télécom), France Télécom explicitly stated that Denmark was a test market for them because of its relatively small size and, at the time in the late 1990s, one of the more advanced markets with respect to mobile communications.

The extent to which this stage of relative advancement is still the case can be debated taking into consideration that mobile communications has developed very quickly in other European countries. GSM penetration figures are slightly higher in some Southern European countries than in Denmark. Furthermore, the i-mode experiment in Europe

Table 2 – **Investment as a percentage of revenue, 1998-2001**

Germany	Sweden	NL	France	UK	Denmark	Norway
15.2%	19.7%	21.0%	24.3%	26.6%	26.9%	37.5%

Source: ITU World Telecommunications Indicators 2003.

Table 3 – **Ownership of largest telecom operators in Denmark**

Company	Ownership	
TDC	42% 7% 10% 13% 28%	SBC Communications, USA ATP (pension fund), DK Private investors and employees Danish institutions Other foreign share holders
Sonofon	100%	Telenor, Norway
Telia Denmark	100%	Telia, Sweden
Orange Denmark	66% 10% 24%	Orange Group (affiliate of France Télécom) Danish State 5 international financial institutions
Tele2	100%	Tele2, Sweden
Tiscali	100%	Tiscali, Italy
Cybercity	Na	5 international financial institutions
Debitel Denmark	78% 9% 13%	Debitel (affiliate of Swisscom) Fleggaard Holding, Denmark Dansk Landbrugs Grovvareselskab, Denmark

Source: NITA: Telekonkurrenceredegørelse 2003 – bilagssamling, p. 33. Information on Sonofon has been updated, as Telenor in December 2003 bought BellSouth's 46.5% share in Sonofon and now has a full 100%.

has been concentrated, primarily, in the Netherlands, Belgium and Germany, and the first 3G launches in Europe were made in Austria, UK, Sweden and Italy. Only lately – in the autumn 2003 – the operator '3' launched its 3G service in Denmark, and the other 3G licensed operators in Denmark have not yet started their 3G services.

As it has turned out, a number of the new operators in the Danish telecom market have not been able to make a profit. Not only have they invested heavily, but they have also been running with a deficit in the day-to-day operations. This applies, first and

foremost, to Telia and Orange among the larger operators, but many small operators have also had substantial financial problems.

This has led to a consolidation in the Danish market with a one-third reduction in the number of operators during 2000-03 (see above). However, at present it does not seem that any of the larger operators are considering leaving the market in spite of large deficits.[8] There has been a certain retrenchment from some market segments on the part of Telia and also Orange. In Sweden, the expectation is that Orange will have to give up their 3G license, as they will not be able to meet the coverage requirements laid down in license conditions on the basis of the 'beauty contest' held in Sweden. In Denmark, there was an auction ending with each of the licensees paying around one billion DKK. However, coverage requirements are a very liberal 30% of the Danish population by the end of 2003 (and 80% by the end of 2007).

5. Innovation

There is no doubt that the liberalisation of the telecom area, the ensuing investments by new operators and the competitive pressure that this has put on the incumbent operators has sparked innovation in the sector. The most prevalent kinds of innovations are service innovations, while operators have scaled down their more basic research and development activities. Research and development in the telecom area is, presently, mostly taken care of by the equipment manufacturers. Telecom operators concentrate their innovative activities on the introduction of new services and tariff schemes based on more short-term considerations.

Both incumbents and newcomers introduce innovations into the markets. However, there has been a tendency in the first phase of liberalisation that new operators have been more innovative than incumbents. Table 4 provides an illustration of innovative activities among different operators in Denmark. The list is far from exhaustive but shows that new operators (and non-operators, e.g. user groups) have been often the first to innovate. A rule of thumb is that the incumbent will be hesitant to introduce a new service which will cannibalise (substitute for) existing services, while the incentive to innovate is bigger if it is a case of offering complementary services – such as the Duét service combining fixed line and wireless telephony introduced by the Danish incumbent TDC in 1997-98 (see Table 4).

The fact that non-incumbents often are first-movers does not mean that they will necessarily retain the largest market shares in the longer run. Evidence shows that incumbents are able to leverage their general market strength, especially in the fixed line area to pass by the first innovators and gain a dominant market share. Internet access is an example of this: TDC was still focusing on videotex solutions when internet access was first introduced to the broader market in Denmark, but the incumbent quickly refocused and has for a number of years been the dominant ISP on the Danish market. ADSL is the most prominent example, presently. Cybercity (at that time Danish owned) and Tiscali (at that time a Danish owned company under another

Table 4 – **Who was first? Examples of services and technological solutions and the first innovators**

Service	First innovator
IN-based services	TDC
Internet access	UNI-C (UNI2, affiliate of Tele2)
Duét	TDC
Prepaid cards (mobile)	Sonofon
National mobile roaming	Sonofon
GPRS	Sonofon
Location based services	Orange
Mobile payment	Orange
MMS	Idiationhouse
ADSL	Cybercity
Cable modem	Telia Stofa
WLAN	Non-operators

Source: CTI: 'Innovation og konkurrence, en analyse af det danske telemarked', in NITA: 'Telekonkurrenceredegørelse 2003 – bilagssamling', p. 62.

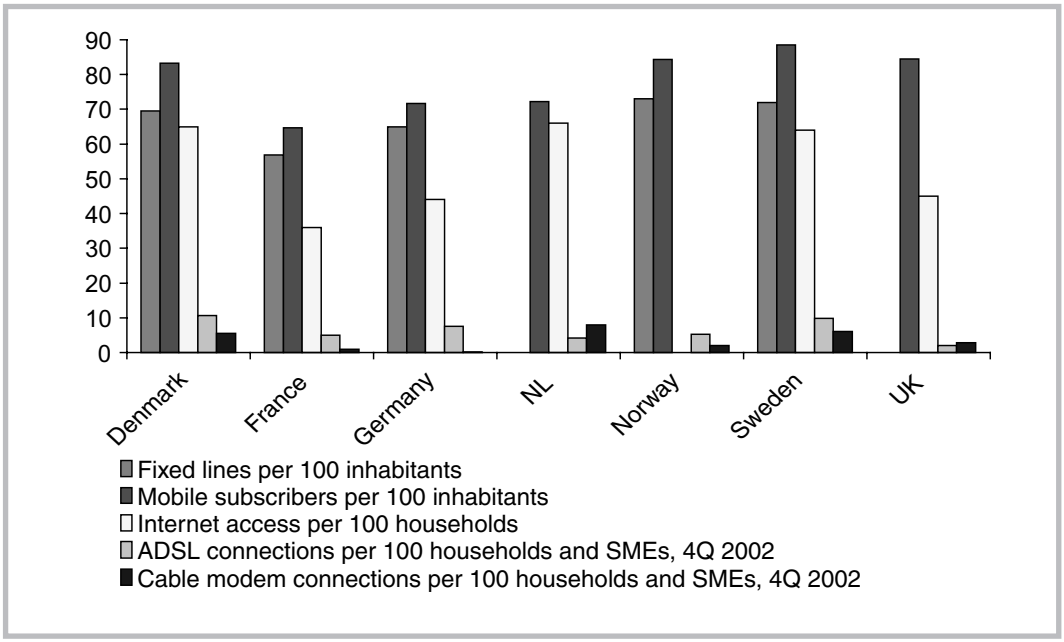
name) were the first to market ADSL, and for a short period these two companies and TDC had approximately one-third each of the then small market. Presently TDC has approximately 80% of the ADSL market in Denmark. Public WLANs is likely to develop in a similar manner.

The fact that important parts of the telecom operator sector are in financial crisis will push the market further in this direction. Telia Denmark is a clear example of this. Not only has Telia down-scaled their investments to a level of 20% of what it was in 2000, they have also cut their development employment down to approximately one fourth of the employment level in 2000. The present financial crisis of the telecom sector will, indeed, put a strain on innovation activities in the sector.

6. Technology Diffusion

To provide a rough sketch of telecoms development in Denmark, diffusion figures of different access technologies are provided. The larger investments in telecoms for the last five years have been in mobile networks, upgrading exchanges with ADSL equip-

Figure 4 – **Comparison of diffusion figures, 2002**



Sources: ITU, Eurobarometer, Telecom Markets.

ment and upgrading cable TV networks to two-way communication networks.[9] Results of these investments can clearly be seen in the availability and diffusion figures for access technologies. Approximately 95% of all fixed line telephone subscribers can subscribe to ADSL. In almost 30% of all 275 Danish municipalities, customers have the possibility to choose between ADSL, cable modem and fixed wireless access (FWA); in approximately 25% of municipalities there is a choice between ADSL and FWA; approximately 12.5% people can choose between ADSL and cable modem; and in approximately 32.5% people only have the possibility of an ADSL connection.[10]

Table 5 gives an overview of the main indicators for access technologies and services. Apart from increases in numbers of ADSL and cable modem subscribers, one notices the low number of FWA subscribers, which has not yet been a success in Denmark. Other noticeable developments are related to the decrease in fixed line telephone subscriptions and the still increasing number of mobile subscribers. The development in fixed lines is, in reality, more significant than can be seen from the table, as the fixed line figures include ISDN subscriptions as two lines. Since 1999, the number of traditional PSTN subscribers has decreased by a quarter of a million from 2.93 million to 2.65 million (as at the first half of 2003).[11] Another remarkable development is the decrease in outgoing fixed line minutes – 18% from early 2001 to early 2003 (NITA 2003b: 3). This is partly due to increased mobile traffic, but mostly to the increasing amount of traffic on private networks.

In comparison with other North Western European countries, telecom diffusion is relatively high. With respect to fixed main lines, diffusion in the Scandinavian countries is higher than in most other European countries but has been decreasing because of fixed-mobile substitution. Mobile telephony is also well-developed in Scandinavia, but other countries (in the table the UK, but also, e.g. Austria and Italy) have arrived at

Table 5 – **Main diffusion indicators, 2000-03**

	First half of 2003	Second half of 2002	First half of 2002	Second half of 2001	First half of 2001	Second half of 2000
Subscriber lines – fixes network (1,000)	3,656	3,701	3,797	3,865	3,840	3,809
Subscriber lines per 100 inhabitants – fixed network	67.9	68.7	70.7	72.0	71.7	71.22
Registration to carrier selection codes (1,000)	2,859	2,966	3,083	2,906	2,857	2,197
Outgoing fixed line traffic (million minutes)	10,003	10,015	10,914	11,301	12,128	11,348
XDSL subscriptions (1,000)	391	307	232	150	75	26
Cable modem subscriptions (1,000)	157	134	122	88	60	41
FWA subscriptions	1,760	1,415	718	…		
Mobile subscriptions (1,000)	4,543	4,478	4,154	3,960	3,660	3,364
Mobile per subscriptions 100 inhabitants	84.3	83.2	77.3	73.8	68.3	62.9
Outgoing mobile traffic (million minutes)	1,075	1,832	1,669	1,585	1,438	1,348
SMS sent (million)	1,517	1,144	871	743	619	465
Portings – fixed network (1,000)	83	64	68	67	68	163 (full year)
Portings – mobile (1,000)	165	143	130	94		
Internet subscriptions (1,000)	2,551	2,581	2,283	2,023	1,856	1,684
Internet subscriptions per 100 inhabitants	47.4	47.9	42.5	37.6	34.7	31.5

Source: NITA: 'Telecom Statistics – First Half of 2003', p. 3-4.

the same or a even higher level. Internet access is high in Scandinavia as well as in the Netherlands. However, for high-speed/broadband access, there are substantial differences. Among the countries compared, Denmark is faring well. For Europe, Denmark is at the top together with Belgium, but outside Europe, South Korea, Taiwan and Hong Kong but also Canada and the San Francisco Bay area are at higher levels. The overall conclusion is that Denmark is situated at the best end in all important categories and is doing especially well in the high-speed/broadband area in a European context.

With respect to many new access technologies and services, Denmark is not more advanced than other North Western European countries. There are relatively few multi-media messaging service (MMS) subscribers (approximately 15,000 in early 2003), but GPRS has started taking off with approximately 27,000 subscribers in late 2002 increasing to approximately 141,000 at the end of the first half of 2003 (NITA 2003a: 15). TDC has just embarked on building public WLANs, however, other countries, for instance, Sweden, began this process earlier on. Fibre to the home (FTTH) has not been taken up, and only one operator – '3' – among the four operators awarded a 3G license has started offering 3G services by the end of 2003. The conclusion must be that regarding well-known and tested access technologies and services, Denmark is generally at the best end together with the other Nordic countries. Technological solutions and services with a yet uncertain market potential are not being pushed especially in Denmark, indicating that the Danish market is no longer viewed as a test market for larger international operators. However, in the high-speed/broadband field (ADSL and cable modem), development in Denmark has been fast compared with other European countries.

7. Price Developments

Liberalisation and the development of competition in the Danish market have decreased end-user prices. Table 6 provides a picture of price developments for fixed-line, mobile and internet usage.

While prices have decreased overall, internet prices have been at a constant level since August 1999, and prices for mobile telephony have decreased continuously. Behind the generally decreasing prices, a rebalancing of prices has taken place. In the case of the incumbent, TDC, prices for fixed telephone subscriptions increased 37% between 1998 and 2003; prices for local calls decreased by 22%; national long-distance decreased by 64%; and international long-distance by 47%.[12]

In comparison with other North Western European countries, end-user prices in Denmark are at the cheaper end, however not significantly. In terms of average monthly expenditures calculated on the basis of 'OECD baskets' of calling patterns and fixed and usage charges, prices in Denmark are on the same level as the EU-15 average with respect to fixed-line telephony for residential users and cheaper in the case of business users (see Table 7). End-user prices for mobile telephony are, furthermore, on an average level compared with other EU countries (CEC 2002).

Table 6 – **Price Development – The Cheapest Offer, 1998-2003**

	Usage per quarter			
	Fixed-line phone 900 minutes	Mobile phone 270 minutes	Mobile phone 450 minutes	Internet 600 minutes
August 1998	644 DKK	477 DKK	651 DKK	170 DKK
August 1999	648 DKK	477 DKK	574 DKK	95 DKK
August 2000	559 DKK	447 DKK	540 DKK	83 DKK
August 2001	560 DKK	380 DKK	514 DKK	80 DKK
August 2002	565 DKK	357 DKK	514 DKK	83 DKK
April 2003	562 DKK	316 DKK	367 DKK	83 DKK
Change 1998-2003 Current prices	- 13%	- 34%	- 44%	-51%
Change 1998-2003 1998 prices	- 23%	- 41%	- 50%	- 56%

Source: NITA, April 2003.

Table 7 – **Average monthly expenditure, composite basket, euros, incl. VAT, 2003**

	Denmark	France	Germany	NL	Sweden	UK	EU15
Fixed-line Residential	39	42	41	39	33	38	40
Fixed-line Business	71	88	86	76	64	111	91

Note: Norway is not included in the EU implementation reports

Source: Ninth EU Implementation Report, Market Overview, 2003, p. 69.

Interconnection prices are low in Denmark. For all areas of switched interconnection, prices in Denmark are either the lowest or second lowest in the EU (see Table 8).

The same is true for twisted pair unbundled local loop (ULL) prices, for which prices in Denmark are also cheaper than in most other EU countries (see Table 9). However, Italy became the cheapest EU country for this area in 2003.

The margins for operators competing with the incumbent are extremely important and have a direct bearing on the competitive environment (which is examined in the fol-

Table 8 – **Prices for switched interconnection, euro cent/minute, high rate, August 2003**

	Local level	Single transit	Double transit
Denmark	0.45	0.68	0.87
France	0.53	0.96	1.31
Germany	0.65	1.07	0.86
Netherlands	0.71	0.90	1.15
Sweden	0.67	0.90	1.03
UK	0.44	0.66	1.59

Note: Norway is not included in the EU implementation reports

Source: Ninth EU Implementation Report, Market Overview, 2003: 24-25.

Table 9 – **Monthly average total cost per full unbundled loop, excl. VAT, 2003**

Denmark	France	Germany	Netherlands	Sweden	UK
11.0	17.1	16.5	12.7	25.4	25.5

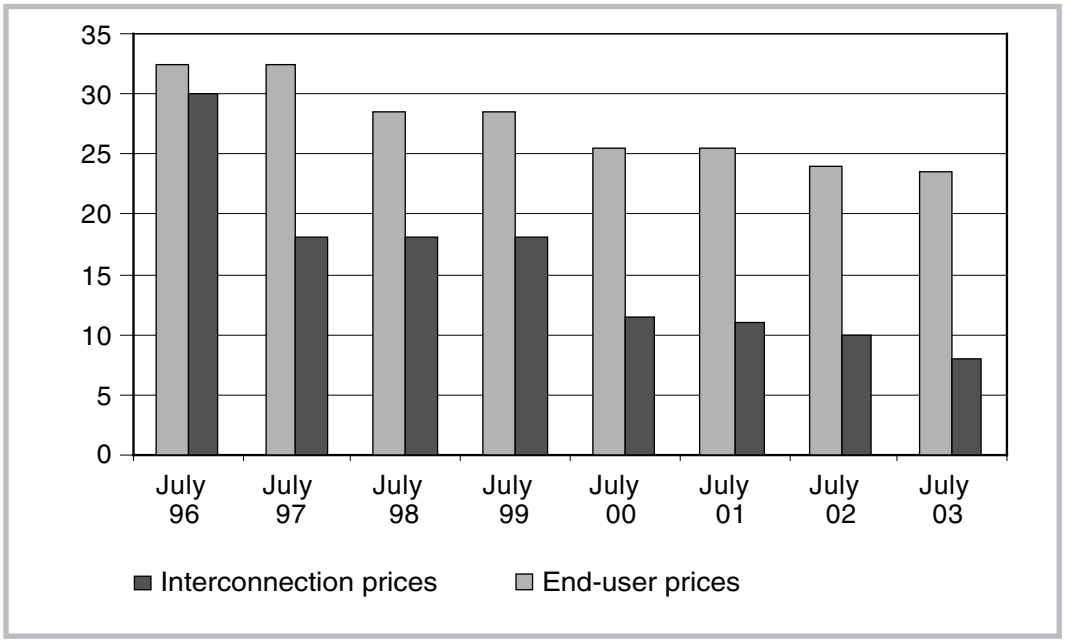
Note: Norway is not included in the EU implementation reports

Source: Ninth EU Implementation Report, Market Overview, 2003, p. 61.

lowing section of this chapter). For traffic prices there has been an increasing margin for the competitors since liberalisation in Denmark. End-user prices have decreased (as witnessed in, e.g., Table 7), however interconnection prices have decreased even faster (see Figure 5). Figure 5 shows end-user prices for local calls and interconnection charges for local access.

Interconnection charges for local access are important for service competition, and Figure 5 shows that there actually is a margin for the operators competing with TDC. At the beginning of liberalisation, the margin for local calls was too small and service competition was only feasible on international and long-distance national calls. However at present, the margin is also sufficiently large for service competition on local calls. With respect to the price for twisted pair ULL, which is important for access competition, the price in Denmark amounts to approximately two-thirds of the end-user PSTN subscription price, leaving very little room for operators competing with TDC. In the ADSL field, the margin is wider – with the ULL price amounting to approximately a quarter of ADSL end-user subscription prices. There are, however, additional expenses, e.g., for collocation for operators renting the 'raw copper' from TDC, making the margin for competition much narrower.

Figure 5 – **Competition margin, local traffic, 1996-2003**



Source: NITA.

Table 10 – **Market shares of TDC in 2001 and 2003 (first half year), in percentage**

	2001	2003 (first half)
Fixed-line subscription	89	85
Fixed-line national traffic (outgoing)	63	63
Fixed-line international traffic (outgoing)	50	54
Internet subscription (active within past six months)	57 (second half 2002)	61
ADSL subscription	74	82
Mobile subscription	42	35
Mobile national traffic (outgoing)	41	38
Mobile international traffic (outgoing)	44	51
SMS sent	29	19

Source: NITA.

8. Competition

Competition is strongest in the internet and mobile fields in Denmark, as in most other countries. The level of competition – illustrated by the market shares of the incumbent, TDC – is indicated in Table 10.

The overall picture provided by Table 10 is that the most significant strongholds of the incumbent TDC are in the areas connected with fixed-line subscription. This applies to fixed-line subscription itself and to internet subscription and ADSL subscription. In the mobile area, on the other hand, TDC has not had the same incumbent advantage as in the fixed line area. There are four operators in Denmark with frequency licenses in the GSM area and around sixteen additional service providers.

When looking at the infrastructure area, the picture is even bleaker – from a competition point of view. TDC holds 85% of all PSTN access lines, and their market share is only decreasing slowly. In the internet area, TDC was not the first mover and had to catch up. However, as figures in the table show, TDC has been able to acquire more than 60% of the active internet subscribers.[13] With respect to ADSL this development is even more pronounced. In the ADSL area, the market share of TDC has increased steeply. TDC was not the first operator to introduce ADSL but quickly followed the first movers, and since then the market share of TDC has increased – from 44% in October 2001 to 82% in mid 2003. It is obvious that in this field TDC has been able to leverage its dominance in the fixed line access area. Compared with other European countries, the market share of the incumbent in the ADSL area is high at present (see Table 11).

In other access areas, the Danish telecom market is generally in the more competitive end in a European comparison. However, as shown in Table 12, the level of competition varies in the different market segments.

Table 11 – **Market shares of incumbents in the DSL market, August 2003, 2001-03, in percentage**

Denmark	France	Germany	Netherlands	Sweden	UK	EU15
83	63	94	84	72	51	77

Source: Ninth EU Implementation Report, Market Overview, 2003, p. 54.

Table 12 – **Market shares of incumbents, 2003, percent**

	Denmark	France	Germany	Sweden	UK
Fixed voice, local, minutes*	na	75.6	92.0	na	72.9
Fixed voice. LD, minutes*	67.4	59.6	60.0	na	51.9
Fixed voice. International, minutes*	54.7	63.4	42.0	na	32.0
Direct access	86.0	99.6	97.0	99.2	81.0
GSM (leading operator)	35.4	48.7	41.1	45.4	46.6

* December 2002.

9. Financial Performance

The financial performance of the incumbent operator TDC has been good since the liberalisation of the telecom market in Denmark. In contrast, the operators competing with TDC have not been doing well financially (see Table 13). The Earnings Before Interests, Taxes, Depreciation and Amortisation (EBITDA) margin is around 30 for the whole telecom operator sector, but generally in minus when excluding TDC. The net result is mostly positive, however fluctuating, for the whole sector but around -25 without TDC. And the return on investment (ROI) is also positive (around 10) for the whole sector but negative (around -10) when excluding TDC. This illus-

Table 13 – **Financial information on the telecom sector in Denmark, 1996-2001**

	Whole sector			Excl. TDC		
	Net result*	EBITDA margin**	ROI***	Net result	EBITDA margin	ROI
1996	11	35	11	-26	-2	-2
1997	2	33	6	-18	6	-3
1998	12	31	12	-37	-15	-9
1999	7	30	10	-24	-7	-9
2000	23	30	17	-22	-2	-8
2001	-8	28	2	-27	-3	-10

* Result before tax, but after extraordinary expenses in % of turnover

** Surplus before tax, depreciations and financial expenses in % of turnover

*** Result before financial expenses in relation to total assets

Source: NITA: Telekonkurrenceredegørelse 2003 – bilagssamling, p. 36.

trates that TDC is a profitable operator – even very profitable in international comparisons (see Table 14) – but that most other operators in Denmark are having a hard time financially.

When compared with OECD countries generally, the telecom operator sector in Denmark is on the same level as in other countries. However, in excluding TDC, the telecom sector in Denmark is doing substantially worse than the OECD average. This shows that TDC is doing better in the Danish market than incumbents generally in their national markets in the OECD area and that alternative operators in Denmark are doing significantly worse than alternative operators in the OECD area generally.

Table 14 – **Financial information on the telecom sector in Denmark and the OECD area, 1999**

	Net result*	EBITDA margin**	ROI***
Whole telecom sector in Denmark	7	30	10
Whole telecom sector in OECD	8	33	7
Telecom sector excl. TDC in Denmark	-24	-7	-9
Telecom sector excl. incumbents in OECD	-1	24	2

* Result before tax, but after extraordinary expenses in % of turnover

** Surplus before tax, depreciations and financial expenses in % of turnover

*** Result before financial expenses in relation to total assets

Source: NITA: Telekonkurrenceredegørelse 2003 – bilagssamling, p. 37.

One of the possible explanations for this under-performance of the alternative operators in Denmark, according to NITA, are the high operational costs for these operators.[14] Table 16 shows that operational costs are higher in Denmark for alternative operators than in the OECD area generally. While operational costs in Denmark in 1999 amounted to 70% of total revenue for the whole telecom sector, operational costs for the Danish alternative operators were 107% of their revenue. The corresponding figures for all OECD countries were 67% for the whole sector and only 76% for non-incumbents.

A considerable share of operational costs goes to labour power (estimated to be around 21%); another important item is wholesale expenses (interconnection and infrastructure capacity, estimated to amount to 15%).[15] NITA argues that as interconnection charges and infrastructure capacity expenses are comparatively low in Denmark, costs of labour power are one of the important explanations for high operational costs in Denmark.[16] The argument of NITA is further that this emphasises the strategic nature of the engagement of foreign owned operators in Denmark.[17] Foreign operators have not primarily invested in Denmark because of the potentials for a

high return on investment but because of the strategic character of the market for different operators: Test market for Mobilix (later Orange) and 'home market' for Telia. In Table 16 the development of operational costs in the Danish telecom sector is shown.

Table 15 – **Comparison of results for Denmark and OECD countries, 1999**

	Whole telecom sector		Telecom sector excl. incumbents	
	Denmark	OECD	Denmark	OECD
Revenue	100	100	100	100
Operational costs	-70	-67	-107	-76
EBITDA	30	3	-7	24
Depreciations	-15	-17	-14	-16
Extraordinary items	0	1	0	-2
Financial items	1	-3	-5	-4
Results before tax	16	13	-26	4
Tax	-9	-6	2	-1
Results	7	8	-24	-1

Source: NITA: Telekonkurrenceredegørelse 2003 – bilagssamling, p. 39.

Table 16 – **Development in revenue, operational costs and EBITDA in Danish telecom sector, in billion DKK, 1996-2002**

	1996	1997	1998	1999	2000	2001	2002*
Revenue, whole sector	22.0	24.9	25.9	29.4	32.1	33.7	34.1
Operational costs, whole sector	14.3	-16.8	-18.0	-20.5	-22.3	-24.4	-25.3
EBITDA, whole sector	7.7	8.1	7.9	8.8	9.8	9.3	8.8
Revenue, excl. TDC	2.1	3.3	4.5	6.7	8.4	9.7	11.0
Operational costs, excl. TDC	-2.1	-3.1	-5.2	-7.2	-8.6	-10.0	-11.3
EBITDA, excl. TDC	0.0	0.2	-0.7	-0.5	-0.2	-0.3	-0.3

* Estimate for 2002

Source: NITA: Telekonkurrenceredegørelse 2003 – bilagssamling, p. 39.

10. Implications of Policy and Regulation

There are two main issues to be discussed in this concluding section. The first deals with how policies and regulation up to now have contributed to the relative success, which the telecom development in Denmark has witnessed, e.g. in the investment area. The other issue concerns the development of new policy directions in terms of, e.g., facilitation and demand orientation. However, first a summary of findings is presented.

- Total telecom investments in Demark increased from liberalisation in 1996 to 2001 by more than three times, but decreased considerably in 2002 – new operators invested and the incumbent also increased its investments. With the relatively early liberalisation in Denmark, the increase in investments started a little earlier than in most other comparable countries, illustrating that investors took the opportunity to try out the possibilities on the Danish market.

- The Danish telecom sector is for the most part owned by foreign companies and investors. There are a large number of operators, but there has lately been a consolidation and a decrease in the number of operators, and because of too little success in the Danish market, large operators like Telia and Orange have scaled down their operations in Denmark.

- The new operators have contributed greatly to innovation activities in the Danish market. However, the incumbent TDC has also made innovative advances, but TDC is often not the first mover especially in fields where new services substitute for products already offered by the incumbent.

- Diffusion of access technologies and services is generally high in Denmark. This applies in the fixed network areas and especially with respect to broadband access. In the mobile area, Denmark and the other Nordic countries do not any more have any obvious leadership positions and this also applies to new areas such as MMS, GPRS and getting started with 3G developments.

- Telecom prices are generally at the cheaper end in Denmark when compared with most other countries. This applies to end-user prices but especially to interconnection and ULL prices.

- Low interconnection and ULL prices facilitate competition, and competition in the Danish telecom market is generally stronger than in most other European countries. However, the absolutely most difficult part is to get competition in the fixed infrastructure access area. The incumbent TDC still dominates the fixed access market, which also has implications, for instance, for the ADSL area.

- Financially, TDC has been doing well since liberalisation, while most other operators have had great economic problems. This may constitute a problem for the further development of the telecom market in Denmark. Large operators have already scaled down their activities and may eventually have to give up.

The findings can be summed-up in terms of relative *success* until the present situation but there will be some critical *challenges* in the coming period. There are certainly many reasons for the success hitherto, among them a relatively high general wealth and favourable business climate; however, one should not overlook the early and consistent moves to liberalise the telecom sector – and not only that, but also a proactive regulation to promote competition by interventions in the market and to ensure better and cheaper services for the end-users.

The Danish telecom market was liberalised one and a half year before the EU deadline in 1998, but much more significant has been the close regulatory scrutiny of end-user prices and other consumer conditions and the conditions for interconnection. Local loops were unbundled in Denmark already in 1998 – two years before the EU Regulation in the field – which may be one of the reasons for the relatively high diffusion of ADSL. Concerning prices, a best practice policy has been used ensuring low prices in most fields. Since the beginning of 2003, LRAIC prices have had to be implemented, which in most cases leads to lower interconnect prices – even though the ULL price for twisted pairs will increase.

In a thought provoking comment on Denmark's progress in telecom reform and information infrastructure development, William Melody – comparing Denmark with primarily the UK – writes:

> Denmark's performance ranks much higher on prices and market development than it does in the development of actual competition. When viewed in the context of Denmark's leadership in minimising barriers to entry, its high ranking on interconnect prices and its leadership position in unbundling access to the local loop, this could indicate that Denmark's good performance is being driven more by the regulator than by competition (Melody 2002: 15).

It is, indeed, difficult to separate the implications of competition and regulation on the levels of performance, because competition is also to a large extent the result of regulatory intervention (as illustrated in Figure 1 above). However, regulatory intervention has been a crucial generator in the development of the telecom market in Denmark.

In the coming years, NITA will put more emphasis on facilitating IT and telecom developments in Demark – as opposed to a mere watchdog type of regulation. This is not only to counter the problems that the set-back in the telecom sector created but more importantly is the result of broader and longer-term policy and regulatory developments for the sector. However, a policy and regulatory approach encompassing facilitation may (at least) be part of the answer to the present crisis in the telecom sector.

Currently, the Danish government's information technology and telecom policies aim to ensure:

- an available, effective, secure and inexpensive digital infrastructure for citizens, businesses and the public sector;

- competition, consumer protection and efficient management of scarce resources in the telecom area;
- an innovative and coordinated implementation of government IT initiatives and other IT projects where the ministry participates in a partnership;
- optimal framework conditions for a digital reform of the public sector;
- and optimal and secure use of IT and other technologies among citizens and businesses.[18]

In all these areas, NITA has responsibilities, broadening the scope of traditional telecom regulation. In a description of the development of regulatory approaches in the telecom area – on basis of discussions in the International Discussion Forum set up by NITA (2003c) – NITA presents a development from an emphasis on tariffs, towards interconnection and further on to broadband and finally towards an emphasis on demand. Among the different policy options (governance via ownership, support for supply, support for demand, and framework regulation), the aim of the present policy prioritisation is to put more emphasis on the demand side. The idea is to facilitate the development on the demand side, first and foremost, in order to achieve improvements for the users. However, indirectly demand facilitation will also constitute the basis for the development of the IT and telecom services producing sectors themselves.

In the 2003 performance contract between the Ministry of Science, Technology and Innovation and NITA,[19] it is stated that in addition to securing competition in the telecom sector, which contributes to a sufficiently advanced and extended telecom infrastructure constituting a precondition for the development of a knowledge society, there are other important assignments for NITA:

- ensuring consumer protection;
- promoting IT security;
- production of information on the public sector;
- stimulation of useful content on the net;
- efficient public communication;
- use of ICT in the public sector; and
- other initiatives to promote the IT and telecom policy plans of the government.

Some of these assignments clearly have their origin in the former public information service bureau (Statens Information), which was merged with the telecom agency in April 2002 to form the present NITA, National IT and Telecom Agency. This applies

to 'production of information on the public sector', 'stimulation of useful content on the net', and 'efficient public communication'. But in addition to the more traditional telecom agency assignments of promoting competition and 'ensuring consumer protection', there are also assignments, which transcend a narrow conception of the role of regulatory agencies, namely 'promoting IT security' and 'use of ICT in the public sector' and, to some extent, also the residual point 'initiatives to promote the IT and telecom plans of the government', which, however, all along has been on the agenda of the Danish telecom agency.

An important area of work for NITA, furthermore, is to facilitate negotiations between market players and public authorities (self-regulation and co-regulation). For a number of years, there have been forums on interconnection and on frequency management, established by the telecom agency, and recently a new TeleForum with a broader scope has been initiated to facilitate negotiations between the regulatory authorities and the operators and between the operators themselves. In line with the initiatives to promote ICT use and to create an open access to information on, e.g. interconnection agreements and end-user prices and the quality of services in the ISP area, these facilitation measures constitute the framework for a new and increasingly proactive role for the regulatory authority. Facilitation and demand orientation are the goals to be developed in the coming years for the IT and telecom regulatory authority.

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[1] This paper is written specifically for the 2003 WDR theme on investment. During the past years, William H. Melody has prepared status reports of Denmark's progress in telecom reform and information infrastructure development for the Danish National IT and Telecom Agency (NITA). Compared with the present paper, the status reports have a broader scope and a greater emphasis on comparisons with other countries. For more details on the Danish telecom development, please refer to the latest status reports <www.lirne.net>.

[2] A significant part of the information in the paper is found in publications and other material from NITA. Lately, a competition survey (Telekonkurrenceredegørelse, May 2003) has been published including information on areas not formerly covered by performance and competition surveys, e.g. financial performance and innovation developments.

[3] Developments in the Danish telecom operation markets are described in, e.g., Anders Henten and Thomas Wulff (1996: 669-684) and in ITU (2002).

[4] Forskningsministeriet: 'Bedst og billigst gennem reel konkurrence', 1995.

[5] See, for instance, presentation by managing director of NITA, Jørgen Abild Andersen: 'Et velfungerende telemarked i Danmark – Telecom 2003, 9 April 2003 (http://www.itst.dk).

[6] Information from TDC.

[7] NITA expresses such an expectation in their newly published competition report, 'Telekonkurrenceredegørelse 2003 – bilagssamling' (May 2003: 31).

[8] There is speculation that Orange will give up, even though this is rejected by Orange, see, e.g., Yahoo Nyheder, 24 February 2003, <dk.news.yahoo.com>. Telenor's take over of BellSouth's share in Sonofon has also contributed to the speculations that Sonofon will make a strategic move to acquire Orange in Denmark when the time is right.

[9] See NITA: Telekonkurrenceredegørelse 2003 – bilagssamling, p. 31.

[10] Information from NITA.

[11] NITA: 'Telestatistik – 2. halvår 2002' page 5; and 'Tele Yearbook, Denmark 2002: 8.

[12] Source: NITA.

[13] The TDC Internet subscription market share is significantly lower when counting all Internet subscribers – also the ones not active with the past six months.

[14] NITA: Telekonkurrenceredegørelse – bilagssamling, p. 39.

[15] Figures are from 'Telekonkurrenceredegørelse 2003 – bilagssamling' p. 39.

[16] Ibid. p. 39.

[17] Ibid. p. 42.

[18] NITA: 'About National IT and Telecom Agency', http://www.itst.dk

[19] Resultataftale 2003, 13 September 2003.

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16. Conclusion

The research studies on the WDR theme, *Stimulating Investment in Network Development: Roles for Regulators,* have provided ample evidence of the need to prioritise network investment considerations in the work of telecom regulators. For the most part, this has not been a high priority. Telecom regulation around the world has given priority to distributional considerations of equity and low prices for consumers rather than production considerations of investment in network expansion. In the developed countries that have already achieved a near universal service, this may be appropriate. But for developing countries with most people unserved and long waiting lists, regulation has facilitated the continuation of equity among the unserved, i.e., the vast majority of the population with no service at all, by maintaining prices below cost for the privileged few who are served that fail to provide the funds for, or justify investment in network development. In applying the blueprint model of a good regulatory structure strongly recommended by the leading developed countries, most developing country applications have not made the necessary adaptations to reflect their very different circumstances and priorities. As a result regulation, or more precisely the policy and regulatory structures, have tended to increase rather than decrease investment risk in network development. The WDR research and dialogue on this issue provides convincing evidence that for developing countries, regulation must place its highest priority on stimulating investment in network development.

The framework for analysis of this issue, outlined in Chapter 2, identified the problem of regulation being viewed by investors as a cause of increased investment risk, when in principle it should serve to reduce risk. Five key areas were highlighted for assessing regulatory risk. The research reported here, and particularly the case studies, show how circumstances in different countries are affecting views of regulatory risk by market players and potential investors. The first is the degree of regulatory independence from capricious interference from politicians and/or a dominant incumbent operator. The case studies demonstrate that none of the developing countries have the degree of independence that Denmark takes for granted. But Denmark and most other developed countries have had a telecom regulator for 15 years or longer, developing countries much less, typically for only a few years. Experience in the developed countries demonstrates that in reality, independence can only be made a possibility by legislation. It cannot be immediately created. Independence is earned over time by the actions of the regulator and the reactions of the government, the incumbent and the courts. Only as all parties come to understand and trust the new structure does

regulation acquire the independence that investors equate with assurance of objective decisions based on facts and evidence. Most developing countries are understandably still in the learning period and will be for the immediate future.

The second area for regulatory risk is clarity of the policy directions that the regulator is supposed to implement, and of the discretion on technical and specialised matters delegated to the regulator. This is associated with the respect accorded by the Minister and government department for the regulatory delegations specified in the policy and legislation. If the regulator is treated simply as a low level administrator with no real responsibility or discretion, the real regulation is effected by the Ministry and Department, and subject to politicisation of key decisions affecting investment opportunities – in most cases political protection of the incumbent's interest. If there is certainty on the roles and powers of the regulator in law and in practice, then investment risk is reduced. The case studies have illustrated that in all the developing countries, investment risk was increased by arbitrary and unexplained usurpation of regulatory decisions by ministers or government departments. When Sri Lanka had a period of demonstrable regulatory independence, investment risk declined and investment in network development increased significantly not only by new entrants but by the incumbent as well.

The third area for regulatory risk is the regulatory process. Is it transparent, expeditious, efficient and accountable? Are the steps to decisions clear, necessary and applied objectively to facilitate effective decision-making by investors and others? The case studies have provided illustrations in which regulatory processes in some countries posed a major barrier to entry, raising investment risk substantially – in several cases to the point where investors have walked away. Comparing this experience to that of Denmark, where license filings are not even necessary to enter the market, suggests that investment risks in these developing countries can be reduced by an order of magnitude when the regulatory processes matures. But for most developing counties there is still a long way to progress along the learning curve.

The application of substantive regulatory standards is the fourth area of regulatory risk. These include matters such as measuring regulated rates of return on investment, applying price cap formulae, developing cost standards for interconnection, access and basic consumer service price determinations, assessing quality of service, applying spectrum rules, etc. A high degree of technical competence is needed in all areas if a regulatory agency is to function well, and this is especially important in applying the substantive standards for regulation. The uninformed application of substantive standards – expressed most dramatically by an operator as regulation by photocopy of standards being applied in some developed country – raises fears of capricious regulation which raises investment risks. The case studies provide evidence of this problem, and our broader research reinforces the fact that both technical and strategic competence is a major problem in nearly all developing countries. The shortage of investment in human capital is as severe as the shortage of investment in network development.

The final area of regulatory risk relates to the attention paid to demand as well as supply conditions in analysing sector issues and justifying regulatory decisions. For example, a far too common experience of regulation in developing (and some developed) countries is licensing processes focused entirely upon either protecting the incumbent's interests or maximising revenue to the government as a license fee. These objectives ignore the investment requirements necessary to achieve network development that will eliminate waiting lists, develop universal access, or stimulate the rollout of new services. They all but ignore the demand conditions that the policy directives and regulations are supposed to be attempting to satisfy. A regulatory process that gives priority to serving consumer demand will tend to reduce investment risk. One that focuses only on supply conditions that will provide short-term gain to the government and/or protection of the incumbent operator will tend to increase investment risk. The case studies have provided examples of both, but primarily of the latter.

The case study of Somaliland raises a number of interesting questions with respect to the impact of regulation, or at least the legislative/policy/regulatory process, on investment risk. Despite the lack of operational telecom laws or regulations, and having no interconnection among operators, Somaliland has had significant investment in network development, has several competitors, relatively low prices and has achieved a higher penetration rate than many developing countries. Clearly the market investment risk in Somaliland is far higher than it need be. Yet it would seem it is demonstrably lower than it is in some countries that have legislation and regulation – including Bangladesh in this report. The market chaos in Somaliland raises market risk, but the operators are not subject to the regulatory risks that can arise from political interference and an incumbent's monopoly power.

The conditions in Somaliland are not likely to extend networks to provide anything near universal access, and do not provide an example to be deliberately emulated. But they do demonstrate that a poorly designed and implemented policy/regulatory structure can raise investment risks dramatically and even block investment. As their regulatory processes mature, developing countries must recognise this and take the necessary steps to turn regulation from a cause of increased investment risk to one of decreased risk.

The chapters examining fundamental issues puncture some myths about the forces that are likely to drive network development in developing countries, and point the way to a more realistic assessment of some of the opportunities. In the early stages of telecom reform in the developed countries, a common refrain was that the three most important issues for telecom regulators are interconnection, interconnection and interconnection. Morten Falch's chapter suggests that for most developing countries, this still applies. A cost-based reference interconnection offer (RIO) by incumbent operators will reduce investment risk significantly, and leading regulators will move in this direction.

Amy Mahan demonstrates that prepaid mobile is not the panacea often claimed for providing universal access, especially for internet services. The explosion of demand for prepaid

mobile services among the poor was foreseen neither by operators nor policymakers and regulators. It grew from the imaginative application of mobile by poor people (especially in rural areas) to basic needs that permit free receipt of calls and shared use of phones for urgent calls within a controllable budget constraint. This is a minimal service for budget-managed urgent communication, not the upgraded, up-market services of the internet. Robin Mansell shows that the hyperbole about how electronic commerce is going to drive economic growth and network development in developing countries fails to consider a host of other factors that are essential for e-commerce to provide significant benefits, including policy and regulation that facilitates greater participation in services development and implementation in the developing countries.

Bruce Girard brings into the network development picture the special case of synergy between internet and radio in providing access to rudimentary communication and information services for poor people who under present circumstances have no hope of obtaining conventional telecom services. Unfortunately telecom policy and regulation, and incumbent operators, have not supported such pioneering applications that focus beyond the end of the formal telecom network, and often have provided formidable barriers and prohibitions. Clearly if universal access is to be a serious goal of policy and regulation, internet and radio, as well as other forms of multimedia experimentation at the frontier of network development will have to be facilitated, supported and considered to be an important part of achieving at least a rudimentary level of universal access for all.

The availability of reliable indicators and benchmarks is important for judging investment opportunities anywhere. One of the factors that raises investment risk in developing countries is a deficiency of indicators in comparison to developed countries. This is especially true with respect to the telecom sector, and to the performance of the regulatory process. Amy Mahan's benchmarking of African national regulatory authority (NRA) websites as vehicles for demonstrating transparency, information, efficiency and accountability has already had a positive impact, as it has stimulated many African NRAs to improve both their websites and the practices being reported.

Rohan Samarajiva has developed a methodology for assessing the telecom regulatory environment (TRE) across five dimensions of regulatory risk, which has been trialed in several other country case studies as well. Although the TRE indicator will need more testing and refinement, it too will focus the attention of regulators and policymakers on the issue of regulatory risk, provide useful information for investors, and facilitate steps for improvement. It is particularly important to emphasise that this indicator assesses the regulatory environment and not just stand alone regulation. Frequently the causal factors for inadequate regulation are found in the Minister's office, the Department or the incumbent. In most of the case studies examined here, regulators have been hamstrung by the fact that they do not have sufficient power and independence to regulate effectively, with the result that often well considered regulatory decisions simply do not get implemented because of the interference of and vested political and economic interests.

The research reported here on the WDR theme, *Stimulating Investment in Network Development: Roles for Regulators*, has demonstrated that network development requires an even broader focus if anything resembling universal access in an internet environment is to be achieved. Participation by all possible contributing parties and interests will not just have to be accommodated, but facilitated and supported. Thus the WDR theme for dialogue and research for the third cycle beginning in 2005 is, *Diversifying Participation in Network Development.* Regulators and policymakers will need to play an important role in this process. This requires much more than licensing a few competitors to incumbent operators. Rather it involves facilitating participation from both the public and private sectors at local, regional, national and international levels, both in supplying services, organising the demand for services, and applying services in many different ways.

This is especially important for the very poor. The case studies of prepaid mobile and internet and radio provide important illustrations of network extensions achieved outside the bounds of official universal access policies and practices. They provide good examples showing network extensions driven by the poor making private markets work for them (prepaid), and local public initiatives responding to the needs and interests of the local poor. Randy Spence's epilogue introduces a new IDRC initiative to support experimentation to learn more about the potential of fostering Pro-Poor Pro-Market opportunities through policy and regulation, i.e., to see if the experience of prepaid mobile can be scalable not only geographically, but also to other services and applications.

This will be an important part of the next WDR research and dialogue cycle. Other parts of the programme will focus specifically on public sector driven initiatives and public-private partnerships, especially at the local level. An important issue to be tested in this research and dialogue is the extent to which policy and regulation is a barrier to, or supportive of such developments. One early test will be the policy/regulatory response to voice over internet protocol (VoIP) as its opportunities become increasingly possible in developing countries. If it is seen more as a unique opportunity to facilitate network development than a threat to vested interests, then one can conclude progress is being made in turning regulation into a major positive force for network development. This will be assessed as part of the next WDR research and dialogue cycle.

Epilogue

Pro-poor, Pro-market ICT Policy and Regulation: Global Initiative, Scaling Up

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In September 2003, a group of experts in the use of ICTs for poverty reduction met at Harvard, including Nobel laureates in economics and specialists in gender, social and economic development and ICTs.[1] They agreed upon both the necessity and the urgency of rapidly extending ICT connectivity, especially to poor populations and for pro-poor services; and upon three principal priorities:

- ICT sector policy and regulatory reform for many developing countries, with focus on cost reduction, diffusion and access via firms, governments and social entrepreneurs, and incorporating pro-poor mechanism to get networks built out and used in poor areas;
- investments in interventions that bring connectivity, services and content to the poor, including:
  - support for social entrepreneurs and their initiatives;
  - appropriate telecentres and community multimedia centres (CMCs);
  - improving pro-poor public services using e-government applications; and
  - public investment and incentives for useable and affordable technologies for the poor;
- ICT alliances with coalitions which are advancing – in particular – gender equality, education, health and democracy.

The global initiative described here builds primarily upon the first two of these three priorities. Since the early 1990s there has been major investment by domestic institutions and donors in the second area, notably supporting social entrepreneurs, CMCs and e-government services. There is more than ample evidence that ICTs, together with the enormous networking they enable, are having major impacts on all aspects of economic, social and political activity including economic growth, social and political development, and poverty reduction.[2] Areas of particular impact include:

- direct uses by poor people and poor communities, notably improving opportunities for employment and incomes, general education, health and health education;
- better and more pro-poor design and delivery of social services, especially for education and health, but also for social safety nets and economic services (water, roads etc); and
- political/social/gender empowerment and government accountability.

In the longer-term, the importance of ICTs for growth and poverty reduction have been described in terms of "dramatically reducing transactions costs, creating new markets, expanding the boundaries of others, driving productivity growth, integrating global markets and supply chains, increasing the value of intangible assets like human capital by making them more accessible, changing relative prices and growth dynamics in the global economy, and putting pressure on multinational governance and domestic governments."[3] One could also add a) dramatically reducing transactions costs and driving productivity growth in social and political activity, and enabling improved governance; and b) providing the platform for the rollout and governance of the next (huge) technology waves – bio, nano, cognitive and combinations.

It is important that the 'divide' question not only be understood in terms of the rich getting relatively richer, but also of the poor getting absolutely poorer as the economies they live in become less and less competitive. Thus ICTs for development and poverty reduction is not just about improving the lot of the poor, but is also concerned with heading-off a large impending decline in the lot of many of the world's poor.

In the interim, much of the investment in pro-poor interventions is on shaky ground because of high ICT access costs, and the consequent risk of failure when public or donor funds are discontinued. The problem is intensified by rapidly changing technology. The answer to the challenge of 'scaling up' is not only to construct more CMCs and other pro-poor interventions, but also to get ICT policy and regulatory frameworks right and to substantially lower ICT costs. Our experience is that proficient ICT policy and regulation is a *necessary condition* for sustained success in the use of ICTs for poverty reduction. Sometimes, it is an almost sufficient condition.

The case of Somaliland also underlines the difference between wireless/mobile and fixed-line/internet technologies. In most of the developing world, notably Africa, mobile use is expanding rapidly. This reflects pent-up demand for voice communication

for a large range of purposes, regulations which allow for enough mobile operators to create competition, and in the case of poor and credit-less users, availability of texting and prepaid cards. However, much of the economic potential of ICTs, including creation and expansion of markets/transactions, comes from the knowledge and networking capabilities associated with use of the internet.

Somaliland*

Formerly part of Somalia, Somaliland declared its independence in 1991. It has no ICT regulatory agency. Although ICT penetration is low, there is considerable use of mobile phones, including by poor people. Local telephone calls are free of charge if they connect users subscribing to the same company, and as noted in a recent case study, "The rates for international mobile calls are internationally among the lowest and this may be seen as a combined result of real 'competition'; low economic development and no public intervention..

A significant problem, however, is the lack of interconnection between providers, resulting in users needing four or five phones to be able to call anyone. This could be solved by light regulation, requiring interconnection and adding slightly to the cost of calls.

*Knud Eric Skouby and Reza Tadayoni, *Case Study on Somaliland, in the Framework of the WDR Project* (this volume).

Unlike mobile use, fixed line and internet expansion has stalled in Africa and elsewhere, largely due to policy and regulatory failures, many of which arise from bad policy or lack of policy support. Affordable wireless broadband connectivity may be the answer, but it is still some years away in terms of technology development, and will run into the same resistance from incumbent vested interests as it attempts to play a more significant role. In the interim, there are important economic applications of wireless mobiles and handheld personal digital assistants (PDAs), including for example the use of PDAs by farmers for direct marketing, thus increasing their margins and reducing uncertainty and volatility. Mobile service provision can also be of major benefit to poor people, the well-known Grameen phone ladies being a prominent example. In the words of Grameen's President, Muhammad Yunus:

> The quickest way to get out of poverty right now is to have one mobile telephone… These telephones are internet enabled telephones, and unfortunately we have not developed the content of the internet yet so that service remains unutilised, but the moment content is developed and people find service of it, I'm sure these 30,000 telephone ladies will become Internet ladies in no time.[4]

The same phenomenon is being repeated in most countries, in different ways. Men and women who sell mobile and PDA services on village street corners, like the Grameen telephone ladies, are effectively tiny affordable telecentres, and are an increasingly important part of the market response to ICT use for development and poverty reduction. 'Cells on wheels,[5] and many other approaches, offer market solutions to connectivity and services for more remote and poor users. Wireless, increasingly-broadband mobiles, PDAs, servers and technologies look likely to supply a large share of growing markets and public services uses in communities, schools, health facilities, etc.,[6] *if* policy and regulation continues to lower costs. Sustainable models for CMCs are also emerging, for example, the 'village knowledge centre' approach of the M.S. Swaminathan Research Foundation, intensive in initial service provision, but comprehensive in integrating ICT use in village and rural development.

Most observers agree that the rapid expansion of fixed-line internet and broadband connectivity remains crucial to ICT use for poverty reduction. More rapid internet diffusion needs public investment – as in the North – but there is not enough (via governments, donors) to bring ICTs to the next 1.5 billion poor people, and available funds must be used optimally. This means good regulation, rolling-out platforms and lowering costs for market activity (for-profit and not-for-profit), as well as public investments. Good regulation relies upon sufficient capacity and the independence of regulators.

In contrast, governments often protect telecom incumbents because they are important sources of government revenue or, worse, are cash cows for powerful vested interests. In other cases, regulators are simply weak – institutionally, politically, and financially – and governments are often incapable or unwilling to provide adequate regulatory tools to the regulatory agency. The frequent 'bear-like embrace' between policymaker, regulator and incumbent has huge costs for both the economy and society. Large vertically integrated incumbents are obsolete; the issue is by which path and timeframe they will become something else. (Typically they become strong market participants, given initial advantages.)

For every case in which progressive liberalisation has been substantial, however, in spite of strenuous objections, the incumbent telecom provider has in fact gained both revenue and profits. The size and speed of market expansion is often greatly underestimated. Although ICT policy and regulatory reform is typically sensitive politically, all experience points to the fact that 'everyone wins.'[7]

There is much technical detail and expertise involved in progressive ICT regulation, but when boiled right down, for extending wireless, fixed line and internet access, the following elements are key:

- competition – typically requiring more than one (three or four) telecom operators (duopoly can be worse than monopoly), and effective performance on core tasks:
- market entry;

- allocation of scarce resources (spectrum);
- cost based interconnection;
- tariffs; and
- regulation of anti-competitive behaviour.

In addition, there are several mechanisms and approaches to making policy and regulatory regimes pro-poor, or aimed at universal service, in addition to the essential element of reducing access costs, including:

- removal of regulatory restrictions on a variety of forms of participation in network and service development, or even better, rapid and flexible licensing and promotion of technologies important for poverty aims including: resale of mobile minutes, VoIP, radio bands for community radio, low cost internet appliances (thin clients, mobile phones and handhelds, wireless (local loop / WiFi / WiMax and mesh networks), geo satellites and new low cost VSAT systems, data broadcasting, hybrid systems and mixed technologies, using power grid infrastructure, user financed infrastructure;
- competitive (lowest-cost) transparent, market-based subsidies to suppliers to build networks in the least serviced areas (e.g. least cost subsidy auctions in Chile, Nepal, South Africa, Uganda);
- demand side subsidies directed to consumers rather than suppliers to address the problem of effective demand in the context of low purchasing power (e.g. voucher systems, commitments to public and private users to buy minimum service levels); and
- asymmetric pricing to correct typical pricing distortions favouring higher income users at the expense of poorer (rural) users.

The evidence from telecom network development throughout the world, in both developed and developing countries, documents overwhelming that pro-market can be pro-poor. For the poorest populations, prepaid mobile and resale of minutes are extending connectivity to the very, very poor for their few essential calls. The market opportunities here are just beginning to be explored and developed in the particular market environments of developing countries and poorest populations. User demand covers a wide spectrum of livelihood and remittances, health, cultural and political activities and, as in the North, many uses are not easily predictable.

But this is no reason to stop public and other donor funded initiatives. Market opportunities alone are not going to provide everyone with universal access. Even in the most developed countries, universal access has been achieved only due to a combination of public and private initiatives. Public initiatives have supplemented market devel-

opment, representing some 5-20% of universal access investment. Developing countries have suffered from a distinct scarcity of opportunities for market initiatives, and have been hindered by policies and regulations preventing them. Regulatory attention to facilitating market developments makes a lot of subsidies unnecessary, and markets can clearly be used to make subsidies more efficient and effective.

Thus, *regulation is typically the problem rather than the solution to expanded access*, and regulatory reform is a necessary condition for the success of all ICT for development and ICT for poverty reduction investments and initiatives.

> If one looks at Africa the costs of access to ICTs will simply mean that there will never be ICT diffusion as it currently is. There is certainly a clearness that privatization on is own has not been a successful strategy… the lack of effective regulation, to give an extended private monopoly, has actually done many of our countries a great disservice.[8]

There has been much research on regulatory reform, and there is thus a good base to build upon. There are few centres of excellence on progressive ICT regulation in developing countries, one being the LINK Centre at the University of Witwatersrand, South Africa.[9] Connected with regulators and ICT associations in Southern Africa, including via Research ICT Africa! (RIA!),[10] LINK provides courses, projects and partnerships – with links also to European Community and Danish support for LIRNE.NET, a rich source of knowledge, communication, dialogue and collaboration on ICT regulation and policy.[11]

From the outset, LIRNE.NET has functioned on a global networking basis, and organises the World Dialogue on Regulation (WDR) which provides opportunities for online discussions and dissemination of resources, as well as expert meetings and annual summits – with support from IDRC, the World Bank (*info*Dev) and the supporting universities and research centres.[12] The experience of the network underlines the importance of local capacity development and advocacy, on a continuous basis. It also underlines the need for scaling-up and strategic approaches to advocacy, as efforts continue to confront substantial obstacles to realising reforms in many countries.

The Southern Africa network provides an excellent model, and parallel initiatives have been initiated in Asia and Latin America and the Caribbean. LIRNE*asia* was launched in October 2004, with its network node in Colombo, and network of regulators, policymakers, researchers and civil society advocates from South Asia and much of East Asia.[13] A Latin American planning meeting was held in early November 2004 in Montevideo. These regional initiatives and networks are training regulators, exerting influence on policy through evidence and dialogue, and supporting civil society engagement. What distinguishes these initiatives from previous ones, e.g. of the World Bank and ITU, is that they:

- are not intergovernmental;
- focus on local research and advocacy;

- aim at long-term local capacity building and the development of regional research networks;
- develop South-South and South-North networking and dialogue;
- are politically reformist in nature, and postulate large areas of win-win territory, based on the experience of developed and developing countries; and
- include microeconomic (community, household) assessment of the impacts, benefits and costs of policy/regulatory reform and ICT diffusion.

These initiatives are proving effective, by the account of regulators and others. This reflects the fact that regulators do not like to be compared unfavourably with their neighbours, and that they prefer analysis, advice and support from local or regional rather than international sources.

We believe that it is time to move beyond the pilot stage of the past decade and scale-up the extension of ICT access particularly to poorer communities. In most poor countries, policy and regulatory reform is a necessary and dynamic step. IDRC and partners are supporting the building of a global coalition working for progressive ICT policy and regulation. This includes global extension of LIRNE.NET and the World Dialogue on Regulation, and strengthening the regional networks and country capacities in Africa, Asia and Latin America and the Caribbean. Highly experienced and motivated champions and colleagues are engaged, including:

- LINK Centre, LIRNE.NET and WDR heads – Alison Gillwald, William H. Melody and Rohan Samarajiva;
- Nobel economist and ICT sector veteran Michael Spence, and ICT social entrepreneurs including Muhammad Yunus, M. S. Swaminathan, Onno Purbo, Frederick Tusubira;
- Harvard Forum partners including Noeleen Heyzer, Executive Director of UNIFEM; Amartya Sen; and Tadao Takahashi, President, Sociedade da Informaçäo, Brazil;
- partners in organisations including DANIDA, the World Bank (*info*Dev), OECD, EBRD, Industry Canada, and Commonwealth Telecommunications Organisation; and
- many research, advocacy and capacity development partners in all regions.

The experience of LINK, RIA!, LIRNE.NET and WDR indicates that in approximate terms, USD 1 million is needed per year in each region, and an additional USD 1 million globally, to:

- assemble and distil existing knowledge on the nature and challenges of achieving progressive ICT policy and regulatory regimes;

- support coalition building and high-level advocacy for progressive ICT governance reform;

- assist in the development of global networking and debate, specifically LIRNE.Net and the World Dialogue on Regulation;

- assist in the development of regional networks, and their main initial nodes, in Africa (LINK Centre), Asia and Latin America and the Caribbean, including:

  - applied and policy-oriented research – case studies, issue studies, political-economy assessments, etc;

  - capacity development activities aimed at researchers, regulators, policy-makers, and other stakeholders;

- stimulate macro and micro-economic assessments of the impact, benefits and costs of policy/regulatory reform and ICT diffusion in households and communities; and

- enable the country institutions and regional network nodes to become integrated sustainably into financing by domestic institutions.

In all, substantial resources are needed for a demonstrable positive impact on the constructive role that informed policy and regulation can make in stimulating and directing development. IDRC and current partners have made major commitments and seek additional partners to support a global *Pro-Poor, Pro-Market ICT Policy and Regulation* coalition and programme over the next ten years. We are increasing our own activity, accelerating our coalition building, and aiming to be well advanced in all regions by the second World Summit on the Information Society in November 2005.

Our strong support for ICT policy and regulation derives in large part from viewing this as a necessary condition for ongoing success in realising the potential of ICTs in poverty reduction. It is important to build pro-poor ICT services, even on shaky and high cost platforms, but it is also necessary for ongoing success and sustainability to achieve and maintain well-functioning platforms, including their pro-poor elements. It is also clear that getting the next round of technologies 'right' – bio, nano and combinations – in the sense of developmental and pro-poor impacts, will rely heavily on the ICT platforms being ubiquitously available.[14]

Excerpts: A Dialogue on ICTs and Poverty: The Harvard Forum

In September 2003, Canada's International Development Research Centre (IDRC) invited 30 people from around the world to discuss information and communication technologies and poverty reduction. The meeting took place on the Harvard University campus in Cambridge Massachusetts. Participants included members of the Harvard faculty, educators, academics, and engineers from developing countries, and Nobel prize winning economists. Their objectives were to:

- discuss the connections between diffusion of ICTs, and poverty, in developing countries of different kinds;
- consider ways which ICT policies, management and investments can be more effective for poverty reduction;
- consider priority areas for action and research, for increasing the contribution of ICTs to poverty reduction.

A summary video, interviews with participants, and an extensive background survey of ICTs for Poverty Reduction is available on the IDRC website,[15] highlights include:

On the urgency of ICT access for poverty reduction

Lincoln Chen: There is a seismic change that is taking place.

Amartya Sen: The availability and the use of this technology is no longer optional.

Noeleen Heyzer: Information technology can become a tool of either decreasing the inequalities that already exist in the world or increasing it.

Carlota Perez: We have to rethink everything from scratch.

Alison Gillwald: We cannot fiddle around the edges any longer. We need some sort of dramatic solution, some quantum leap.

Keith Bezanson: Can we wait? The answer is clearly no.

F. F. Tusubira: The mobile phone was for a very long time in the West seen as a tool for the rich. In our countries it is a day-to-day instrument of survival, even among the poorest communities.

Amartya Sen: If you agree with the view that the opportunity is just enormous – but we have to see how the opportunities are divided and how rather than reinforcing inequality across class, gender, and regional barriers, it has the effect of reducing these gaps and indeed make the least well off people benefit most – you have to do something about it.

Michael Spence: Remember, you have the cost reductions driving forces in the technology working all the time in your favour. So things that look very expensive now to implement on a large scale may not look so daunting later one. On this platform, and this is a steady historical process, the number of buyers and sellers who can find each other without reference to the transaction costs associated with region and so on, is much, much larger and so the markets are larger, the boundaries move out, the liquidity in the markets gets greater, and at some level, this is the platform on which the idea of a kind of global economy actually turns into a reality.

On the importance of ICT policy and regulatory reform

Onno Purbo: Liberalisation of regulation is the major barrier right now in Indonesia. We basically steal the frequencies… liberating is what I mean. Education of the society can be done self-financially, they can do the education using their own money, but liberalisation of the regulation is the major barrier.

Michael Spence: It is clear that the proper regulation of telecommunications is absolutely critical. You can have all the infrastructure you want, but I think we probably could all walk out the room saying, that if that problem in a particular country can't be fixed then something is broken that is critical and it's very hard to see how you can get to the rest of the benefits.

Alison Gillwald: If one looks at Africa, the costs of access to ICTs will simply mean that there will never be ICT diffusion as it currently is. There is certainly a clearness that privatisation on is own has not been a successful strategy … the lack of effective regulation, to give an extended private monopoly, has actually done many of our countries a great disservice.

Jim Moore: ICT technologies have become fundamental infrastructure for doing business in this new economy. For example, undersea fibre connections for each country are the equivalent of deep-water ports. And so you wouldn't have a lot of argument over whether a country should have deep-water ports for shipping goods... it's become so fundamental we don't even have a category for it.

On social entrepreneurs - services and content for the poor

Muhammad Yunus: The quickest way to get out of poverty right now is to have one mobile telephone, and you will see how quickly she is changing her life. Come back in two years and you will not recognise what she was before.

Onno Purbo: It is a movement. The whole society moves towards the knowledge-based society without any funding from the government, without any funding from the World Bank, without funding from IMF… what I'm hoping I can see is that 200 million Indonesians can survive using their own minds. Not survive using their muscles, not depending on their muscles. Using their minds. That's the success criteria I am using.

F. F. Tusubira: A common mistake is that we think it is the ICT that is the objective. Once you look beyond that, we find that real benefits can now grow and very fast too… I don't know if I can quantify that fully. But if you take simple things like people establishing the prices of their food products around the country, which they can do nowadays through simple messaging, to me, that is very fast.

M. S. Swaminathan: I would give great emphasis to research and development of content creation which can make a difference to the life of the poor, in economic terms,

in livelihood terms … For new technologies to benefit the poor, we must work on content of the communication, what do you want to communicate to them which makes a difference to their day-to-day life?

On the need for ICT alliances for gender equality, education, health, democracy

Amartya Sen: ICT could get into a much more successful mode if it tries to form alliances with political agitators and public reason advocates, the basic education people and the gender expansion thing … that's the direction I would suggest.

Noeleen Heyzer: Information technology can become a tool of either decreasing the inequalities that already exist in the world or increasing them – these inequalities include inequalities along the lines of human rights and inclusion. These inequalities include the whole issue of class, of language, of the North / South divide, and increasingly of gender.

Nancy Spence: One of the lessons we have learned is that when you do invest in women there are these tremendous knock-on effects, so that the impacts go directly both into the family, they go into education and they go into health and nutrition and children, and they go into the community.

Marty Chen: There is another form of connectivity collective that is being generated which is actually grass roots international movements. One example is an international grassroots alliance of all the home-based workers around the world for the industrial outworkers, and 80 to 90% of them are women and they're really trying to deal with transformation in the workplace.

Noeleen Heyzer: The content, to ensure that in a knowledge-based economy and increasingly a knowledge-based international set-up; we need to ensure that the knowledge of women is used in the content of what is being designed in the technology.

Michael Spence: The internet is not an alternative or a superior way of delivering education, it's an input.

Clothilde Fonseca: These technologies are certainly tremendously empowering for children. They really develop wonderful sense of self-efficacy. They develop a sense they can have a future. They have to do with the development of the individual in a more integral way, in developing the individual's capacity and the community's capacities.

Lincoln Chen: It's quite clear that ICTs – and here "T" is important – will be revolutionary in terms of health, there's just no question about it. I think in my note, what I was not sceptical about, but what I was unclear about was the equity of that health distributive element and whether the poor will be able to harness this technologic capability for their health production.

Jim Moore: We really are building larger and larger communities and so I've lately started to think about this is kind of the civic layer of the web … And if you want to take it a little wildly, it is the layer where we build [a] collective mind around the globe.

Grameen Ladies

The Harvard meeting was attended by a Bangladeshi banker who is committed to using ICT tools for poverty elimination. His name is Muhammad Yunus, President of the Grameen Bank. Last year the Grameen Bank loaned almost USD 500 million to poor people in Bangladesh; 95% of the borrowers are women. Muhammad Yunus' bank has gone from loaning poor women money to buy chickens and cows to financing the largest mobile telephone company in the region. That story begins in the mid 1990s when the Bangladesh government invited applications for mobile phone licenses.

Muhammad Yunus: We applied for a license for mobile phones. And in the government everybody was curious … they thought we were pulling their legs. You are a bank for the poor people. You give $50, $100, $200 loans. You have no idea what a mobile phone company is about … how much money it needs. Why would you want to do that? It totally irritated everyone around to have mobile phones go in the hands of poor women. People kept asking, whom would she call? Well, we said, she is not going to call anybody. She is going to sell the services of the telephone to the people who need to use telephones.

And people kept asking, well she is illiterate, she wouldn't even know to push those buttons and dial a number and so on. So I said, there are only ten numbers. So if this pushing these numbers can bring income, money, I think she will learn it in ten minutes. That is not a big deal … learning those numbers.

About five or six months later I was going around in the villages talking to the women who got this new telephone about how they were doing. They were all delighted, excited about the phone. Everybody has a phone in her hand when we're talking about it. At the middle of the discussion, I asked, do you have any problem in pushing those buttons to dial a number? Everyone said, no we don't have any problems. We can do that. So one woman stood up and said why don't you give me a number and blindfold me and if I fail to dial it the first time I will return your telephone. I was stunned. I was stunned because I wished that all those people who had doubted in the ability of these women were there.

These women never had never in their lives seen a telephone. Many of these women had also never seen electricity. About 80% of the people in Bangladesh have no access to electricity today. So, one of the first problems we faced is, how do you bring mobile phones to villages where there is no electricity? We resolved it with a very simple solution… solar panels. So, our telephones look a little different. They are all connected with solar panels to the battery of the telephone. But it works.

Now we have more than 30,000 telephone ladies providing the service and not only are they providing the service, the amazing thing is the income they earn from this service. Minimum income is USD 50 per month net profit and it goes all the way up to USD 500 per month. Imagine in a country with an average *annual* per capita income less than USD 400, a woman with a mobile telephone earning USD 500 per month by just making this service available.

These telephones are internet enabled telephones, and unfortunately we have not developed internet content yet, so that service remains unutilised, but the moment content is developed and people find service of it, I'm sure these 30,000 telephone ladies will become internet ladies in no time.

The Way Forward

IDRC is pursuing initiatives, and the challenge of helping create global coalitions, in the areas of ICT policy and regulation, social entrepreneurs and the services and content they provide to the poor, and ICT alliances with existing coalitions in education, health, gender equality and democracy. Existing initiatives are on the IDRC website, <www.idrc.ca>, and documentation on new initiatives is available on request.

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[1] For a video summary, and more detailed material on this meeting, see <http://web.idrc.ca/en/ev-47003-201-1-DO_TOPIC.html>.

[2] For a recent comprehensive survey, see R. Spence, *Information and Communications Technologies (ICTs) for Poverty Reduction: When, Where and How?* IDRC, July 18, 2003: <http://network.idrc.ca/ev.php?ID=27329_201&ID2=DO_TOPIC>.

[3] Michael Spence, Nobel Laureate in Economics and PPPM Advisor, CTO Forum ICT - Business & Development, 20-21 September 2004, Colombo, Sri Lanka

[4] From the Harvard Forum <http://web.idrc.ca/en/ev-47003-201-1-DO_TOPIC.html>.

[5] <www.lankabusinessonline.com/new_full_story.php?subcatcode=5&catname=ICT&newscode=504750371>

[6] See for example, *Wireless Points the Way in Africa*: <www.enn.com/direct/display-release.asp?objid=D1D1366D000000FD7C603500A454F635>.

[7] All groups win – incumbent, new telecom operators, internet and other service providers, government (revenue) and consumers/users. There may be some 'winners and losers' among firms and thus within labour, and concerns of losing need addressing as they can make cause some elements of industry and labour to resist needed competitive changes.

[8] Alison Gillwald, Harvard Forum: <http://web.idrc.ca/en/ev-47003-201-1-DO_TOPIC.html>.

[9] See Profile: <http://link.wits.ac.za/profile/profile.html>,
Research activities: <http://link.wits.ac.za/research/research.html>, and
Events: <http://link.wits.ac.za/news/news.html>.

[10] <http://www.researchictafrica.net/>

[11] See general information: <www.lirne.net/about/index.htm> and, in particular, sections on Learning and Training, Research and Consultancy, and World Dialogue on Regulation.

[12] <www.regulateonline.org/index.htm>

[13] <www.lirneasia.net>

[14] For surveys and links on biotechnology and emerging technologies, diffusion in the North and South, issues and debates, donor activities, research priorities, etc: <www.idrc.ca/biotech>.

Foundation Partners

The World Dialogue on Regulation is a project of LIRNE.NET and its Foundation Partners, *info*Dev and IDRC.

IDRC CRDI

International Development Research Centre

<www.idrc.ca>

Canada's International Development Research Centre (IDRC) is one of the world's leading institutions in the generation and application of new knowledge to meet the challenges facing developing countries.

IDRC funds applied research by researchers from developing countries on the problems they identify as crucial to their communities. It also provides technical support to those researchers. IDRC builds local capacity in developing countries to undertake research and create innovations, believing that people from developing countries must take the lead in producing and applying knowledge for the benefit of their own communities. IDRC also fosters alliances and knowledge sharing between scientific, academic, and development communities in Canada and developing countries.

The mission of IDRC remains "Empowerment through Knowledge," i.e. to promote interaction, and foster a spirit of cooperation and mutual learning within and among social groups, nations and societies through the creation, and adaptation of the knowledge that the people of developing countries judge to be of greatest relevance to their own prosperity, security and equity.

*info*Dev

<www.infodev.org>

*info*Dev is a consortium of public bilateral and multilateral development agencies, working in close cooperation with partners from civil society and the private sector, and assisted by an expert secretariat housed at the World Bank. Its mission is to help developing countries and their international partners use information and communication technologies (ICTs) broadly and effectively as tools of poverty reduction, sustainable economic growth, and empowerment of individuals and communities. Its work is rooted in the conviction that information and communication are indispensable elements of effective and responsive institutions (including governments), markets and societies.

<www.lirne.net>

LIRNE.NET is a strategic collaboration between researchers and faculty from: the Center for Information and Communication Technologies (CICT), the Technical University of Denmark; Economics of Infrastructures, Delft University of Technology, the Netherlands; media@lse, London School of Economics, UK; the LINK Centre, University of Witwatersrand, South Africa; LIRNE*asia*, Sri Lanka; and Comunica, Uruguay.

The LIRNE.NET mission is twofold:

- To facilitate ICT-related institutional reform throughout the world – through research, training, dialogue, policy and regulatory advice; and

- To build human capital in this new area as the foundation for effective policy, regulation, governance, management and development in new 'network' or 'knowledge' economies.

LIRNE.NET activities include:

- External Training Initiatives (for government, industry and NGOs) ;

- Research Activities and Reports;

- World Dialogue on Regulation for Network Economies <regulateonline.org>;

- Expert Analysis & Commentary on Current Issues.

About the Authors

Anupama Dokeniya is currently a consultant with the World Bank Institute's Governance program. Previosuly, she has worked with the institution's Information and Communications Technologies unit, and consulted with the Harvard Institute for International Development on ICT strategy. She has also been a Research Fellow at the Deft University of Technology and a Visiting Faculty at George Mason University, working on ICT and development issues. She holds a PhD from Cornell University, and has previously worked as a journalist in India.

Morten Falch is Associate Professor at Center for Information and Communication Technologies at Technical University of Denmark. He holds a PhD (1993, Technical University of Denmark), a MSc (1984, Economics, University of Copenhagen) and a BA (1980, Math, University of Copenhagen).

Research activities have been concentrated on economic analysis of applications and telecommunication networks and services. This includes telecom economics and policy and impact assessment of various types of ICT services and applications. Specific topics include: Cost analysis of telecom networks, The role of tele-centres in providing universal access in Ghana, ICT impact on international trade in services, the role of competition in innovation of new services, frequency management and regulation of interconnection using LRAIC.

He has participated in many EU funded research projects in the telematics area. He has also conducted a large number of consultancies for national and international organisations such as ITU, UNCTAD, the World Bank, the national Telecom Agencies in Denmark and Sweden.

Sabina Fernando recently completed her PhD on transnational communication law at the University of Sydney. She also holds a Masters degree in Law from the University of Sydney, a law degree from the London School of Economics and Political Science in the UK and is a Barrister of the Inner Temple, UK. Her work experience includes the Commonwealth Public Service of Australia, teaching at the Faculty of Law, University of Colombo and both national and international experience in the NGO sector having worked for the Law and Society Trust in Sri Lanka and the International Commission of Jurists in Geneva.

Godfred Frempong is a Senior Research Scientist of the Science and Technology Policy Research Institute of the Council for Scientific and Industrial Research in Accra, Ghana. He is a member of the African Technology Policy Studies Network and Research ICT Africa Network. His research interests are in telecom reform, regulation and universal in developing countries. For his doctorial thesis submitted to the University of Ghana, he assessed the performance of the reformed telecom sector in Ghana.

Currently, he is assessing alternative networks in Ghana with Anders Henten and Morten Falch (Centre for Information and Communication Technologies, Technical University of Denmark).

Alison Gillwald is currently Associate Professor and Research Director of LINK Centre University of the Witwatersrand, which she launched in 1999 to fast track ICT policy and regulatory training in Southern Africa. She is responsible for Research ICT Africa! an Africa-wide network which aims to fill the ICT policy and regulatory research vacuum that exists on the continent.

Prior to that she was appointed to the founding Council of the South African Telecommunications Regulatory Authority (SATRA) and was responsible for establishing the Policy Department at the Independent Broadcasting Authority in 1994.

She has chaired the national Digital Broadcasting Advisory Body to the Minister of Communications and currently serves on the boards of the public broadcaster, the South African Broadcasting Corporation, Womensnet and the Media Monitoring Project.

She is founding editor of the *Southern African Journal of Information and Communication* and has published in the areas of telecommunications and broadcasting policy and regulation, gender and politics more broadly.

Bruce Girard has worked extensively with the combination of local radio and the internet. In 1996, he founded the *Agencia Informativa Púlsar*, a Latin American internet-based radio news agency, he later established *Comunica*, a network for researching and promoting new information and communication technologies by local and independent media to reinforce local initiatives for development and democracy. Through Comunica, Girard organised three international seminars on radio broadcasting and the Internet, two in collaboration with the Friedrich Ebert Foundation (*Converging Responsibility: Broadcasting and the Internet in Developing Countries*, Kuala Lumpur, 1999, *Mixed Media/Medios Enteros: Broadcasting and the Internet in Latin America and the Caribbean*, Florida, USA, 2000) and one with the FAO, AMARC and ALER (*La Ond@ Rural: Radio, New ICTs and Rural Development in Latin America*, Ecuador, 2004). Comunica, FAO, AMARC and ALER are currently developing *La Ond@ Rural* as a Latin American regional platform for the promotion of communication and rural development. A recent study conducted with with Seán Ó Siochrú for UNDP, looked at how the community ownership concept could be combined with new technologies to enable sustainable community ownership of rural ICT networks (*Innovative Technologies and Community Ownership: A New Model of ICT Access for the Rural Poor*, 2005).

Girard has been active throughout the WSIS process and is a founder and member of the executive of the Communication Rights in the Information Society campaign (CRIS). Recent books on issues related to communications, media and the information society include *Communicating in the Information Society* (UNRISD, 2003, editor with Seán Ó Siochrú) and *Global Media Governance: A beginner's guide*, (2002, Rowman & Littlefield, with Seán Ó Siochrú and Amy Mahan).

Involved in founding the *World Association of Community Radio Broadcasters* (AMARC), he has also published about local broadcasting, recently a study on community radio in Senegal, with Martin Faye and Ndeye Ndiaye (2003); and *The Potential for Community Radio in Afghanistan*, with Jo van der Spek (2002). Girard has edited two books on community radio: *The One to Watch: Radio, ICTs and Interactivity* (2003) (also published in Spanish as *Secreto*

a Voces); and *A Passion for Radio: Radio Waves and Community* (1992 – also published in French as *La Passion Radio* and in Spanish as *RadioApasionad@s*).

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Henten has worked professionally in the areas of communications economy and policy for more than 15 years. He has participated in numerous research projects financed, e.g., by European Community, Danish Research Councils and Ministries, and in a large number of consultancies, financed by World Bank, UNCTAD, ITU, Danish Ministries, etc. He has published nationally and internationally – more than 150 academic publications in international journals, books, anthologies, conference proceedings, etc.

Amy Mahan is a senior researcher and in charge of publications for LIRNE.NET. Her current research focuses on telecom reform and regulatory institutional practices in the Latin America and Caribbean region. Recent books include: *How to Build Open Information Societies* (UNDP, 2004, editor with Yuri Misnikov); *Networking Knowledge for Information Societies: Institutions & Intervention* (Delft University Press, 2002, editor with Robin Mansell and Rohan Samarajiva); and *Global Media Governance: A beginner's guide* (Rowman & Littlefield, 2002, with Sean Ó Siochrú and Bruce Girard).

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She began her professional career as a lecturer of economics in an undergraduate college at the Delhi University, where currently she is a senior lecturer. In addition to teaching she started consulting on research projects at the National Council of Applied Economic Research (NCAER), and has been associated with NCAER for the last eight years. For the past three years she is at the Centre for Infrastructure and Regulation, NCAER. In the capacity of a consultant her research at NCAER has been on the infrastructure sector, where she undertook extensive policy based research on the issues of market structure and regulatory design for sectors like power and telecommunication. At NCAER she has been a team leader on several projects sponsored by the Telecom Regulatory Authority of India (TRAI) and was a team member of the team that drafted the Electricity Act, 2003 for the Ministry of Power, Government of India. Currently, she is engaged in two projects, one with LIRNE*asia* and the other with the Water and Sanitation Programme-South Asia. Her research interests have led her to write extensively on the economic problems of network industries both in popular press and professional journals.

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Shan has also been a Consultant for Schneeweis partners llc who are boutique hedge fund consultants and manage a billion dollar fund of hedge funds. Shan has also been a consultant for the World Bank. Shan has also lectured Economics at the University of Massachusetts, Amherst

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Trust and Crime in Information Societies (Edward Elgar Publishing, 2005, editor with B. S. Collins); *Networking Knowledge for Information Societies: Institutions & Intervention,* (Delft University Press, 2002, editor with R. Samarajiva and A. Mahan), *Inside the Communication Revolution: Evolving Patterns of Social and Technical Interaction* (Oxford University Press, 2002, editor) and *Mobilizing the Information Society: Strategies for Growth and Opportunity* (Oxford University Press, 2000, with W. E. Steinmueller).

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He has served as Chief Economist, US Federal Communications Commission, and as adviser and expert witness for the US Department of Justice in *US v. AT&T*. He was previously the editor of *Telecommunications Policy*, and Policy Review editor, *info*. His edited volume, *Telecom Reform: Principles, Policies and Regulatory Practices*, is used in training programs in more than 100 countries. He was Founding Director (1989-94) of the Center for International Research on Communication and Information Technologies (CIRCIT), Melbourne, Australia; and (1985-88) of the UK Programme on Information and Communication Technologies (PICT), ESRC, London. He was Director of multidisciplinary ICT programs at Simon Fraser University and University of Pennsylvania. In 2001, he was awarded the honorary degree of *doctor technices, honoris causa*, in recognition of his "outstanding research contributions on the interaction between technology, economics and regulation in the area of communications, with emphasis on telecommunications" by the Technical University of Denmark.

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He has extensive experience in telecom and ICT regulation and policy formulation: He assisted the Government of Sri Lanka as Team Leader of the Public Interest Program Unit (Ministry for Economic Reform, Science and Technology), responsible for telecom as well as other infrastructure reforms and the design of the *e Sri Lanka* Initiative (2002-2004); he was Director General of the Telecommunications Regulatory Commission in Sri Lanka (1998-99); he is a member of the management team of the World Dialogue on Regulation for Network Economies; he currently is a director of the Lanka Software Foundation and the Vanguard Foundation, which includes the Vanguard Disaster Preparedness Centre, and serves on the National Reawakening Council of Sarvodaya (Sri Lanka's largest NGO). He also chaired the expert workshop on fixed-mobile interconnection for the International Telecommunication Union (ITU) in 2000 and served on the ITU's expert group on International Telecommunication Regulations. He was a member of the Study Group on the India-Sri Lanka Economic Partnership Agreement (2003) and moderated the Ministerial Roundtable on ICT for Development at the Asian Forum on Information and Communication Technology Policies and Strategies in Kuala Lumpur in October 2003. He

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He has also he has been involved in research in ICT policy and regulation, in the academic arena as Associate Professor of Communication and Public Policy at the Ohio State University (1987-2000) and Visiting Professor of Economics of Infrastructures at the Delft University of Technology in the Netherlands (2000-2003). He serves on the editorial boards of several academic journals, including *South African Journal of Information and Communication*, *International Journal of Regulation and Governance*, *Information Technology and International Development*, *Telecommunications Policy*, *Communication Review*, and *New Media and Society*. He is Honorary Professor at the University of Moratuwa, Sri Lanka and Guest Faculty at the TERI School of Advanced Studies, New Delhi.

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