

TRENDS IN
TELECOMMUNICATION
REFORM
2010/11
Enabling
Tomorrow's
Digital World



SUMMARY



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International Telecommunication Union
Place des Nations
CH-1211 Geneva, Switzerland

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I n t e r n a t i o n a l T e l e c o m m u n i c a t i o n U n i o n

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ENABLING TOMORROW'S DIGITAL WORLD

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MARCH 2011



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INTRODUCTION

The Telecommunication Development Bureau (BDT) of the International Telecommunication Union (ITU) is pleased to present the eleventh edition of *Trends in Telecommunication Reform*, an integral part of ITU/BDT's ongoing dialogue with the world's ICT regulators. The theme of this edition of *Trends*, "Enabling Tomorrow's Digital World" derives from an important meeting organized last year: the 2010 Global Symposium for Regulators (GSR), held in November 2010 in Dakar, Senegal.

This year's *Trends in Telecommunication Reform* contains nine chapters that explore these challenges and opportunities in building tomorrow's digital world to harness the potential of broadband to build a safe and secure global Information Society:

- Chapter one provides an overview of trends in the ICT market and in ICT regulation to set the stage for the following chapters.
- Chapter two examines the impact of broadband on the economy. It provides evidence, but also presents the complexities, of the conditions under which broadband has an impact. It further outlines the public policy options for stimulating the deployment of broadband.
- Chapter three focuses on ICT regulation in the digital economy by exploring the possible route regulators and policymakers can take to facilitate deployment of ICTs based on a multi-pronged approach.
- Chapter four examines the liberalization of the ICT dispute resolution field and the new opportunities opening up in this regard.
- Chapter five explores policy and regulatory matters surrounding spectrum management issues related to the digital switchover and the Digital Dividend.
- Chapter six looks at the role of ICT regulation in addressing offenses in cyberspace.
- Chapter seven discusses the relationship between climate change, the ICT sector and regulation.
- Chapter eight offers "postcards" from the Information Society, examining what the Information Society is and how it is changing every aspect of our lives for the good, the bad and the just plain baffling.
- Chapter nine offers a conclusion based on preceding chapters.

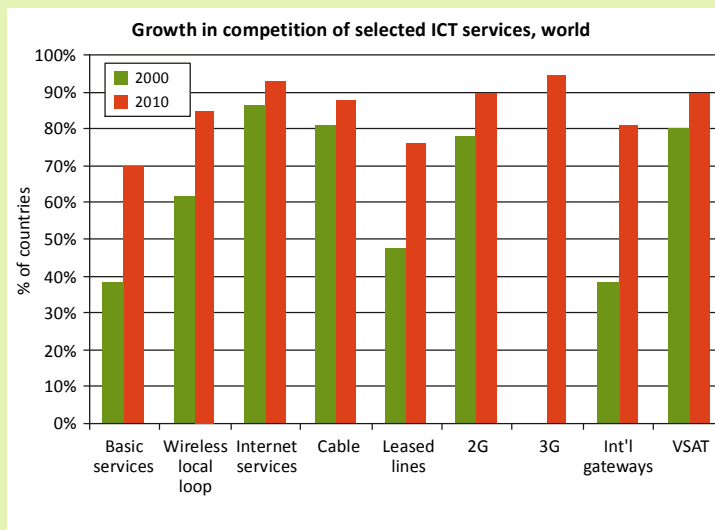
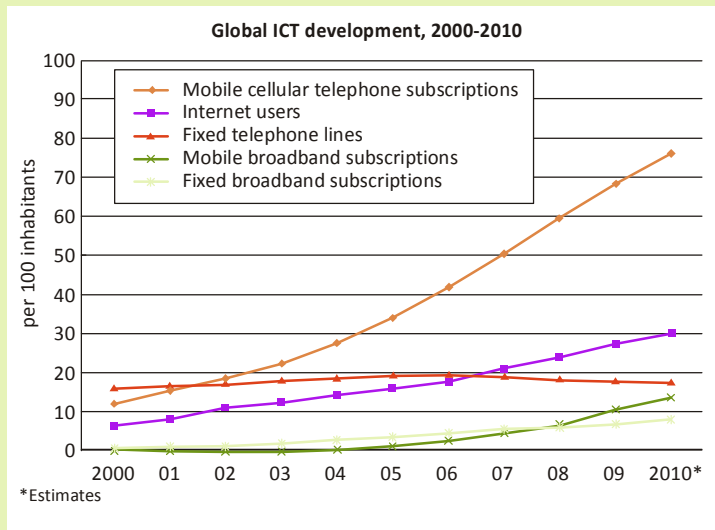
1 OVERVIEW OF TRENDS IN THE ICT MARKET AND IN ICT REGULATION

The introductory chapter to this year's *Trends in Telecommunications* summarizes key market and regulatory trends in the ICT sector. Despite the global economic downturn, on the whole, the ICT sector has continued to grow, in large part due to continued growth in emerging markets. Key drivers of growth have been the mobile sector and mobile data services, including digital mobile content and applications. Although mature mobile markets are reaching saturation, wireless subscriptions continue to increase in developing countries. Moreover, operators and service providers in mature markets are adapting their business models to respond to the increased demand for mobile data services. The digital generation will likely use to a greater extent their smart phones and new mobile devices, such as gaming consoles and tablets to access the Internet, social networks and online user generated video content, thus putting additional pressure on mobile operators to offer high speed any-time, any-where services.

In general, ICT markets around the world are becoming more competitive, including international gateway services, wireless local loop services, and the 3G market. Fixed line services, however, continues to lag behind other ICT sectors in terms of its competitiveness. Nevertheless, there has been an increase in the percentage of countries that have opened their fixed line markets to competition, although the number of fixed lines per 100 inhabitants has remained relatively flat over the past 10 years. This stands in contrast to the exponential growth in the number of mobile cellular telephone subscriptions per 100 inhabitants over the past 10 years and the continued growth of mobile broadband services.

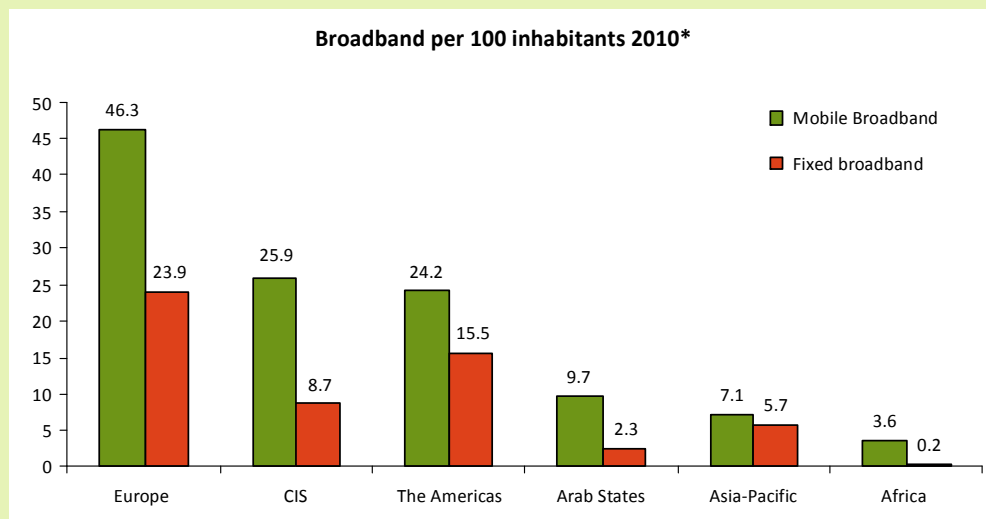
While the average penetration level of mobile broadband services was 5.4 subscriptions per 100 inhabitants in developing countries, it is 10 times higher in the developed world, at 51.1 per 100 inhabitants. The ongoing deployment of higher speed 3G mobile broadband networks such as WIMAX and more recently HSPA+ and LTE systems will certainly contribute to greater levels of mobile broadband services uptake worldwide. Regulatory measures taken in selected countries such as spectrum refarming and the licensing of 3G services, will also contribute to accelerating the growth of mobile broadband penetration. These regulatory measures have been complemented at the industry level by a move towards developing next generation 4G systems (IMT Advanced).

Figure 1.1: Global ICT development and growth in competition, 2000-2010



Source: ITU World Telecommunication/ICT Indicators database – ITU World Telecommunication/ICT Regulatory Database

Figure 1.2: ICTs users and subscriptions and competition in selected services by region, 2010 (end)



Note: * estimates.

Source: ITU World Telecommunication/ICT indicators database

Developing countries continue to lag behind when it comes to fixed (wired) broadband where the limited number of fixed telephone lines constrains the deployment of broadband access via xDSL. Even though subscriptions are increasing, a penetration rate of less than 1 per cent in Africa for example illustrates the challenges that persist in increasing access to high-speed, high-capacity Internet access in the region. The wide disparity between developed and developing countries in broadband penetration levels and rates of Internet access illustrates the need to ensure developing countries are not excluded from the digital information society.

In terms of the affordability of ICTs, people in developed countries still spend relatively less of their income (1.5 per cent) on ICT services compared to people in developing countries (17.5 per cent). The most striking variations in relative prices are found in the broadband market, where a regional comparison of prices for fixed broadband services highlights a striking disparity, particularly between Africa and the other regions.

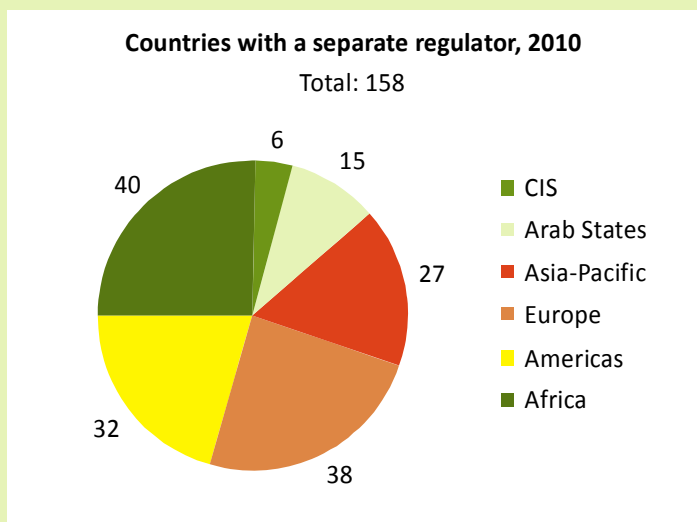
One notable trend relates to how ICTs have transformed how people communicate. Life in the “global village” is characterized by ubiquitous access and always-on connectivity. Moreover, mobile applications, including web-based services, have significantly contributed to changing the way that users experience being online. Besides their commercial uses, m-applications (e.g., m-banking) can have a far reaching impact on the ability of the rural and poorer populations in developing countries to participate in the economy.

Only a handful of privatizations were in the pipeline in 2010. Privatization processes took place or are still unfolding in Zambia, Comoros and Benin. Privatization activity has slowed over the past few years, especially following the economic downturn, as there are fewer interested investors and reduced investment funds available. Today, the incumbent operators in 126 countries are partly or fully in the hands of private sector owners.

The fast pace of economic and technological change affecting the sector over the last decade prompted governments to react by launching far-reaching reforms to restructure the sector. Sector reform happened in different phases and took many paths and varied forms, depending on the national political, social and economic circumstances and public policy. Throughout the phases of reform, major efforts were and still are required from policy makers and regulators to keep abreast of the changes occurring in the markets and to build understanding, knowledge, and expertise in order to ensure effective market regulation.

Establishing a separate telecommunication/ICT regulator was one of the main building blocks of the sector reform process launched more than fifteen years ago. By the end of 2010, separate regulators were established in more than 80 per cent of countries across the globe, totalling 158 regulators worldwide¹, up from 106 a decade ago.

Figure 1.2: Separate telecom/ICT regulators

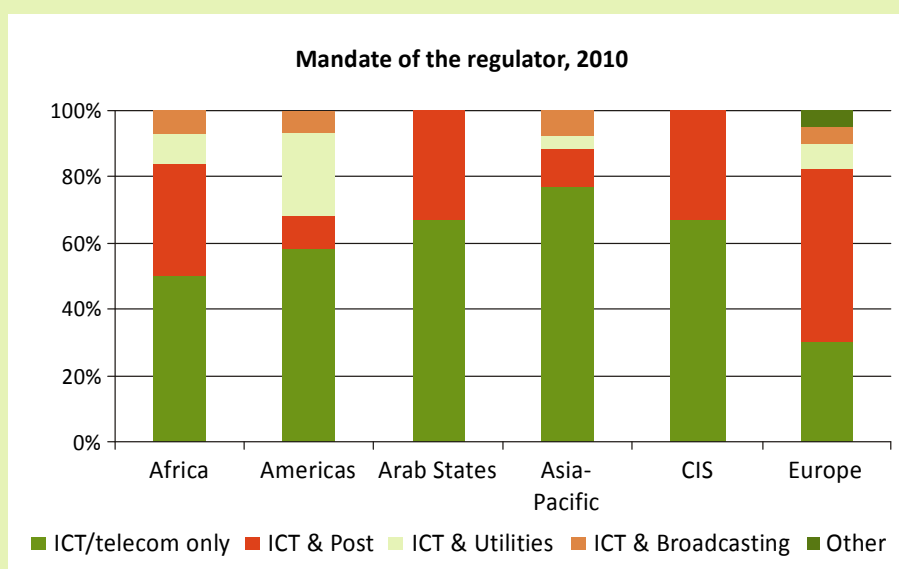


Source: ITU World Telecommunication/ICT Regulatory Database.

While the main trend in most regions was to establish a sector-specific regulator, some countries have moved towards expanding the mandate of the regulator to include one or more of other sectors such as posts, information technology, broadcasting content, and spectrum management. Several countries in the Americas, Europe and Africa regions have established multi-sector agencies, either when sector reforms were initiated or later in the reform process, after reaching a certain level of maturity of their markets.

In addition to performing traditional functions such as dealing with interconnection issues and managing universal access programs, telecommunication/ICT regulators in several jurisdictions are now responsible for carrying on regulation beyond those traditional core activities. Some ICT/telecommunication regulators have jurisdiction over broadcasting content, Internet content, cybersecurity and some are also involved in matters dealing with climate change.

Figure 1.3: Mandate of the Regulator, 2010



Source: ITU World Telecommunication/ICT Regulatory Database.

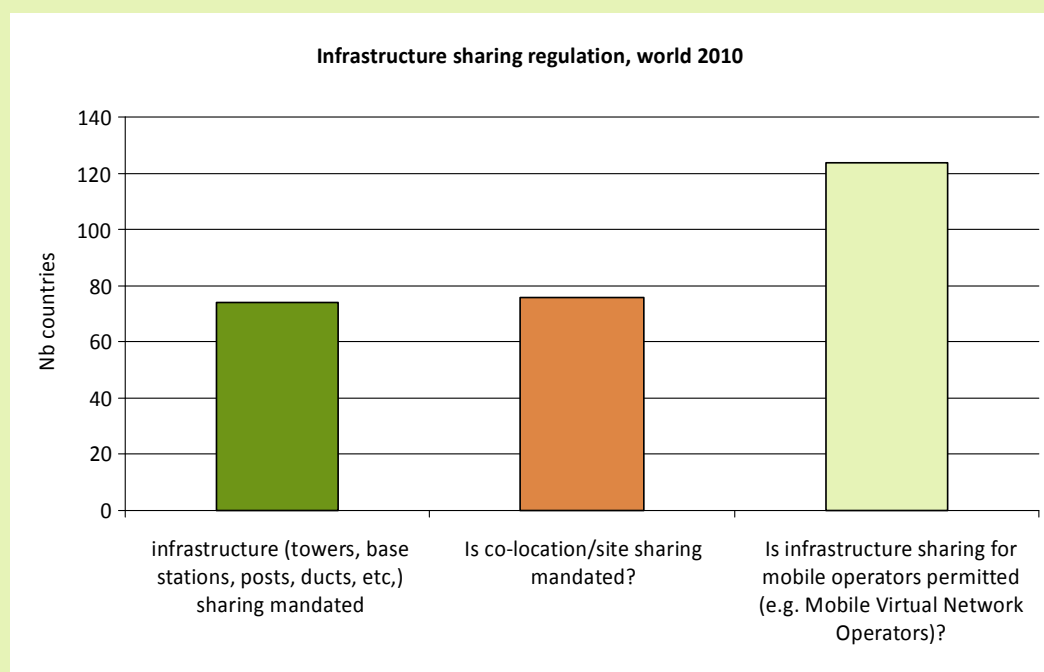
ICT/telecommunication regulators have also become increasingly involved with dispute resolution within the sector. The number of countries having established a regulatory framework for dispute resolution nearly doubled in five years, from 77 in 2005 to 140 in 2010. Interestingly, however, these frameworks often involve alternative dispute resolution (ADR) mechanisms such as arbitration, mediation and expert determination. ADR mechanisms are used in more than 55 per cent of countries worldwide as these mechanisms provide faster and less-costly redress and feature less involvement from the regulator.

Perhaps the most dominant policy and regulatory issue at present concerns the promotion of broadband access. At least 70 governments have adopted a national policy, strategy or plan to promote broadband. Several developed countries have done so as part of their economic recovery plans to ensure the deployment of these high cost networks and to stimulate employment. Others have done so as part of their broader strategy to develop the information society and to extend universal access to ICTs. One-fifth of ITU Member States have included broadband as part of universal access policy.

Promoting infrastructure sharing, open access and spectrum refarming (in-band migration) are some of the innovative regulatory tools being used by telecommunication/ICT regulators to spur network development and extend access to ICTs. With regard to open access of the incumbent's local loop, unbundling is a requirement in 60 per cent of countries worldwide.

Many of the trends discussed above are canvassed in greater detail in the chapters in this year's Trends Report.

Figure 1.4: Infrastructure sharing regulation, 2010



Source: World Telecommunication/ICT Regulatory Database.

2 THE IMPACT OF BROADBAND ON THE ECONOMY: RESEARCH TO DATE AND POLICY ISSUES

Investment in broadband (defined as the technology that enables high speed transfer of data) has soared around the world. Given that such large amounts of capital have been dedicated to the technology, it is logical that researchers in the social sciences have begun to analyze the economic and social impact of broadband. Although researchers have confronted challenges when critically assessing the existing data, evidence suggests that broadband does have an important economic impact. However, this impact only becomes significant under certain conditions.

Chapter two focuses on three issues related to the research on the economic impact of broadband. First, it presents the evidence generated by the different bodies of theory regarding the economic impact of broadband, and outlines the complexities and conditions under which broadband has an impact. Secondly, it illustrates a methodology for calculating the investment necessary to implement national broadband plans. Finally, it outlines the public policy options for stimulating the deployment of broadband and for maximizing the positive economic impact of the technology.

Chapter two's review of the research on the economic impact of broadband indicates multiple effects. First and foremost, the evidence is fairly conclusive about the positive contribution of broadband to GDP growth. While the degree to which broadband contributes to economic growth varies in different studies, the discrepancies can be related to different datasets as well as model specifications.

Secondly, broadband has been found to have a positive impact on productivity and evidence generated both at the micro-economic and macro-economic level appears to confirm this effect.

Thirdly, broadband does contribute to employment growth, both as a result of network construction programs and spill-over effects on the rest of the economy. While the deployment programs are, as expected, concentrated in the construction and telecommunications sectors, the impact of externalities are greater in sectors with high transaction costs (e.g., financial services, education, and health care).

Finally, beyond economic growth and job creation, broadband has a positive effect on consumer surplus in terms of benefits to the end user that are not captured in the GDP statistics. These benefits include efficient access to information, savings in transportation, and benefits in health and entertainment; these benefits can be measured in terms of the difference between consumers' willingness to pay for the broadband service and actual prices.

Most of the research so far has been conducted in developed nations, specifically, the United States and Europe. The challenge going forward is to test for similar effects in developing countries, where data availability remains an even larger challenge.

This chapter also includes a number of case studies of both developed and developing countries.² These case studies examined the impact of broadband on various economic indicators such as growth in GDP and employment creation using methodologies that included input/output analysis, micro-economic estimates, and economic metric modelling.

The results of the analyses of the case studies validate the positive contribution of broadband to GDP growth for developing countries and regions. While limited in the number of countries studied, these analyses safely confirm that broadband has a directionally positive economic impact. The results of the analyses also validate the positive contribution of broadband on employment creation for less developed countries and regions. In this case, all prior research, as well as the results of this study, indicates that broadband has a positive impact on job creation.

Chapter two presents a methodology for estimating investment requirements to meet deployment targets as stipulated in national broadband programs. By applying the methodology to the German and Brazilian cases, it was possible to gauge the significant funding requirements of these plans.

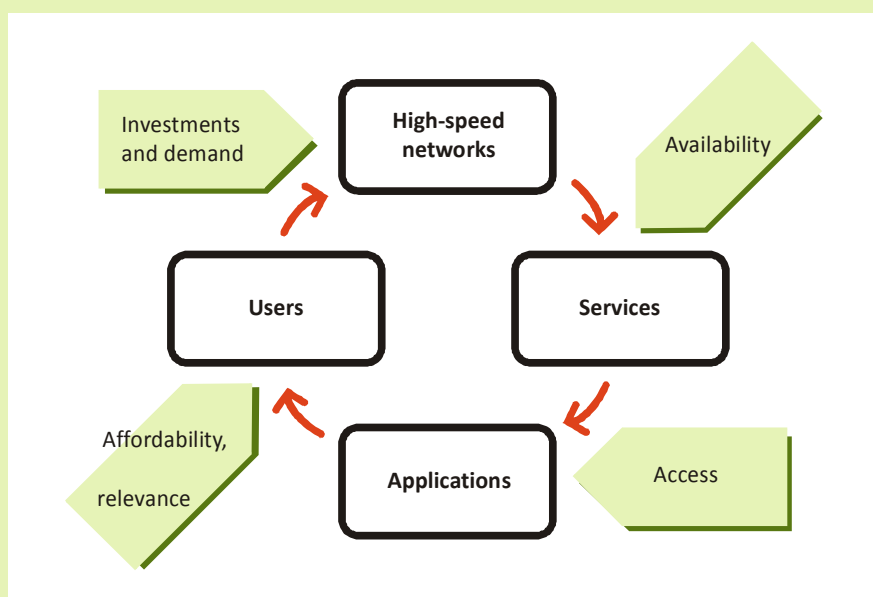
Chapter two concludes with a consideration of the policy tools necessary to promote broadband deployment and adoption in order to realize broadband's potential to contribute to economic growth and the creation of jobs, and reviews best practices in countries that have succeeded in reaching a high level of performance in the development of their broadband sector.

3 ICT REGULATION IN THE DIGITAL ECONOMY

Chapter three charts the possible route that regulators and policymakers can take to facilitate deployment of ICTs. Increased adoption and use of ICTs in the next decade and beyond will be driven by the extent to which broadband-supported services and applications are not only made available but also are relevant and affordable for consumers. Thus, this chapter focuses in particular on the deployment of broadband and on broadband's transformative power as an enabler for economic and social growth in the digital economy.

Chapter three situates the issue of the provision of access to networks and services and the specific reasons for the non-adoption of ICTs within the broadband ecosystem. As shown in Figure 3.1, the broadband ecosystem involves the multiple, interconnected layers of networks, services, applications and users.³ Issues such as the environment, data privacy and security, copyright protection, healthcare and education are all integrated within this ecosystem.

Figure 1.5: The Broadband Ecosystem



Source: *Strategies and Policies for the Developing World*, GICT, World Bank

In order to expand the broadband ecosystem, policymakers must continue their traditional focus on the supply of competitive access networks (*i.e.*, wireline and wireless broadband networks), as such networks continue to be the critical pipeline linking the other elements within the ecosystem. However, policymakers must also focus on facilitating the supply of, and promoting demand for broadband applications and services. Connectivity to broadband networks will increase demand for services and applications such as Internet Protocol television (IPTV) and Voice over Internet Protocol (VoIP), cloud computing and online video streaming. Addressing the demand components of the broadband ecosystem requires new tools for policymakers, and should be grounded in a comprehensive diagnosis of the reasons for non-adoption of broadband and ICTs. Understanding the reasons for lack of adoption of broadband services will be essential for designing adequate policies to promote the development of broadband and ICT services over the next decade.

In light of the regulator's role in expanding the broadband ecosystem, chapter three reviews regulatory trends. As ICT markets become more competitive, regulators are beginning to move from *ex ante* to *ex post* regulation. This is particularly true in the case of broadband markets, where the various links in the value chain may be subject to different degrees of competitive pressure. In promoting access to and adoption of ICTs, policymakers need to consider whether to establish sector-specific, forward-looking regulation (*ex ante* regulation) to prevent or promote certain activities, or establish or rely on competition law to remedy specific instances of anti-competitive behaviour (*ex post* regulation). Due to the fast pace of technological advances and an increasing recognition of the value of competition, policymakers increasingly have implemented *ex post* rules to foster innovative markets while imposing targeted *ex ante* regulation to address specific market failures, particularly with respect to the physical layer of broadband.

Continued convergence within the ICT sector will present regulators with new challenges associated with vertical and horizontal integration of on-line services and applications. The nature of the broadband ecosystem requires ICT regulators to engage in cross-sectoral cooperation. Since ICTs interact and intersect with every other major social issue and sector of the economy, including the environment, cybercrime and security, education, health and banking, governments need to coordinate various interests in order to achieve large-scale objectives, including promoting global e-environment policies and addressing transnational cyber security concerns. It also requires regulatory frameworks broad enough to allow the ICT regulator to consider the relevant interrelated issues while remaining focused on promoting innovation and development in the ICT sector.

In light of the need for greater cross-sectoral cooperation, ICT regulators are coordinating with regulatory authorities responsible for other sectors, such as banking, the environment and health, to ensure that the benefits of ICTs reach all members of society. Due to the influence of converged ICTs on all other sectors, ICT regulators are in a special position to ensure that the benefits of ICTs permeate throughout the economy. ICT regulators need to be aware of the impact that their decisions have on other aspects of society. Increased coordination of policies and initiatives will be critical in the coming decade to harness the potential benefits and efficiencies that ICTs can bring to consumers and the society at large.

4 THE LIBERALIZATION OF ICT DISPUTE RESOLUTION

Chapter four explores dispute resolution in the ICT sector. The ICT sector is rife with deep tensions due to the driving forces of innovation and creative destruction. The types of ICT disputes are wide ranging. Traditional telecommunication disputes over interconnection and access to wholesale services and essential facilities remain very much the order of the day, though with new dimensions. For example, convergence has led to new tensions between infrastructure and content providers. Moreover, the wide range of unresolved legal and regulatory questions around data protection, cybersecurity and privacy continue to find their way into dispute processes. The scope for disputes in ICT also extends to intellectual property.

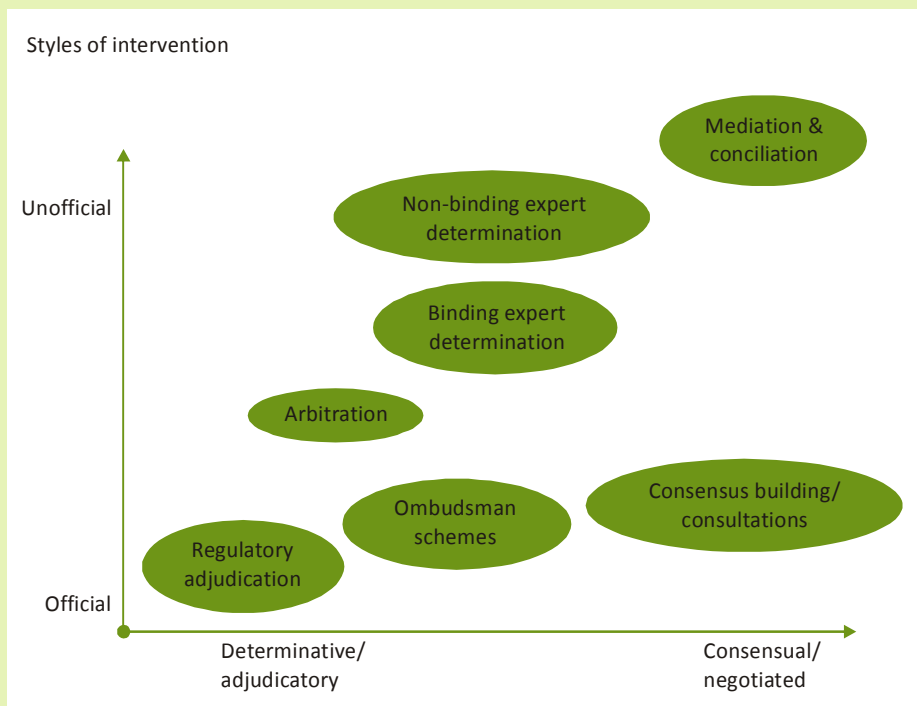
These disputes must be resolved in the courts, in regulatory proceedings and through arbitration. Chapter four explores how dispute resolution processes are being transformed in response to the traditional and new disputes facing the sector. This transformation in dispute resolution processes in some ways mirrors the transformation of the ICT sector itself. The ICT sector worldwide has been undergoing major liberalization and unbundling over the last quarter of a century. The field of dispute resolution has undergone a similar transformation, though in certain respects over a longer period.

Until relatively recently, in most countries, the official sector (government authorities, regulators and courts) retained sovereign control – a sort of monopoly – over the resolution of disputes. Over the last several decades, however, numerous countries have recognized that the public judicial system is inadequate to the task of resolving the cases brought before them. Through various developments, a shift occurred in dispute resolution that saw private actors take a greater role in the dispute resolution process.

The public policy benefits of unbundling elements of the dispute resolution process and redefining the role of the official sector to remove its direct control over each element have become widely recognized. The liberalization and unbundling of dispute resolution have evolved further to include the emergence of a variety of dispute resolution subfields. These include adjudication, binding expert determination, non-binding expert determination, mediation, ombudsman schemes, dispute boards and hybrids between these.

All of the various types of dispute resolution processes involve greater or less reliance on, and encouragement of, consensus of the parties. To the extent that a particular process relies less on consensus, it is more adjudicatory, or determinative. The dispute resolution processes also involve greater or less involvement of the official sector. This interplay between the official and private sectors and the boundary between consensual and mandatory elements of dispute resolution are particularly complex in a liberalized environment that nevertheless remains subject to extensive regulation.

Figure 1.6: Styles of intervention



Source: Author.

There are numerous elements within adjudicatory processes that may be unbundled from control of the official sector. One is through appointment of decision-makers who are at arms' length from the traditional official decision-makers, such as courts and regulators. Another element is the choice of process used to resolve the dispute. Examples of processes include adjudication, final offer arbitration, and mediation.

Almost all countries have a system of judicial review over administrative agency decisions. In most countries, judicial review focuses on procedural and jurisdictional matters, such as whether the regulator has given each party a fair opportunity to be heard, has considered relevant factors, and has acted within its powers. But even such matters can require significant technical and economic understanding. Many countries' judicial systems struggle with the complex and urgent task of telecommunications dispute resolution. The rapid development of the market and the large amounts of investment at stake require regulators' decisions to be affirmed or overturned relatively quickly. In addition, investor confidence depends on the experience and expertise of those who have the power to annul or change regulators' decisions.

Many countries have bolstered the quality, and sometimes the speed, of controls over administrative agency decision-making through various innovations. These include the referral of appeals to special tribunals. Other countries have innovated by combining in a single tribunal mechanism both appeals from regulators' decisions and original disputes between service providers. There has been significant liberalization even in this important area of controls over regulatory decisions.

Private arbitration agreements and proceedings have been used to achieve regulatory policy goals. Increasingly, mediation is provided as a component of regulators' dispute resolution portfolio of procedures, and sometimes is a condition precedent to formal adjudication proceedings. Mediation is not, however, an alternative to an adjudicatory process if the parties insist on requiring a third party (whether a judge, arbitrator or regulator) to render a decision for them. In such circumstances, the adjudicatory process is necessary.

In sum, a wide range of dispute processes are being used in ICT disputes today as a result of the liberalization and unbundling of dispute resolution. This can be expected to continue, with more reliance on private actors to assist with the resolution of disputes with a public policy dimensions. In some cases, only dispute resolution processes such as mediation will be able to help bridge the fault lines in the sector. Ultimately, the primary source for innovation lies with private actors who can devise ingenious processes to handle difficult situations. The official sector will continue to develop if it engages with private participants in the ICT sector and seeks to collaborate on developing suitable dispute resolution methods.

5 SPECTRUM IN TRANSITION: THE DIGITAL DIVIDEND

Chapter five focuses on spectrum management issues related to the digital switchover and the digital dividend.

The digital switchover and the digital dividend are related concepts. The digital switchover occurs when analogue television broadcasting signals are converted to and replaced by digital television services. While digital signals are not necessarily better than analogue signals for recording or broadcasting in terms of frequency response, signal-to-noise ratio, or dynamic range, the transmission of digital signals is much more efficient. Because digital transmission requires less spectrum than the amount needed to accommodate the existing analogue transmissions, the digital switchover is expected to free up spectrum in the VHF and UHF bands.

The digital dividend refers to the spectrum that will become available in the VHF and UHF bands as a result of the digital switchover. There are two categories of digital dividend spectrum: cleared spectrum and interleaved spectrum (whitespace).

The fundamental reason why the digital dividend spectrum is so important is its physical characteristics: an exceptionally attractive combination of capacity (bandwidth) and coverage. The digital dividend spectrum can be used to provide a very wide range of existing and new services. Given current market trends and the manner in which broadband is fundamentally re-shaping society, the digital dividend carries economic, political, and social importance.

The ITU has been leading global spectrum allocation efforts over the past decades. The band plans and technical standards for the spectrum affected by the digital switchover vary across the three regions of the ITU. Moreover, although the ITU acts to harmonize the efficient use of the spectrum resource on a global basis on behalf of governments, the implementation of ITU recommendations and regulations rests with national governments. Practices and decisions made about spectrum allocation vary across the three ITU regions. Because markets are different and because the bands and technologies used to deliver broadcast services to consumers vary, different timelines for digital switchover have evolved. Practices and decisions made about spectrum allocation also vary across the three ITU regions.

How to use the digital dividend and how to reallocate the released spectrum are the subjects of ongoing intense debate involving consumers, legislators, regulators, and operators involved in broadcast, telecommunications, and ICTs (in particular, broadband). Broadly speaking, the main uses for the digital dividend spectrum include both broadcasting and fixed telecommunication services, as well as a mix of both over mobile platforms: Digital Terrestrial TV (DTT); broadcast mobile TV; commercial wireless broadband and public protection and disaster relief. The suitability of digital dividend spectrum for each of these uses differs from one country to another, owing to

national circumstances such as the country's geographical position, size and topography, penetration of satellite/cable services, and spectrum usage in adjacent countries.

Table 5.3: Digital Dividend Decisions and Stakeholders

Required Decision	Entity/Stakeholders
Analogue Shut-off	Essentially a political decision taken by the political authority (the legislature), likely led by a ministry or a regulator
Digital Dividend – Size and Allocations	A complex set of issues combining economic, social, and technical considerations with a critical need to coordinate and harmonize results ensuring maximum benefits. The process and decisions are best suited for entities primarily responsible for policy assessment and policy setting, aided by technocracy and user input (through public consultation processes, etc.).
Technical Standards	Requires decisions and collaboration amongst regulatory agencies.
Interference Management	Best suited to the spectrum management agency.
<i>Source: McLean Foster & Co.</i>	

Some of the regulatory and policy issues that regulators must address as they prepare for the digital switchover include:

- Allocation and assignment of spectrum;
- Reserving spectrum for future use;
- Interference;
- Migration; and
- Harmonization

In addition to the above issues, chapter five includes discussion of various considerations related to policies for the promotion of ICT access and innovation. It also includes case studies from each of the three regions of the ITU. Based on these case studies, in addition to the experiences of other countries, chapter five highlights the following best practices:

- spectrum planning;
- reallocation and refarming processes;
- migration of services; and
- consultation and assessment of the value of the Digital Dividend.

The chapter concludes by providing insight into the lessons learned from the experiences of various countries.

6 THE ROLE OF ICT REGULATION IN ADDRESSING OFFENCES IN CYBERSPACE

With the growth in the number of private users and businesses relying on ICTs for the functioning of their everyday lives, ICTs should be seen as a critical part of national infrastructure. Even brief interruptions to ICT-based services can cause significant economic or social damage. As a result, as reliance on ICTs increases, there is a growing awareness that cybersecurity and the fight against cybercrime must be taken more seriously.

The term “cybersecurity” refers to various activities such as the collection of tools, policies, security safeguards, guidelines, risk management approaches, training, best practices, and technologies that can be used to protect the cyber environment and the assets of organizations and users. ‘Cybercrime’ is often defined as criminal acts committed within computer networks, by the means of computer networks, or against them.⁴ Deterring and preventing cybercrime can be seen as an integral part of a cybersecurity and critical information infrastructure protection strategy.

Many countries are currently in the process of developing legal and regulatory frameworks for cybersecurity, including legislative frameworks for addressing cybercrime. Because of its nature, addressing cybercrime challenges traditional regulatory approaches and criminal law paradigms. Cybercrime and offenses in cyberspace traverse national borders and impact multiple sectors and industries. Its crime scenes are in the virtual world and evidence is typically electronic rather than physical in nature. The “neighborhood” where cybercrime occurs is the global network and thus it is – just like in the real world – impossible to contain or to monitor at all times. The diffuse and global nature of the Internet implies that many, including international stakeholders must be involved in coordinated responses to cybersecurity and cybercrime as criminals are able to exploit vulnerabilities in one area to attack users in many other places. Moreover, because cybercrime stems from the use of evolving technologies, those charged with policing cybercrime must be nimble enough to keep pace with a rapid element of change.

In this context, traditional centralized models of regulation – with the government at the top of hierarchical decision-making structures – might not be the only solution for responding to cybercrime, particularly since modern global digital networks have evolved beyond direct governmental influence. The Internet has eroded old models of the division of responsibilities between government, private sector and civil society. Consequently, the fight against cybercrime must engage multiple stakeholders.

Box 6.5: Reviewing cybercrime-related regulation in Belgium

In 2006, the Belgian ICT regulator (BIPT) was involved in the amendment of some specific areas of cybercrime legislation. BIPT had detected the necessity of amending the data retention legislation and prepared a draft transposition of an EU directive related to data retention into Belgian national law. The draft amendments were developed in cooperation with the Federal Public Service of Justice and the Federal Computer Crime Unit. During the development process, the draft passed public consultation. In addition, in 2008, BIPT announced that it was considering the possibility of rephrasing the legal provisions with respect to privacy in the electronic communications sector.

Source: Annual report 2008 of the Belgian Institute for Postal Service and Telecommunication⁵

In this regard, the fight against cybercrime is said to be based on multi-stakeholder involvement described as the cybercrime ecosystem. The cybercrime ecosystem is a multi-stakeholder environment where the tasks to be undertaken can be performed by different stakeholders or shared by two or more stakeholders. Chapter six highlights the roles, responsibilities and activities of the main stakeholders in the cybercrime ecosystem, as well as the tools to fight cybercrime. The stakeholders include the State and the public sector (including regulators); the businesses and the private sector; civil society, academia, and individual users; and regional and international organizations.

The tools and actions required to respond effectively to cyberthreats and to address cybercrime are evolving and must be assessed within a wider context of national and international cross-sector approaches and collaborative arrangements.

The urgent need to criminalize the misuse of ICTs goes hand-in-hand with another trend, namely, the ongoing transformation of the traditional role of ICT regulators. Many ICT regulatory authorities have found themselves involved in a range of activities related to tackling offenses in cyberspace. In some cases, these activities involve new duties and responsibilities, while other activities are direct expansions of normal tasks of the ICT regulator. From this point of view, fighting cybercrime can be seen as a part of the broader trend of moving from strictly centralized models of regulation towards more flexible and non-hierarchical structures.

The exact mandate of ICT regulators in the field of cybercrime has not yet been clearly defined. An analysis of practices in selected countries suggests that the mandate of ICT regulator can potentially be usefully extended into or strengthened in the following areas related to cybercrime:

- Consumer protection, for example, educating consumers, prohibiting spam, and fighting the dissemination of malware;
- Responsibility for information security and/or network security, for example, protecting the reliability and security of critical information and communications infrastructure; and
- Granting a new regulator the operational mandate over Internet security.

Going forward, the issue of cybersecurity appears to involve challenges for ICT regulators but also opportunities to play pivotal roles in the fight against cybercrime. One of the biggest issues for ICT regulators and other stakeholders involved in responding to different kinds of offenses and threats in cyberspace is the rapid pace of change in the ICT sector and in technology itself. Cyberthreats are growing in variety, sophistication, and so is their impact. In this environment, the role of ICT regulators will evolve and their involvement should respond to the specific needs of the national ICT ecosystem, and especially of users and the industry. ICT regulators often share the heavy responsibility of ensuring the reliability of the Internet and avoiding disruptions to its current and future uses by consumers, businesses and governments that may result in significant loss to the community and/or economy. Discharging this responsibility requires the ICT regulator to be capable of acting quickly to respond to cyberthreats and suggests that there is a high value to adopting preventative measures. As the ICT regulator's mandate continues to evolve, it will be crucial to ensure that the regulator is equipped with the tools and resources necessary to detect cyberthreats, to engage in awareness raising among all stakeholders, to mobilize particular stakeholders to play their roles in fighting cybercrime, to coordinate its responses with authorities from the public and private sector, and to contribute to fostering cooperation and coordination between countries and across regions.

7 CLIMATE CHANGE, ICTS AND REGULATION

Chapter seven discusses the relationship between climate change and the ICT sector, with a specific focus on telecommunications. This chapter considers whether the nature of the special position between ICT players and climate change suggests that ICT sector regulators, specifically those in charge of regulating telecommunications service providers (TSPs), should have a more active role in environmental protection and should consider climate change issues when making decisions concerning TSPs. The *status quo ante* represents the converse position, namely that decisions relating to climate change should be left to general laws and regulations that apply to other companies, organizations and individuals.

This chapter focuses on the greenhouse gas (GHG) emissions generated by telecommunication service providers (TSPs) acting under a general or specific authorization and their customers. This chapter also focuses on the ICT regulators who have jurisdiction over such TSPs, and considers sector-specific regulatory interventions aimed at curbing GHG emissions from TSPs and facilitating the ability of TSPs to curb emissions from other industry sectors.

As a relatively new and under-explored area, the Chapter seven is a discussion document. The objective is not to set out policy prescriptions, but rather to generate debate, raise awareness and commence a collaborative regulatory effort to curb carbon emissions in the ICT sector.

GHG emissions have been identified as a major driver of changes to the climate, and human activity has been identified as the probable cause of rising GHG emissions, particularly carbon dioxide (CO₂) emissions. ICTs have the potential to make a positive contribution to reducing the levels of GHGs; at the same time, ICTs could materially increase the rate of climate change. Whilst there is growing interest in applying ICTs to reduce GHGs, the role of regulators in facilitating, enabling and promoting measures that would capitalize on ICTs' ability to reduce GHGs is comparatively unexplored.

There are three *existing* points of contact between climate change and TSPs: adaptation, mitigation, and transformation. There is also one other, a *potential* point of contact: regulation. Adaption refers to the impact of climate change on TSPs, as well as the changes in processes, practices, and structures to moderate potential damages or to benefit from opportunities associated with climate change.

Mitigation refers to the contributions of TSP GHG emissions to climate change. The most important source of GHGs arising from the activities of the ICT sector are indirect GHG emissions which result from the generation of purchased electricity consumed by TSPs to power digital facilities and the services that sit upon them.

There is a paradox at the heart of the relationship between ICTs and climate change. On the one hand, continuing market growth in the ICT sector is driving power consumption ever higher

and thus creating more GHGs. On the other hand, the ICT sector features rapid technological transformation, with all that this implies for reduced power consumption per unit of output and, in consequence, proportionate reductions in GHGs per unit of output.

Transformation refers to the role of TSPs in helping other sectors to reduce GHGs. TSPs can help players in other sectors to become aware of their own GHGs through techniques to monitor carbon production and energy consumption. But TSPs can also develop, and help others develop, innovative products, services and business models that reduce GHGs across the economy, particularly by substituting ICT for more energy intensive modes of business and communication.

As indicated above, regulation is a *potential* point of contact. Chapter seven considers the question of whether regulation should be the fourth point of contact between ICTs and climate change by considering four dimensions of this possible point of contact:

- General framework for regulator's involvement in climate change issues;
- Modalities of regulator's involvement;
- ICT regulators as exemplars; and
- Regulators as facilitators of sustainable market development.

The core activities of ICT regulators typically focus on ensuring fair market entry and competition, promoting investment and universal access to ICT services, and protecting customers. Regulators seek to provide a balance of incentives and sanctions to bring about the desired outcomes without becoming involved in the micro-management of the sector. Some regulators are also concerned with shaping behaviours of sector actors, which may go beyond the regulated players to include their customers or their customer's customers. Generally, however, many of the energy-intensive services and applications that are emerging in the new "telecosm" are not owned and operated by the regulated TSPs. In fact, these services and applications are mostly "outside" the scope of current telecommunication regulation, other than technical and commercial requirements that apply to any customer that is connected to a telecommunication network.

Important questions flow from this reality. Should the mandates of ICT regulators be expanded to include the promotion of public policy objectives related to reducing GHGs? Should these mandates be expanded to include increased oversight over the end-users of ICT products and services with a view to reducing their GHG emissions? What role should climate change play in ICT regulators' decision-making? What role is there for ICT regulators in persuading the public to behave differently so as to reduce the GHGs produced by individuals through the use of energy-saving and clean-energy ICT services and applications?

Assuming that there is a role in the mandates of ICT regulators for public policy objectives related to climate change, how can regulators integrate climate change measures in TSP regulation? The methods that can be employed to promote climate change-related objectives take many forms, with varying degrees of formality and legal enforceability.

One of the themes in this chapter is the need for ICTs in general and TSPs in particular to show that they have “clean hands” when it comes to GHGs. In this vein, some governments have set out how they intend to act as exemplars, by reducing their own GHG emissions.⁶ Should ICT regulators follow suit, with benchmarks and publication of their own GHG-related behaviours?

Some ICT regulators already record their plans for environmental protection and periodically report on their actions. It is important that, in conducting their own activities, sector regulators set a good example in seeking to manage their GHG production. Regulators might undertake this management through their use of buildings and travel; through their use of ICT products and services to substitute for GHG producing activities where possible; and by measuring their GHG footprint.

Beyond sector-specific regulation and the ICT regulator’s own activities, is there a potential role for the ICT regulator in advocating for sustainable market development, for example, by lobbying for more effective carbon pricing? The rising price of energy and more rigorous emissions controls will incentivize companies both inside and outside the ICT sector to find innovative ways to curb GHGs. But will leaving it to the market provide sufficient incentives?

As indicated above, the purpose of chapter seven is not to provide answers to the aforementioned (and other) questions, but rather to create a framework for dialogue about the potential role of ICT regulators in addressing climate change. The debate about this issue has only just begun and the possibility that ICT regulators should have some specific involvement relating to climate change is bound to be controversial.

8 POSTCARDS FROM THE INFORMATION SOCIETY: LIVING WITH ALWAYS-ON TECHNOLOGY – THE GOOD, THE BAD, AND THE JUST PLAIN BAFFLING

Chapter eight takes an exploratory and critical view of the Information Society – not as it was predicted to develop, but as it actually is evolving in many areas of the world.

In 2010, ITU estimated that more than 2 billion people were using the Internet.⁷ There is evidence that people around the world have accepted the idea that the Internet is not only useful but perhaps even essential. Increasingly, the Information Society includes an array of the following capabilities:

- Converged voice and data networks that empower text messaging, email and instant messaging;
- Options for "e-government" services, allowing online public access to government information, programmes and services;
- Access to social and educational services, including distance learning, tele-medicine, job training, cooperative extension and other public benefits;
- A revolution in business and commercial behaviour, empowering telecommuting, accelerating e-commerce and innovating new "virtual" companies;
- A whole new universe of social networking, allowing individuals and groups to share information, pictures and contacts online; and even
- A growing "networked environment" of appliances, automobiles and handheld devices that are "aware" of their environs and can adapt their energy usage and other functions accordingly.

These capabilities are unequally distributed around the world. While Internet penetration reached an estimated 71 per cent in 2010 in already-developed countries, in developing countries, the penetration number lagged behind at just 21 per cent.⁸ There continues to be both a regional divide and an overall lag in the build-out of fixed and mobile broadband networks. Broadband access – which empowers much of the advanced multimedia and graphically rich content that defines the Information Society – remains largely confined to Internet users in developed countries in 2010.

The implications of stratification in Internet access are twofold. First, the digital divide between countries threatens to widen information and economic disparities between more developed countries (or rapidly developing ones) and economically undeveloped countries. Second, the

limited availability of broadband access could easily widen disparities between the economically advantaged and disadvantaged populations *within* countries.

Chapter eight reviews the underlying technologies – from networks to handheld devices – that underlie the Information Society. These include the high-speed, large-capacity backbones, the wireline and wireless broadband access networks, the end-user devices, the features and applications for these devices, and advanced services like mobile TV that provide content. The chapter then explores the effect of these "always-on" technologies and Information Society services and applications on our daily lives. For individuals with broadband access to the world, and for the regulators who are called upon to protect them, the Information Society has truly become an environment of "the good, the bad, and the baffling."

In terms of the "good", there is no doubt that broadband networks, smart phones, computers, and the Internet together provide enormous advances in social and personal welfare. Broadly, the benefits of the Information Society fall into categories relating to citizenship, consumer empowerment, communitarian involvement, and personal welfare.

As with every technological and sociological revolution, the information revolution has had some unintended consequences. There are some clearly detrimental aspects of the Information Society. The "bad" aspects of the Information Society include: computer malware and botnets; identity theft, fraud, and invasion of privacy; inappropriate and offensive online content; online "predators" who seek to establish contact with potential victims over the Internet; and unintended environmental and health impacts from discarded computer and cell phone components.

Finally, the Information Society comes with its share of the just plain baffling. That is to say, the intensive use of online services and new forms of social interaction has generated questions that have never been addressed before. Among the questions that have emerged during the past decade's immersion in cyber-mania are:

- Are online links and relationships crowding out face-to-face interaction?
- Can individuals actually become addicted to online experiences, to their own detriment?
- Are individuals using the anonymity of the Internet to bully, harass, or deceive others?
- Does the hyper-kinetic, multi-tasking nature of living online lead to a re-ordering of the way we think, observe, and make decisions?
- Are the omnipresence and variety of the online experience affecting the welfare and development of children?
- What affect are Internet commentary and political blogging really having on the level of civil and political discourse?

Chapter eight concludes by presenting the challenges and some useful approaches for regulators as they attempt to understand and address the new Internet-infused world in which consumers now live. One challenge relates to "the regulation gap": existing regulatory frameworks often do not address newer technologies or maintain outdated categories that do not account for

convergence of platforms to provide similar services. Increasingly, governments have been reviewing their regulatory structures and codes to determine whether and how they should be amended to address the differences between older, circuit-switched networks and newer, packet-switched ones.

Chapter eight explores some of the regulatory areas in which governments are expanding, or considering expanding, their role in guiding the Information Society. These areas include:

- Promote broadband roll-out;
- Rationalizing jurisdiction and regulatory status;
- Competition and tariff regulation;
- Open access and "net-neutrality";
- Consumer protection and privacy;
- Online content;
- Security issues; and
- Spectrum.

Many of the issues confronting regulators are outside regulators' "comfort zones." That is, they often raise questions of social well-being in addition to economic vitality. While the benefits of the Information Society are manifest, the broadband revolution has opened up a Pandora's Box of new issues and challenges. In most countries, regulators are now fully engaged in addressing these challenges. But for now, consumers of all ages are very much pioneers in the Information Society, reaping the benefits of their new world, but also incurring the risks, without much regulatory protection. It will be up to policy-makers and regulators to determine how actively regulators can or should intervene to protect consumers without squelching the very innovation that has revolutionized telecommunications in the 21st century.

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- ¹ Extracted from the ITU World Telecommunication/ICT Regulatory Database on the ICT Eye. See www.itu.int/icteye
 - ² Note that the developing country case studies were confronted with major methodological problems due to the lack of sufficiently large time series and sample sizes and sufficiently disaggregated indicators.
 - ³ Yongsoo Kim, Tim Kelly and Siddhartha Raja, Building Broadband: Strategies and Policies for the Developing World, Global Information and Communication Technologies (GICT) Department, World Bank, January 2010 at www.infodev.org/en/Article.454.html.
 - ⁴ This is however a broad definition. There is no single definition of cybercrime. For an overview of the various offences that fall within the definition of "cybercrime", see Box.1.
 - ⁵ Annual report 2008 Belgian Institute for postal service and telecommunication, BIPT, 2009, available at: <http://bipt.be/GetDocument.aspx?forObjectID=3091&lang=en>.
 - ⁶ DEFRA, *A Framework for Pro-environmental behaviours* (London: DEFRA, 2008) at 53, online: www.defra.gov.uk/evidence/social/behaviour/documents/behaviours-jan08-report.pdf.
 - ⁷ See ITU-D, "The World in 2010: ICT Facts and Figures" at: www.itu.int/ITU-D/ict/material/FactsFigures2010.pdf.
 - ⁸ www.itu.int/ITU-D/ict/material/FactsFigures2010.pdf

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