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Report on the

WDR Dialogue Theme 2002

# Designing Next Generation Telecom Regulation: ICT Convergence or Multisector Utility?

January 2003


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infoDev ITU LIRNE.NET


# The World Dialogue on Regulation for Network Economies (WDR)

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# Acronyms

| | |
|---|---|
| ATM | Asynchronous Transfer Mode (networks) |
| BCE | Bell Canada Enterprises |
| BT | formerly British Telecom |
| CCI | Communications Commission of India |
| CpU | Capacity per User |
| CRTC | Canadian Radio-television and Telecommunications Commission |
| DVB | Digital Video Broadcast |
| EU | European Union |
| FCC | Federal Communications Commission |
| HDTV | High Definition Television |
| ICT | information and communication technology |
| IP | Internet Protocol |
| IPR | Intellectual Property Right |
| KPN | Koninklijke PTT Nederland (Royal Dutch Post services, former Dutch PTT) |
| NARUC | National Association of Regulatory Utility Commissioners (formerly National Association of Railroad and Utility Commissioners) |
| NS | Nederlandse Spoorwegen (Dutch Rail) |
| OFCOM | Office of Communications (UK) |
| OFFER | Former UK Office of Electricity Regulation |
| OFGEM | Office of Gas and Electricity Markets (merged UK Regulatory Agency) |
| OFTEL | Office of Telecommunications (UK) |
| PLC | Power Lines Communication (or Carrier), *also* PLT – Power Line Telecom |
| POTS | Plain Old Telephony Services |
| POTVS | Plain Old TV Services |
| PUCs | Public Utility Commissions |
| QoS | Quality of Service |
| SDTV | Standard Definition Television |

# Executive Summary



Continuously expanding applications of information and communication technologies (ICT) are transforming local, national, regional and international economies into network economies, the foundation for information societies. They are being built upon expanded and upgraded national telecom networks, the new information infrastructures. The point of entry to participation in these new economies and societies is through local communication networks, which determine the access possibilities and boundaries of opportunity for individuals, organisations and countries. The telecom reform process is directed to creating an environment to foster a massive expansion in the coverage and capabilities of the information infrastructure networks, with national telecom regulators as the key implementers of the policies of reform.

The first phase of reform has focused on industry specific telecom policy and regulation, with mixed results and generally slower than expected progress. The second phase, now being formulated in most countries, is influenced primarily by experience to date and the rapid changes underway in technologies, markets and industry structures. This report examines the main alternatives being considered – ICT convergence regulation and multisector utility regulation.

ICT convergence involves the integration of IT hardware and software into telecom systems, digitising networks and making possible an increasing array of Internet services. But it is also introducing new issues that may require regulation, including security, privacy and consumer protection. The report outlines this ICT convergence showing that, it has many dimensions and trade-offs and is proceeding with varying speeds at different points in the value chain and among different network elements and technologies; it is accompanied by divergence and disintegration developments as well as convergence and integration; technology trends and market trends can be very different; and the processes of convergence are far from complete and subject to unpredictable change.

ICT convergence also may involve an attempt to integrate telecom and broadcast media regulation. As networks become digitised and broadband capacity is established, telecom broadcast services can be provided over the enhanced information infrastructure and on the Internet. There is a potential integration of telecom network carriage and broadcast content. But carriage and content regulation have been about quite different issues and applied within very different regulatory frameworks. The report examines the evidence as to whether and how these are converging and the potential implications.

Multisector utility regulation involves the integration of common regulation across a combination of utility sectors that are undergoing structural reform, e.g., telecom, energy, transport, water. These sectors are going through very similar processes of structural reform, use important common

resources, e.g., rights of way, and are characterised by increasing multisector mergers. The regulatory objectives of liberalising monopoly utility industries – encouraging efficiency and universal access – are essentially the same. The report assesses the potential advantages and disadvantages of multisector utility regulation focusing particularly on the circumstances in developing countries.

Although there is no inherent reason why a country could not establish a super regulator covering all the ICT and multi-utility sectors, none have or are seriously considering it. The different circumstances, problems and priorities among countries suggest that the next step in telecom reform will be in response to the priority policy issues in each country. The research, dialogue and analysis of these issues leads to the following conclusions:

1. ICT convergence that is upgrading the capacity and capabilities of telecom networks to information infrastructures raises many issues that next generation policy and regulation in all countries must address. They cannot be avoided. Although the scope of regulation may vary among countries, and all responsibilities for regulation – e.g., electronic commerce, information security, consumer protection – need not be assigned to the telecom regulator, it is important that the specific role for telecom regulation in helping to manage the information infrastructure for the network economy be clearly defined, especially as many of these issues will require regional and international coordination.

2. Although the integration of telecom and broadcast media and its regulation is most often presented as a case of ICT convergence, it has more characteristics of multisector integration than convergence. Attempts at industry integration have not realised significant convergence benefits, and the major regulatory issues remain very different. And even from a multisectoral perspective, essential commonalties between telecom and broadcast media operations and regulation are not evident. The case for attempting to integrate next generation ICT / telecom regulation with broadcast media content regulation is very weak. Considering the risk of political interference in the regulatory process, inevitably raised with respect to broadcast media content regulation, the essential independence and accountability of ICT/telecom regulation could be compromised. Most countries are likely to find that the benefits of keeping telecom and broadcast media regulation separate will exceed those of integration.

3. The case for multisector regulation is not driven by convergence, but by the potential efficiency in regulating issues that are common to several utility sectors, and to the most effective design of regulatory institutions. Experience suggests that the potential efficiency gains are likely to be much less in practice than in theory, although still positive. For developing countries they will be greater because of major shortages of skills in the specialised technical disciplines of engineering, law, accounting and economics, and for

that reason alone multisector regulation must be seriously considered. Although some experts expect multisector utility regulators to be structurally more protected from the influences of political and corporate lobbying, and more capable of implementing market liberalisation policies, this will depend on the circumstances in each country. Similarly, whether multisector regulation will tend to lift all utility sectors to the standards of the leading sector – in most cases telecom – or hold back the leading sector from more progressive development will be determined by local conditions.

Whatever structure of next generation telecom regulation is adopted, all countries will need to pay much greater attention to the need for increased coordination of policy directions and regulatory activities both across the industries and sectors examined here and with other countries. This report provides an assessment of evidence and a framework for analysis that will assist countries in examining the issues, options and implications, as they establish the policy objectives and design the structure of their particular next generation telecom regulation.

# A. Building the Regulatory Foundations for Network Economies

## 1. Infrastructure for 21st Century Network Economies

Continuously expanding applications of information and communication technologies (ICT) are transforming local, national, regional and international economies throughout the world. Just as electricity, the telephone, railroad and automobile each provided a major stimulus to economic growth and a significant restructuring of economies and societies during the 20th century, so the ICT revolution is in the process of creating another "paradigm shift" for 21st century economies and societies (Freeman & Louçã 2001). This has been recognised in recent years at the highest levels of national, regional and international government in a variety of Information Society policy statements and reports, culminating in the adoption of the *Charter on Global Information Society* at the Year 2000 G8 Summit in Kyushu – Okinawa (Digital Opportunity Task Force 2001).

Although the information society perspectives, objectives and characteristics that are outlined in these policy statements and reports vary considerably, they are all based upon a common premise – that the extensive use of advanced telecommunication (telecom) networks for the communication of vast amounts of information will enable significant improvements in economic productivity, and provide a wave of opportunities for economic, social and individual growth. These advanced telecom networks will become the *information infrastructures* for a cornucopia of new services – sometimes called next generation Internet services – that will transform economic and social relations and activities. The foundation of information societies will be their information infrastructures, the transformed and upgraded telecom networks (Melody 1997: chapter 32).

### 1.1 Participation and Opportunity

The point of entry to participation in information societies is the communication networks that provide both access to services and information, and opportunities for participation. The productivity improvements and benefits that are actually realised by people, organisations and countries will depend upon how effectively these networks can be used. Therefore, as a descriptor of the new economies we have selected the term *network economies*. It is the network characteristics of economic activity that will be changing quite dramatically, and it is the capability for exploiting the potential benefits of these new networks that will

drive economic growth and productivity improvements. The networks determine the boundaries of participation and opportunity.

The relationships described here are illustrated in Figure 1. The telecom infrastructure provides the foundation resource that is being transformed into a broadband information infrastructure capable of supporting next generation Internet services. It is expected that these services will be applied widely across most institutions in society, bringing about the paradigm shift to network economies and information societies. Those countries with a modern telecom infrastructure providing a universal service have a much stronger foundation on which to build than do poor countries with very limited telecom networks. But they all have many formidable challenges to confront.

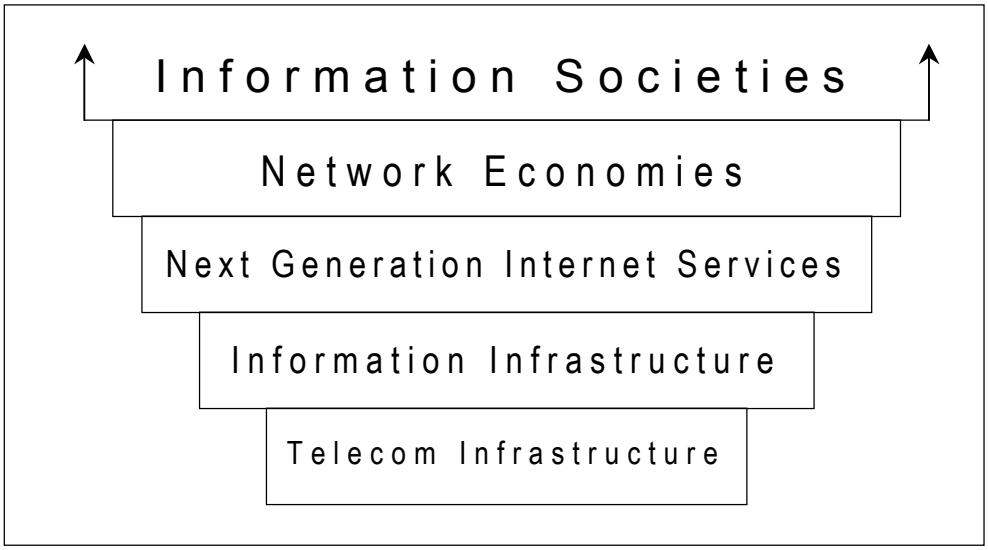


**Figure 1** – The Building of Information Societies

## 1.2 Slow Development

In its early stages, the pace of information infrastructure development has been unacceptably slow, at least with reference to the expectations of many analysts, policymakers and potential users. In the homeland of the Internet, the US, the *Telecommunications Act of 1996*, and its key implementing agencies – the Federal Communications Commission (FCC) and state regulatory agencies – have not provided as strong a stimulus to information infrastructure development by the telecom industry as anticipated. In Europe, the long awaited European Union (EU) "telecommunications package" of new Directives is widely seen as catching up to the present rather than preparing the ground for the future.[1]

In developing countries more than two-thirds of the people have never made a telephone call and have no access to a phone, let alone a personal computer. During the last decade, more than 100 countries have restructured their telecom institutions, providing for market-based development, the licensing of additional operators and the establishment of sector-specific regulators to drive network development. This has provided explosive growth in basic mobile services in a number of countries, but only very limited improvements in fixed network capabilities. In most countries new regulatory agencies have had difficulty establishing and maintaining transparent and independent processes during the early stages of telecom reform; and about half the developing countries in the world have not yet implemented telecom reform.

For most developing countries, the task of rolling out a national telecom network where there was none before is daunting. But the Internet, and next generation Internet services, help make a business case for greater network roll-out on a financially sustainable basis, although by no means approaching general standards of universal service. The potential for next generation Internet services makes all telecom networks more valuable. The challenge for developing countries is finding ways to leverage the potential of next generation Internet services to stimulate the roll-out of national networks that will meet both basic communication and advanced Internet services needs.

It is apparent that national telecom policy and regulation – both the regulations and the regulators – will play a major role in implementing structural reforms. The distinctive network and public interest characteristics of the information infrastructure will require a continuing proactive role for regulation if network development objectives are to be met, and the foundations prepared for the next generation Internet services that will support new network economies (Melody 1999). What is unclear at the moment is how direct regulation by independent regulators can best facilitate the achievement of these objectives. Should industry specific telecom regulators be redesigned as convergence regulators so they can more comprehensively and systematically address the full range of next generation Internet issues? Or should they be redesigned as multisector utility regulators so they can leverage synergies across infrastructures to promote the most rapid information infrastructure network roll-out? The best solution may vary from country to country. What seems very clear, however, is that it is highly unlikely that industry specific telecom regulation as initially established will be able to do the job.

## 2. The Dynamics of Technologies, Markets and Regulation: Synergy or Blockage?

The development path of any industry or economic sector is significantly affected by the opportunities provided by, 1) the available technologies; 2) the particular characteristics of its markets; and 3) the directions and

priorities of related government policies and regulations. These factors can be mutually supportive in stimulating growth and creating benefits, or they can conflict with one another, creating major blockages to development. Potential opportunities for development in the sector will unfold along a trajectory arising from the interrelations among technologies, markets and policies. This is illustrated in Figure 2.

However, the existence of development opportunities does not guarantee the delivery of benefits in the real economy. Technological opportunities must be productively applied; market opportunities must be converted into desired services; government policies must be implemented through effective regulation. The development path of real economies is governed by the interactions among these *implementation* factors, also shown in Figure 2.

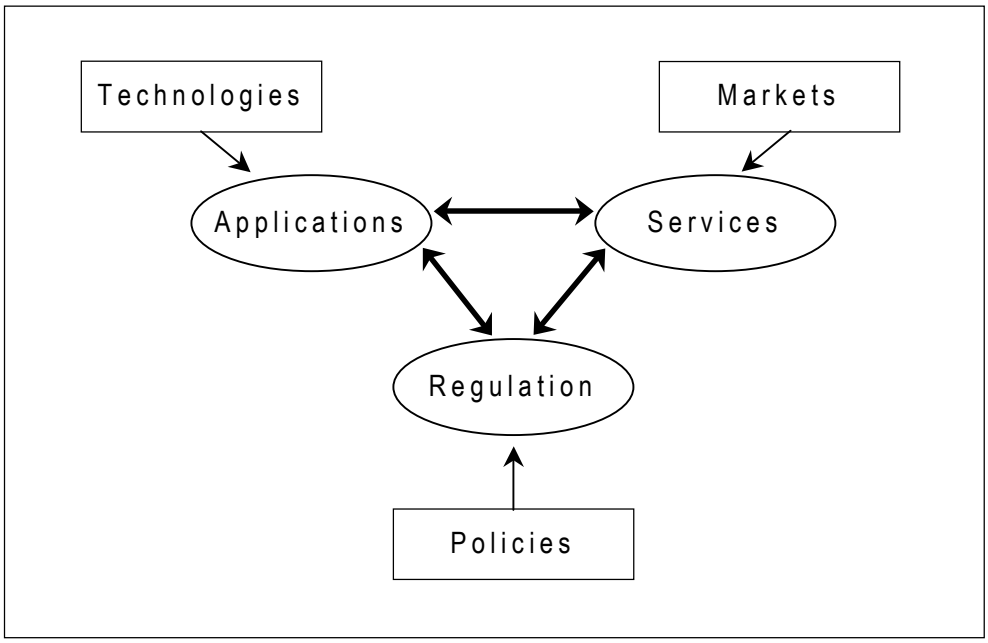


**Figure 2** – Criteria for Economic Growth

In a dynamic environment, it is often technological change that leads the way by creating new opportunities, which are then exploited in the marketplace, before policy and regulation are adapted to the new circumstances. But not always. It can be observed that the most successful countries implementing telecom reforms over the past decade have been characterised by proactive regulatory agencies driving the process of adjustment to new technological and market opportunities. This is especially true in developing countries, where telecom reform has been highly dependent on the effectiveness of the new regulators. Regulation can be a catalyst for development or a constraint upon it. Information infrastructure development requires that regulation be established and

recognised as a highly productive resource – a creator of synergy and a catalyst for growth.



## 2.1 Moving Beyond Industry Specific Telecom Regulation

Today there are many policy visions of information societies on the horizon. They are founded on opportunities now coming into sharper focus in the form of network economies, where next generation Internet services will be provided over ubiquitous broadband information infrastructures. The technologies are improving rapidly, and markets and industries are in a continuing process of realignment as reflected in the many mergers, joint ventures and strategic alliances taking place. But the policy and regulatory frameworks until recently have remained focused on, and constrained by the inherited boundaries of the telecom industry. Policy and regulation is lagging behind technology and markets in adapting effectively to the changing environment.

As regulation is presently structured in most countries, industry specific telecom regulators cannot come to grips with the challenges of fostering a rapid and efficient roll-out of information infrastructures, and building the regulatory platforms needed to promote electronic trade, network and information security, consumer protection, and other requirements for widespread take-up of next generation services. It is time to examine more closely the design of next generation regulation that is capable of building the regulatory foundations for growth in network economies. This is an important matter for all countries. They will all be part of the global information infrastructure network, so there will need to be a high degree of international compatibility across many of the network regulations.

## 2.2 ICT Convergence Regulation

One direction for next generation regulation gives priority to ICT convergence issues. Regulation must focus on the ICT sector and the issues associated with converging technologies, the digitalisation of all forms of content, electronic trading and other core next generation Internet services.

Yet, it is noteworthy that telecom reform so far has been driven more by the unbundling and separation of network activities than by converging activities. During the national monopoly era, there was a high degree of integration of, if not convergence of activities. More recently, telecom has been separated from post; telecom services have been unbundled from facilities; IT hardware has been unbundled from software; broadcast television, cable, satellite, mobile and Internet services have all developed as independent networks or relatively independent components of the larger telecom network, for the most part outside the control of incumbent telecom operators.

Does technological convergence that allows the transmission of all forms of content in digital bit streams change this trend toward unbundling and wider participation of more diversified players from different industries? Does convergence point the industry in the direction of more integrated networks and services, major mergers and acquisitions, barriers to entry and monopoly power? Does it require that the more politically sensitive media content regulation somehow be integrated with telecom regulation, which historically has had quite different objectives? And if it is, will national regulation become more or less effective? What are the implications for policy development and the effectiveness of regulation? What is clear now is that industry specific telecom regulators generally do not have a mandate broad enough to enable them even to examine such questions effectively. So far, only a few countries have begun to respond to the policy and regulatory challenge of convergence.

## 2.3 Multisector Utility Regulation

A quite different direction influencing policy options and the design of next generation regulation gives priority to multisector utility developments, which unexpectedly have become a major part of the first stage of telecom reform in many countries. Most facilities-based network competition in the telecom industry has involved – indeed required – major co-operation with other utility sectors, resulting in many joint ventures, mergers, and a significant trend toward multisector utilities.

Would the establishment of multisector utility regulation provide both more efficient and effective regulation across the different utilities, and a more direct and immediate stimulus to investment not only in information infrastructure network roll-out, but also network development in other infrastructure sectors as well? Is this not also a step in the direction of sanctioning, if not promoting excessive monopoly power, in this case by providing implicit policy and regulatory support for mergers among dominant incumbent operators in different utility sectors? Yet, is there not clear evidence of economies in addressing the many regulatory issues that are common to all utility sectors?

## 2.4 Designing Telecom Regulation

This report critically examines the multiple rationales for ICT and media convergence regulation and multisector utility regulation and the practical questions of implementation they pose with a view to contributing to informed policy choices. Both options involve substantive as well as procedural issues, not necessarily separable. Policy design is affected by overall policy objectives, not necessarily limited to extant and accepted objectives such as increasing investment in a particular infrastructure sector. The design may be driven by explicit objectives such as enhancing a country's comparative advantage with regard to advanced service industries, or implicit objectives such as minimising the political or

perceptual fallout of a change in regulatory regime or personnel. This report examines the conditions that may affect the creation of convergence and multisector regulation, ranging from underlying commonality of inputs and the behaviour of regulated firms to considerations that are specific to the regulatory process such as scarcity of regulatory resources and safeguards for regulatory independence.



## 3. Definitions of Industry, Sector and Multisector

An *industry* is defined primarily in terms of substitution possibilities in consumption, i.e., do consumers treat the products or services as substitutable.[2] Conceptually, complete substitutability would be the test to determine the boundaries of an industry. In reality, a high degree of substitutability of consumer products or services defines an industry. For purposes of regulation, it is more common to define the scope of regulatory agencies in terms of *sectors*, rather than single industries. A *sector* is a set of closely related industries which have a degree of substitution possibilities or substantial economies of scope in the supply or demand of the different products or services. Industries within a sector have grounds for a common interest that do not extend to a high degree of substitutability of products or services. The higher the substitution possibilities, the more likely it is that the term “industry” will be used rather than “sector”.

As consumption (demand) or production (supply) conditions change, the definitions of industries and sectors will change. For many decades, the telecom industry was seen as providing voice communication, which was distinct from both the data communication industry and the broadcast industry because there were few substitution possibilities. Improvements in packet switching have increased substitutability for circuit switching on the production side of telecom. Substitution of Internet Protocol (IP)-based services for conventional voice telephony is becoming more feasible on the consumption side (ITU 2001b). This has led to the classic telecom industry and the data communication industry being seen as converging into one industry. In regulatory terms, this is not as much of a watershed as claimed because the two industries have for a long time been seen as part of the same sector, evidenced for example by the Computer Inquiries initiated by the US Federal Communications Commission more than 30 years ago (FCC 1970).

Recent technological changes have broadened the service capabilities of the cable industry which has been considered a segment of the broadcasting industry, on the production side. It is now technically possible to supply television, voice and data services on cable networks. This makes a stronger case for industry-level convergence among telecom, data communication and cable industries.[3]

In Canada and the United States, the broadcast and telecom industries have for a long time been regulated by the same federal agencies, albeit by

distinct divisions. The United Kingdom is among the most prominent of developed countries committed to establishing a convergence regulatory agency that would subsume the current Office of Telecommunications (OFTEL) and four other agencies covering the broadcast media and radio spectrum. Bolivia, Brazil, Burundi, Guatemala, Honduras, India, Jordan, Kyrgyzstan, Nigeria, Tanzania, Venezuela and Zambia are among the developing countries said to have convergence regulatory agencies or to be seriously considering them (ITU-D 2001).

Industries that are not characterised by a high degree of substitutability of services and economies of scope are considered to be in separate sectors. In comparison to telecom, and the other industries converging into an ICT sector, energy (gas and electricity), transport (different modes), pipelines and water are considered separate and distinct sectors. There is no substitutability of consumption or production with the ICT industries, but there are significant economies to be realised with coordination across these sectors in the planning and use of rights of way and other common resources.

Multisector regulation has become an issue in many countries, not because of technological convergence or the substitutability of services, but primarily because of economies of scope in regulation across several infrastructure sectors. Given the existence of scarce regulatory resources, multisector regulation may be a vehicle for achieving more efficient and effective regulation, and thereby more effective sector performance, in several infrastructure sectors supplying public utility services. Many developing countries in particular are examining the possibilities for multisector utility regulation.

It is clear that the fundamental issues relating to ICT convergence regulation are quite different than those relating to multisector utility regulation. Countries are seriously considering changes from industry specific telecom regulation to one or the other. Although there is no reason in theory why a country could not consider the creation of a super ICT and multisector utility regulator, none are. Each country is responding to the priority issues that confront it with respect to the next step in its telecom reform. It is important that the options and implications of ICT convergence and multisector utility reform be identified and assessed. By so doing, this report can provide a useful reference for all countries planning and implementing the next step in their particular specific telecom reform processes.

# B. The Convergence Perspective

## 4. ICT and Media Convergence / Divergence

The broad range of industries involved in ICT and media convergence are IT, telecom, broadcasting and other media dealing with information and entertainment. Table 1 illustrates the industries involved and the levels of activities from equipment / hardware and transport / software to content / service provision. Each of the different industries can be conceived as encompassing all three levels although they are not entirely comparable. However, Table 1 illustrates that there are many possibilities for convergence at a horizontal level between different industries as well as vertical integration between different levels. It also illustrates that divergence and disintegration are possible. Industries that formerly have witnessed (some degree of) vertical integration may experience new lines of divisions of labour between different actors in the field. Convergence / integration and divergences / disintegration go hand in hand. It is in essence a process of unbundling and realignment of functions and activities that is underway.

**Table 1** – Convergence / integration and divergence / disintegration

| | IT | Telecom | Broad-casting | Other media |
|---|---|---|---|---|
| Content / services | Software based content | Telecom based services and content | Broadcast programs | Film, music, newspapers, etc. |
| Transport / software | Software | Network services | Transmission | Cinemas, video rentals, etc. |
| Equipment / hardware | IT hardware | Telecom equipment | Broadcast equipment | Reproduction of ilms, printing, etc |

## 4.1 Technology Neutrality

There is thus both a horizontal and vertical aspect to convergence issues, and both aspects are subject to examination in this report. The horizontal level has hitherto been primarily concerned with convergence at the equipment / hardware and transport / software levels (in communications called infrastructure and associated services, in the terminology of the European Union [see for example EC 1999]). Often countries have dealt differently – in terms of, for instance, licensing procedures and interconnection rules – with fixed telecom networks, mobile networks, and cable and terrestrial broadcast networks. At present, there is, however, a general shift in the rules and procedures in many countries towards an equal treatment (convergence) of different information and communication infrastructures. The EU is a case in point with its emphasis on technology neutral regulation (EC 1999).

## 4.2 Content Issues

The horizontal level also includes the possible implications of convergence at the content layer. Types of content that formerly were dedicated for specific industries can be conveyed on different infrastructures because of the common digital platforms. This presents new possibilities for end users and new market potentials for producers, but it also presents new regulatory problems that have to be solved. One of the problems is related to the provisions for public service in the broadcast area. Should such provisions be extended to the Internet web, or should convergence on the content level lead to an abolition of public service rules? Another issue relates to the extended access to different kinds of illegal or harmful information, for instance racist propaganda, which the Internet facilitates. What are the possibilities for countries to retain control of this? Yet another problem is related to the provisions for media responsibility that exist today for print and broadcast media but do not apply to Internet media.

## 4.3 Infrastructure and Content Together?

There is also a vertical aspect – not only in the sense that there are numerous examples of industries integrating or trying to integrate equipment, transport and content provision, but also in the sense that some countries integrate infrastructure regulation and content regulation. India is an example of this. The new Communications Commission of India (CCI), the Indian communications regulator, will integrate infrastructure and content regulation in one institution (see Government of India 2001). The UK is another example, in which the government is uniting five existing regulatory bodies dealing with communications into one regulator, OFCOM, with authority in both infrastructure and content questions (see Department of Trade & Industry – UK 2001). Singapore and Malaysia are also

examples of countries that have assembled the regulation of infrastructure and content. The InfoComm Development Authority of Singapore left the regulation of all forms of content to the Singapore Broadcasting Authority but it is envisaged that this too will soon be merged (ITU 2001a; Leong 2001).

In the case of horizontal convergence, it is a matter of converging regulation and possibly converging regulators. In the case of vertical integration, it is mostly a matter of integrated regulators, as infrastructure and content regulation are two rather different fields, although integration of content and infrastructure provision may have implications not only for the industrial structure but also for the content itself. The EU, for instance, draws a sharp line between infrastructure (and associated services) and content. It is, however, a question whether this is possible without leaving aside important issues.

## 4.4 Is Convergence Something New?

Often convergence is described as something new. But industrial convergence and regulatory dealings with convergence issues have existed throughout the history of telecom.[4] In many countries, there has been a deliberate policy to keep different communication fields apart for the reason of limiting media concentration. Formerly, companies have also had the intention of covering several media fields, and the question of benefits of complementarities between different media areas versus the problems of excessive media power is not new. What is relatively new is the technological foundation that digitalisation of all media provides for convergence developments and complementarities between formerly distinct media. What is also relatively new is the general trend toward liberal policies that has been seen during the past 20 years. Together, these developments constitute a new basis for the development of convergence and for the balancing of the benefits of complementarities versus the problems of media concentration and corporate monopoly power.

The trend toward liberalisation of telecom is in part an expression of a convergence policy. The introduction of data communication on telecom networks was an important technological basis for the regulatory changes in telecom and the motivation of the industrial interests that lobbied for the initial moves in this direction. Companies, first in the US and later elsewhere, argued for changes in the regulatory structure, as they wanted a greater liberty to use the telecom networks for data communications. The newer questions that are put forward today under the heading of convergence first and foremost deal with the development of the Internet into a powerful communication infrastructure and the possibilities for integrating interactive one-to-one telecom and one-way one-to-many broadcast and print media, in addition to novel information retrieval capabilities.

### 4.5 The Main Issue

Convergence involves technological, market and policy / regulation dimensions. The main issue in the convergence discussion is, therefore, concerned with the possibilities for exploiting the industrial opportunities in creating a new dynamic ICT sector encompassing hitherto separate sectors.[5] Apart from the broad diffusion and use of the new media and communication (universal access) and the protection of consumers in new media markets, this is the overall issue for convergence policy: to establish a framework for the growth of a dynamic communication and information industry. It is in this perspective that most convergence policies are seen.

Regulatory policies with respect to telecom and broadcasting have, of course, always had an influence on business developments. But with the growing importance of the ICT sector and the even greater importance in relation to other industries and social developments, regulation of converging communication and information industries assumes central importance in the economic development strategies of governments. A sceptical view, of significant import especially in countries with poor governance, holds that the absence or minimal enforcement of regulation is what caused the efflorescence of IT, and that one must be wary of increased intervention, especially by uninformed, if not rapacious, governments.

## 5. Convergence Technology Trends

This section provides a summary overview, or layman's guide, to the major technological aspects of the ICT and media convergence processes. The focus is on the role of technological changes and developments in the creation of new conditions for production, aggregation, delivery and consumption of communication services.

The major technological changes that have facilitated the convergence processes are digitalisation and computerisation. Digitalisation enables new possibilities for development and creation of services within and beyond the framework of traditional communication sectors. It is, for example, likely that services that go beyond the traditional broadcasting services, like Internet services, will have a certain weight on the broadcasting market in the future, as demand for these services is increasing with the penetration of the Internet. When transmission capacity for end-user sites reaches that needed for transmission of video services, the Internet can be one of the platforms for interactive TV services.

Emerging new infrastructures with more capacity, developments in the traditional networks enabling them to offer more capacity to end users, and developments in compression and coding technologies resulting in less bandwidth requirements for audio and video services, all have diminished the technically based limitations for different networks to provide an

increasing variety of different types of services. But there is still a long way to go before network capacity constraints are substantially eliminated.

The following analysis is structured around the value chain of communication networks depicted in Figure 3, so that different subsections deal with the technological aspects of convergence in different parts of the value chain.

The analysis aims at illustrating not only the technological drivers, but also the barriers, for the convergence processes in different parts of the value chain.



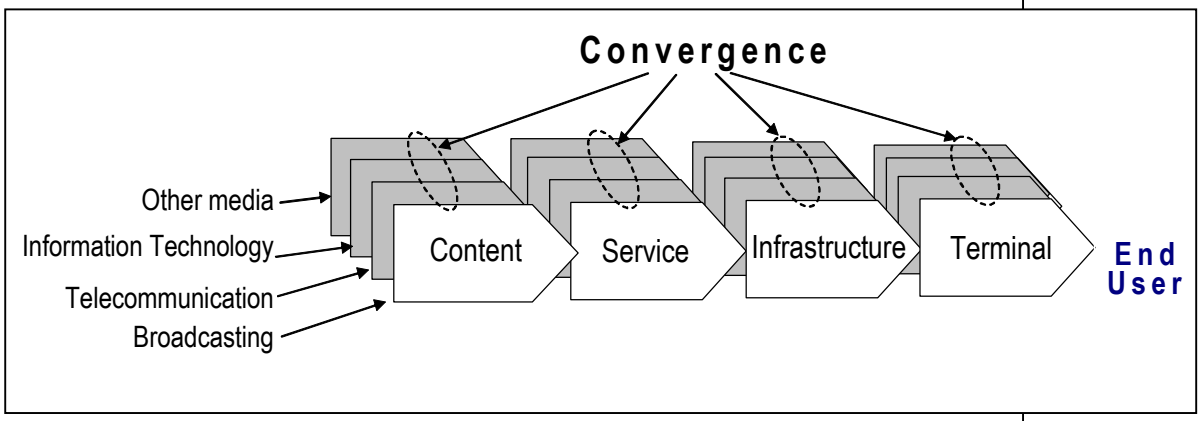


**Figure 3** – Convergence in the value chain

## 5.1 Infrastructure

Traditionally, different infrastructures have been used to transmit and deliver specific information and communication services. Examples regularly mentioned in the literature include: dedicated telephony infrastructures for transmission of Plain Old Telephony Services (POTS) and broadcasting networks for casting Plain Old TV Services (POTVS). These infrastructures have been dimensioned and optimised to meet the specific requirements of their respective services.

The technology of information and communication services has, however, been subject to radical changes during the last 20-30 years. Technological developments have resulted in the emergence of new infrastructures and better integration of services across infrastructures mainly due to digitalisation.

Integration and convergence occur at different speeds in different levels of the network. Core networks have other characteristics than access networks resulting in different conditions for their levels of convergence. The primary focus of the following is on the access networks where

convergence has developed more slowly and the most difficult convergence issues reside.

Apart from digitalisation, there are other important factors that impact on the convergence processes. Those include the following, that will be examined below:

- Network architecture
- Capacity requirements of the services
- Quality of Service (QoS) requirement of the services
- Way of use requirements of the services

### *5.1.1 Network Architecture*

We can broadly distinguish between two types of networks: telecom networks and broadcast networks. Broadcast networks traditionally do not have the return path necessary for interactive services. Digital broadcast networks, however, have a return path, either integrated in the network or using other networks.

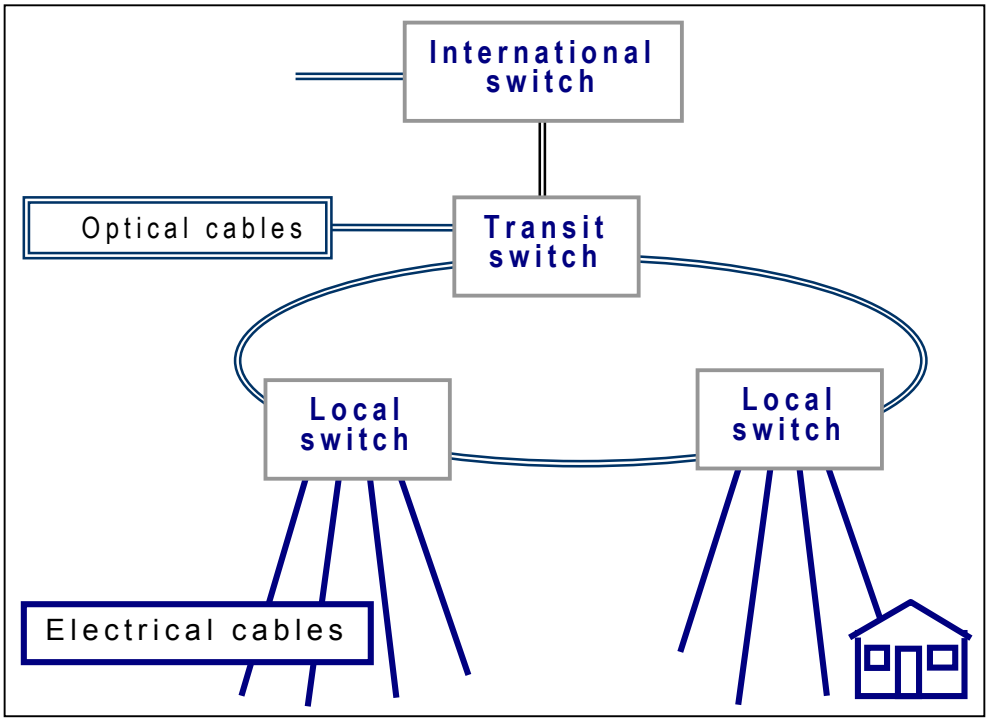


**Figure 4** – Switched Network: POTS network is depicted as an example of a switched network

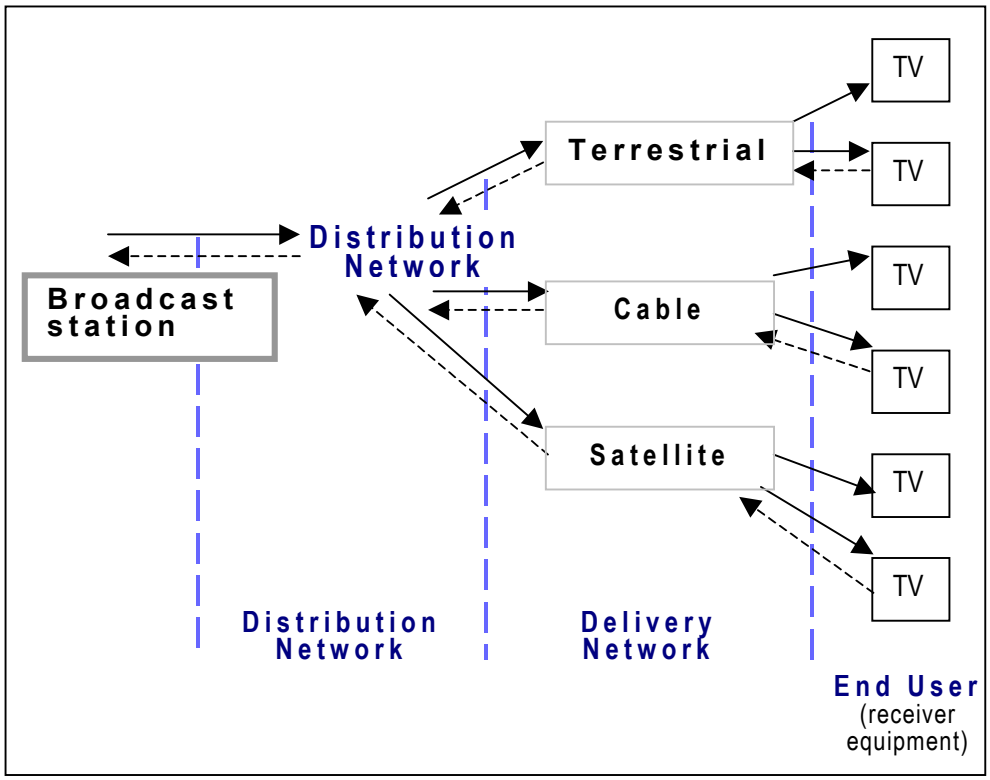


**Figure 5** – Broadcast Network: the dashed arrows in the figure indicate the possibility for interactivity in digital broadcasting

Traditionally, telecom networks are built to provide point-to-point services resulting in network architectures where the network resources between the user and the first switch in the networks are not shared (see e.g. Figure 4). This enables the service providers to offer customised services to individual users. However, the cost of operation and maintenance of these networks is high and the increase of capacity at end user sites is developing slowly, making it impossible in the short-term to integrate all kinds of services. In the longer term (yet undefined) developments in audio / video compression technology and new access technologies will make it possible to offer new services in these networks.

In broadcast networks (see Figure 5), users are connected to distribution points in the network and share the network resources. The capacity allocated to a broadcast service is dimensioned to give a good technical quality of the service; however, the Capacity per User (CpU) is very low. These types of networks are not optimised for point-to-point services but are well-suited for services with common interest.

Transmission of broadcast services over switched / routed networks is not necessarily an efficient way of utilising network resources, especially when 'broadcast service' denotes a service that is transmitted to many users and these 'many users' demand the service. All switches and routers in the

network will then do a simple job of connecting the same input to many outputs, which is an inefficient way of using a switched / routed network.

To a certain degree, this is in line with the experiments in the UK in the early 1980s, where the cable companies implemented switched cable networks. The cable companies observed that the vast majority of users watched the same kinds of programs for most of the time, reducing the function of the expensive switches to a wire connecting these inputs to all outputs.

A precondition for Internet TV (TV delivered over the Internet) becoming comparable to traditional (digital) TV is an exponential increase in transmission capacity to end user sites. By using a simple assumption that two or three services must be available for a household (different family members must have the opportunity to watch different programs at the same time, and be able to record a program on VCR), the necessary capacity will be about 40-60 Mbit/s in the case of HDTV and 8-12 Mbit/s in the case of SDTV.

For some time to come, the broadcasting networks with their one-to-many structure will be the most optimal way of transmitting broadcasting services to the vast majority of end users. However, when capacity is sufficient to provide broadcasting services over the Internet other parameters like the way services are used can limit the provision of broadcasting over Internet. If a service is used by the majority of people, it is a waste of resources to provide it through a switched / routed network, as it can easily be broadcast to all people using broadcast networks.

One scenario might be that Web-TV (world-wide web pages delivered over broadcast TV) co-evolves with digital TV and exists as a complementary and competitive platform to other delivery networks. As a complementary platform, special types of services that will not be provided on other platforms can be provided on the Internet. As a competitive platform, special narrowcast types of services provided on cable and satellite delivery networks could be provided on the Internet and compete with these infrastructures for some broadcast services.

### *5.1.2 Capacity / Bandwidth*

The capacity or bandwidth of different networks varies considerably. To provide convergence services, different networks must be able to transmit “the same kinds of services”. Video services have the most demanding capacity requirements and are one of the major components in all ‘convergence services’. Here we examine the capacity requirements of video services.

A bandwidth of 4 Mbit/s corresponds to regular PAL quality in the analogue world and is denoted as Standard Definition TV (SDTV). It is quite certain that traditional broadcasters will not accept a quality less than SDTV. Looking at the current capacity available at end-user sites (regular modem

up to 56 Kbit/s, ISDN up to 128 Kbit/s, and even available DSL technologies of up to 512 Kbit/s), it is obvious that allocation of 4 Mbit/s for a TV service is not currently possible on the Internet.

The capacity problem is not only relevant for the access network. Even if the access networks in some residential areas are increased to be able to provide the required capacity, it is far from certain that the backbone network will be upgraded accordingly. There are firms specialising in provision of new infrastructures, which offer LAN types of networks of 10 and even 100 Mbit/s to residential premises. But their backbone capacity can not match this development.

Regarding video services over the Internet, other coding schemes are used that do not offer acceptable broadcast quality but are feasible for narrowcast purposes, where the picture quality is not as important, and other Internet related added-value compensates for the lack of quality to some degree.

### *5.1.3 Quality of Service (QoS)*

Traditionally, QoS has been associated with the ability of telecom networks to guarantee a predefined level of quality for specific services when these are established and transmitted from point A to point B. These QoS standards are meticulously described in ITU / CCITT recommendations and have been among the arguments for establishing dedicated networks for different services, as this makes it easier to optimise the networks with respect to the QoS-parameters. A simple example is POTS, which demands specific quality for end-to-end delay, delay variation and noise when the connection is established. QoS requirements are not only applied in the transmission part of the communication, but also for other parameters as well. An example is the establishment phase of a POTS connection, where a set of other QoS parameters like the blocking rate and the number of lines in the access network and the capacity of the core network are needed.

Video services, especially interactive video services, are very sensitive to end-to-end delay, delay variation, noise / interference, etc. As long as a dedicated network is deployed for the distribution of video signals, these QoS parameters can be kept under control. When integrated networks are used, where video services are one of the services in the network, then different methods must be used to guarantee some minimum QoS parameters.

One method to guarantee a given level of service is that every service negotiates parameters over the network (delay, loss-rate, etc.). This method is now used for connection-oriented networks such as ATM-networks (Asynchronous Transfer Mode), but it is still an unresolved challenge in connectionless networks such as the Internet. Another approach is the establishment of a prioritising scheme that can be applied to IP types of networks and will be applied to the forthcoming advanced

IPv6. Meeting the QoS requirements of different services in integrated networks is considered as one of the major barriers to the convergence process.

### *5.1.4 Way of Use*

Another important aspect is the way in which services are used. One of the major differences in Way of Use is mobility versus fixed use. There will certainly be a degree of substitution between mobile and fixed networks (indeed there is substitution for some voice services now), but some services will only be relevant in either mobile or fixed networks.

An example frequently cited is radio services. These services are consumed mainly in mobile and portable environments. In this case, the Way of Use is one of the major reasons for establishing mobile networks for provision of radio services. The question of the necessity of dedicated networks for provision of radio services or the possibility of using, e.g., mobile communication networks for the provision of radio services is another issue that will be determined by a combination of other parameters.

## 5.2 Content / Services

Digitalisation of content is one of the major drivers of convergence. In the digital world, the same content can be transmitted across different networks, and different services can be offered based on the same content. The synergy achieved goes far beyond the electronic communication forms and includes among others the printing press.

The above mentioned capacity-per-user problems and the problems associated with return paths in broadcasting networks will influence the development of data services that will be available in the broadcasting networks. Examples of interactive services offered in broadcasting networks without using a return path include:

- Download of software: The broadcasting networks are mostly used in the daytime and evening hours. The transmission capacity during the night-time can be used to download, e.g., new versions of software to set-top boxes.
- Download of newspapers: In a similar way, newspapers can be downloaded to set-top boxes.
- Internet on TV: Access to the Internet in current TV communication networks is not possible because of capacity-per-user problems of digital TV networks. A partial solution can be to broadcast a limited version of Internet.

When using return paths, the traditional interactive services can be offered within broadcast networks. The spread of TV services within the Internet is the major example of the reverse process, namely provision of services that

traditionally belong to the broadcasting industry within the upgraded telecom network.



## 5.3 Terminals

Terminal convergence denotes the coming together of consumer devices such as the telephone, television and personal computer. Penetration of TV sets is much higher than PC terminals. TV sets are by far the most universal household communication terminal. Providing interactive services, including Internet, on TV can potentially benefit especially the 'information poor' and thus reduce the 'information gap' in many countries. This is an important implication of convergence, as a major part of the population of many countries will only benefit from the new services of network economies if it can receive the Internet services on TV.

The PC terminal is developing into a real competitor to the TV set as an access device to broadcast services. Additional low cost TV tuner cards are needed to be able to see traditional broadcast services on a PC. The PC is a well-designed medium for consumption of Internet services and is a good medium for convergence of a wide variety of services. But here also the way of use will be a vital parameter that determines the services for which the PC terminal and TV set will be substitutes.

Developments in the last four to five years show, however, that the direction of convergence is not only bringing together traditional services provided over different consumer terminals. There is also a trend toward the development of a variety of different access terminals for dedicated services and applications. The trend to services integration is being paralleled by a trend to a new diversification.

## 5.4 Heterogeneity *versus* Integration

One of the major barriers for convergence relates to the transport and delivery part (i.e. the infrastructure part) of the value chain. It has been shown that although digitalisation is a major parameter, it is still only one amongst several parameters that influence convergence at the infrastructure level. It is also important, to emphasise that the success or failure of convergence is not directly connected to the capability of one infrastructure to integrate all services.

None of the infrastructures available can integrate all the services in their current state. While integration of the back-bone parts of the networks have had better conditions to evolve, integration of the last mile coverage has been shown to be dependent on many different parameters. However, some infrastructures have better potential to be upgraded to integrate more types of services. Cable TV networks are examples of this. On cable networks, it is possible to offer several broadcasting services of acceptable quality and at the same time deliver Internet and basic telecom services.

Also new LAN types of networks in residential areas (and different wireless solutions coming onto the market) can provide acceptable performance levels. However, when upgrading cable TV networks and establishing new networks large additional investments must be made, and it is often not economical to do so.

One way of implementing convergence and delivering 'convergence services' is to utilise the synergy between different networks and consequently to utilise the strength of different networks. In this way, different components of the same service can be transported over different networks. This organisation of heterogeneous networks can be totally seamless for the end-user and function like an integrated network.

There are, therefore, choices to be made between a pure integration model and a heterogeneous network model. This choice depends partly on the characteristics of the types of communication in question and the characteristics of different kinds of networks and partly on the history of network development in different countries. There is a certain path dependency in the possible choices countries make, hinging on the former history of network development.

## 5.5 Developing Country Perspectives

The overall technological aspects of convergence in developing countries are not significantly different from developed markets. There are, however, certain possibilities for developing countries to leapfrog some particular stages of technical network development that developed countries have gone through. While in developed markets, the convergence process (both in integrated and heterogeneous network versions) mainly facilitates a platform where the same service is delivered through different infrastructure, for developing countries it mainly facilitates increased penetration of services in expanded networks. In developed countries, convergence facilitates more potential competition, for a range of services. In developing countries it is more likely to facilitate complementarity that justifies extending networks, although integrated services competition also will be enhanced.

One of the main aspects of convergence is that different services can be transmitted within different networks. This can be used in developing countries to extend the penetration of basic communication services. For example, cable TV networks can be used to offer telephony and Internet services. However this possibility of reuse of infrastructure is only possible if a regulatory framework is established that facilitates the efficient utilisation of available resources in different networks. This is often not the case.

Another important aspect concerns geographical regions where communication infrastructure is not available. This gives more freedom in the design of the future networks because the demand for other services

than telephony can be taken into account from the beginning, if policy and regulation permit it.

In many developing countries mobile communication is seen as a replacement for fixed telephony. The development of new generations of mobile networks can be utilised to offer mobile Internet and other advanced services. This is important for the provision of 'convergence services' in developing countries as the penetration of PCs is low (and is likely to remain low due to the costs of PCs, electricity constraints, etc.) in many regions.

In many developing countries the broadcast frequencies are under-utilised. Establishing digital TV networks in these countries will give the providers the possibility to go beyond the traditional broadcast services. For assignment of broadcast frequencies, it is important to consider that other services can be offered over these networks. This is important both for regulators working to extend advanced services and for market actors that can find new business opportunities in digital broadcast services.

For the longer term, the technological possibility now in the research and development phase that enables using electrical power lines for communication (PLC) is of special interest for developing countries as communication services can be offered without the need for laying new cables and wires to cover the last-mile. In many developing countries, power lines are extended to many small local areas that lack communication. And in areas unserved by either electricity or telecom, the combination of delivery of electricity and communication services will give new incentives for this development.

# 6. Convergence Market Trends

In this section, current trends in convergence of markets are examined. The ICT sector has been reshaped through a series of alliances and mergers. This has resulted in more globalised ICT and media industries and created new relations both between various layers in the value chain and across industries. Vertical integration between different levels in the value chains and international integration of national markets are also important aspects in many alliances and mergers.

Convergence is shaped by the combination of the technological trends described above and of financial and strategic considerations, which can be independent of the convergence of the underlying technologies. Until the 1970s, large industry conglomerates saw diversification as part of their strategy. Companies spread their activities over a wide range of industries, and quite often there were no links, or very weak ones between the divisions. This financial strategy has fallen out of fashion and been replaced by a trend towards concentration on core competencies. According to this strategy, involvement in other sectors should only take place if it possible to create symbiotic advantages through cross-sectoral activities.

## 6.1 Vertical Integration

Vertical integration is generally related to integration across the two or three horizontal layers depicted in Table1 above, and can take place within all of the four mentioned ICT industry sectors.

### *6.1.1 Telecom*

Telecom services markets were generally highly vertically integrated up to about 1980. The telecom operators focused on delivery of end-to-end services and they either produced their own equipment or had a close relationship with national equipment suppliers. During the 1980s much of equipment production was divested from service operations. This was partly a consequence of the emerging liberalisation of the telecom sector. The equipment manufacturers wanted to sell their products to incumbent operators as well as new entrants. Too strong links with one operator would limit this potential and most manufacturers therefore benefited from a position as independent companies. However, many operators still maintain, substantial R&D departments, mainly in software and service development, in order to create a competitive edge through provision of the most advanced and innovative services. So, for innovation some integration between the production of technology and service production still persists.

### *6.1.2 IT*

The IT sector also experienced a kind of unbundling as hardware and software has gradually become more separated. From the outset hardware manufacturers (e.g. IBM) developed their own software, but later software production was outsourced to independent companies and soon software became a separate industry. Hardware has become primarily a mass production commodity industry. Software has become highly diversified with a primary focus on services and applications.

### *6.1.3 Broadcasting*

For terrestrial broadcasting, equipment production and service production have in general been two separate activities. However, distribution and content production is highly integrated. For satellite and cable there is some vertical integration between content and distribution, as well as equipment production. The basic distribution by cable or satellite may be separated from content production, but most broadcasters act both as gatekeepers and producers of content although they also buy content from others.

### *6.1.4 Content and Distribution*

Integration of content and distribution is also seen in other sectors. Many telecom operators are supplying new content services over their networks. This can be seen as a continuation of the end-to-end philosophy that has dominated the telecom sector, but digitalisation and convergence with other media have drastically increased the market opportunities for delivery of various sorts of content via the telecom network.

From the content providers side, Reuters is an example of a company that has expanded its operation downwards to distribution and equipment production. Reuters has expanded its activities in IT service consultancy and has formed an alliance with the network computer maker Sun Microsystems.

## 6.2 Convergence

Convergence across industries can take place at all three horizontal levels depicted in Table 1 equipment / hardware, transport / software, and content / services. Each level is related to one of the technical dimensions of convergence:

- Convergence in content production is related primarily to *services convergence*;
- Convergence in distribution is related to *network convergence*;
- Convergence in equipment production is related to *terminal convergence*.

Convergence in equipment production is also related to a convergence between different network technologies, as equipment suppliers produce equipment for use both in production and distribution as well as consumption of content.

## 6.3 Convergence in Content and Services

Convergence in services implies that the same content can be reached from different types of technical platforms (e.g. either through the Internet accessed via the telecom network or through a digital video broadcast (DVB) service delivered through a broadcasting network). This will lead to increasing competition between different platforms. Customers may, therefore, face a convergent market for various types of information services.

This does not imply that the different platforms will be used for provision of the same services – a degree of specialisation is likely to remain. But the former boundaries between IT, telecom, broadcasting and other mass media companies are going to be redefined and less visible. Even if a

broadcasting company chooses to remain basically a broadcaster, it will be necessary to become visible on other platforms as well. New service integrating elements from IT, telecom, broadcasting or other mass media will continuously be developed. These new services will not always be a source of creation of new companies but will contribute to the blurring of boundaries between the different industry sectors.

Services convergence implies that content providers will become cross-sectional in the sense that they provide content to more than one sector. Most content providers are, however, still rooted in one sector and their new activities are mainly in the new sectors. This is seen most clearly in content provision to the Internet. Both newspapers and TV broadcasters have developed their own web-sites, where they exploit the economies of scope related to provision of the same content to different platforms.

These activities may expand in such a way that this will lead to a convergence between providers of content to the Internet and either newspapers or broadcasters. But it is also possible that provision of news services to the Internet will develop into separate entities that may be spun off as independent companies. Or the market will be taken over by completely new companies that have content provision for the Internet as their core business.

An important barrier to the development of cross-sectional content providers is that it is not enough to provide the same content on different platforms. In order to remain competitive, content must be designed in a way that takes the potentials and limitations of each platform into consideration. As long as the technical capabilities vary across platforms and networks, there will always be scope for development of content designed for a particular platform.

### *6.3.1 Convergence between Telecom and Broadcasting*

Another trend is the entry of telecom operators into the broadcasting sector. In Denmark, for instance, the incumbent operator TDC (formerly TeleDanmark) tried to establish its own TV channel in the mid 1990s; Telecom NZ has bought a stake in Rupert Murdoch's Sky Network Television; and British Telecom has recently applied for a broadcasting license.

One of the most convergent content providers is Bell Canada Enterprises (BCE). This company is not only Canada's largest telecom company, it also owns the best selling newspaper, the *Globe and Mail*, the largest commercial television network, CTV, wireless data and telephone services, satellite television services, the popular Lycos / Simpatico Web portal, the Teleglobe global Internet protocol and data network, Workopolis job finding database and many other online media activities. Thus, BCE is active in content production in all of the four sectors and in distribution of both broadcast and telecom services.

These examples deal both with horizontal and vertical integration. The philosophy is to ensure content to the networks. For example, BT (formerly British Telecom) seeks to distribute its broadcasting service via its own broadband network.

However it is not yet clear whether these attempts at convergence will be successful. TDC had to realise that broadcast and telecom are two quite different types of businesses and their TV channel was closed down due to lack of subscribers. It has also been questioned whether the strategy of BCE has paid off in terms of generation of revenues.[6] And BT has yet to make its broadcast service profitable.

### *6.3.2 Convergence between IT and Broadcasting*

Some of the larger IT companies have shown their interest in broadcasting. Providers of content as well as software and hardware to the IT sector have a strong interest in promoting a PC-based approach digital television. On the content side, Microsoft is involved in development of the American cable TV industry and they have also acquired Web-TV Networks for nearly half a billion dollars (Moore & Koprice 1999).

However, many of these initiatives cannot be seen only as a result of technical convergence. They must also be seen in a financial perspective. Many telecom operators and large IT companies had an overflow of capital after liberalisation and were looking for new investment opportunities. It was not always possible to find attractive investments within the telecom sector. The hype surrounding ICT shares at stock markets provided easy access to more capital and contributed to the overflow of capital within the sector. Many of these investments were characterised more as strategic investments in related areas than extending core competencies or responding to convergence opportunities.

## 6.4 Convergence in Distribution

### *6.4.1 Telecom and Broadcasting*

The most important trend in convergence of distribution networks is between the telecom networks (which also provide the infrastructure for many IT services) and the broadcasting networks. The telecom networks are used for telephony as well as data, and now Internet services. Broadcasting services are still mainly distributed over separate networks, but some broadcasting can also take place via the Internet. On the other hand, cable-TV networks can offer telecom services as well. In the UK, US and some other countries, cable operators have upgraded their cable networks to provide telephony, and cable modems are used to offer Internet access in many countries.

In some countries, the incumbent operators have from the very beginning been among the major cable-TV operators. This has tended to slow down convergence as telecom operators have been hesitant to introduce new services in the cable network (such as cable-modem access to the Internet) that compete with services delivered in the telecom networks. In the US, through its acquisitions of leading cable operators TCI and MediaOne, AT&T has become one of the two major cable-TV operators. Since its divestiture from its local operating companies in 1984 AT&T has lacked a direct network access to its customers. Through this acquisition it seeks to regain direct access.

### *6.4.2 Divergence: Mobile Operators*

There is, however, also a trend towards divergence. Mobile communication, for instance, has emerged as a new sector. The largest player on the market for mobile communications, Vodafone, is an independent company with a focus on mobile businesses. In addition, some of the fixed operators are divesting their mobile activities. The explosion in mobile services around the world has been driven by independent competition made possible by the separation of mobile from fixed network operators, not its integration.

### *6.4.3 Divergence: Networks & Operators*

Another trend divergence trend is the increasing separation of supply of telecom services and operation of the physical network structure. Today a number of telecom operators base their operations in part on access to other operators' networks through leasing and interconnection agreements. In addition, a number of infrastructure providers have emerged. These are often public utility companies, which are in possession of their own telecom infrastructure but do not have any intentions of entering the retail market for telecom services. The financial crisis following the UMTS auctions may be an additional factor prompting this development, as some of the incumbent operators may be forced to sell off their infrastructure in order to reduce their debt. Among others, BT has received offers for their infrastructure from at least two different consortia. Although these offers have been rejected, analysts observe that BT (as well as other debt burdened telecom operators such as KPN, Deutsche Telekom and France Telecom) must decide whether they want to be pure network operators or service providers in the future.[7]

## 6.5 Convergence in Equipment Production

Convergence in equipment production is not a new phenomenon. Many industrial corporations such as Philips and Siemens are involved in many different industrial activities in most of the ICT and media sectors. The

reasons for this relate primarily to strategy of conglomeration and the synergies between equipment production of different types of electronic equipment that existed before the digitalisation opportunities arose.

During the past decade, convergence has been most visible in the IT and telecom sectors. The liberalisation of the telecom sector has made it possible for new entrants from IT hardware, software and consumer electronics to start up production of telecom equipment. At the same time, the technical convergence between IT and telecom equipment has made it economical to enter the telecom market. One prominent example is Cisco which supplies routers to private data networks as well as public telecom networks (in particular IP-networks).

Convergence is not only a matter of utilisation of synergies in development and production. It is also a question of developing new types of equipment with features originating from different industries. This is clearly seen in the development of terminals for digital TV. These terminals not only combine broadcasting and IT technologies in their technical design. The services they provide are also a result of the convergence between the different industries.

## 6.6 Summary of Market Trends

Convergence is shaping the present development of the ICT and media industries in ways that challenge existing institutional arrangements. The major market trends can be described as follows:

- Company and market structures are formed as much by other factors as by convergence, including financial considerations and corporate strategies (conglomeration versus focus on core competencies);
- A large number of mergers and alliances have occurred. Most of these mergers and alliances have taken place between actors within the same market segment, and may rather be attributed primarily to internationalisation than to convergence. Still, a number of cross-sectional and vertical mergers have taken place;
- Vertical integration has mainly taken place between content production and distribution. At the same time there has been a trend toward disintegration of service production and manufacturing, particularly in the telecom sector. It is possible that a further disintegration in the telecom sector will take place through a separation of network provision and telecom service provision;
- Many companies have set up new activities in other sectors in order to complement their core business. Content providers such as newspapers and broadcasters are becoming multi-channel content providers, although they keep their main activities within one sector.

Telecom companies are going into content provision (including broadcast) in order to ensure content for their networks;

- Convergence takes different forms in the different layers of the value chain. Convergence in content production includes all of the four sectors, while convergence in distribution is most prominent between the telecom and broadcasting sectors. For equipment production it is the IT and telecom sectors that are converging;

- New ICT and media market sectors are emerging. The most obvious example is the mobile industry. In spite of a considerable overlap between the markets for fixed and wireless services, operators tend to separate their mobile operations into independent activities, which later may be spun off as new independent companies.

# 7. Convergence Policy Issues

From a policy and regulatory perspective, convergence trends in the ICT and media areas raise a number of issues. Some are related to all three levels (equipment / hardware, transport / software and content / services) in the convergence model (Table 1). The ones that will be examined here take up the issues of the general societal importance of convergence policies, the balance between benefiting from industrial complementarities and the problems of media concentration, access to networks and content. Other issues are related to the infrastructure levels (equipment / hardware and transport / software), where the overall question is to what extent it is possible to subject all infrastructures to the same framework of regulation. At the content level, there are a large number of issues to be resolved, including the question of whether all content areas can be treated in similar ways regarding, for instance, what it means for public service provisions in the broadcast area and what it means for media responsibility rules.[8] Other questions deal with privacy protection, security, consumer protection, intellectual property rights, and illegal information (Samarajiva 1997a). Finally, there is the issue of the possibilities and problems regarding the separation of regulation of infrastructure and content.

## 7.1 General Societal Importance

The general societal importance of convergence policies lies in the growing importance of ICT and media industries in terms of size of the industries themselves and the broader social implications. ICT elements are integral components of products and services in many sectors, and information and communication systems constitute infrastructures for many functions in society. Information and communication infrastructures are, for instance, crucial in importance for the many services activities that play an increasing role in social developments. Many countries have, therefore, devised

information / network society visions and plans to take advantage of the potential applications of the new information and communication technologies and services.[9] Countries strive to establish the best possible economic and regulatory framework conditions for the development of dynamic information and communication industries and innovative applications and uses of ICTs.



## 7.2 Benefits and Problems in Media Complementarities

The balancing of benefits and problems in relation to media complementarities and market power is not a new issue. Public policies have been seeking to strike such balances in many areas for a long time, and many countries have for years had regulations limiting cross media ownership (Henten 1999). However, technological developments including digitalisation of different media content, policy developments in the direction of increasing liberalisation and a less stringent view on economic power concentration, and increasing business internationalisation leading to larger corporations and political support for such tendencies, have altered the former balance points between the benefits and problems associated with media concentration. There is today a widespread political trend toward loosening the restrictions on media concentration, including cross media ownership provisions, in order to take advantage of the new complementarities between media. However, the policy issue is still there and just a important as it ever was. New balances have to be struck in view of benefits and drawbacks in loosening and restructuring regulations on media concentration.

## 7.3 Access to Networks and Content

Access to networks and content has become an increasingly important issue. Many countries have some form of universal service rules in telecom, or are in the process of developing such rules. Many countries also have provisions for access to public service broadcasting, even though in some countries there is an unfortunate conflation of public service and government propaganda broadcasting. The policy question is whether and to what degree such access provisions should be extended to new networks and services, reflecting developments relating to convergence, e.g., broadband, Internet, public information services, etc.

The arguments in favour have centred on the issues of overcoming the social divides and the economical and social advantages of a broad take-up of new technological possibilities, including both democratic aspects and the industrial growth potentials made possible by a broad diffusion. Arguments against have been concerned primarily with creating a situation where the mass of users are forced to support the most advanced early adopters of new technologies, and the dangers and inefficiencies of subsidising technologies that are quickly made obsolete by new and more powerful technologies. However, some developed countries have gone

beyond the mere provisions for universal service in basic telephony and there is generally open-mindedness in relation to the possible inclusion of new technologies, services and content in some sort of universal access provision, e.g. broadband access; and increasing attention is being paid to possible "digital divides" between developed and developing countries and ways of overcoming them.

## 7.4 Technology Neutral Regulation

With respect to information and communication infrastructures, there is a general trend in policy discourse towards uniting the regulation of the different infrastructures. Most countries have operated with different rules applying to fixed networks, mobile networks, and broadcast networks. But with the technical convergence developments and the increasing possibilities for conveying similar services over different networks, the foundation for differences in regulatory rules are being questioned. Many countries, therefore, are seeking to harmonise regulatory frameworks of different communications infrastructures based on the principle of technology neutrality. However, there are some problems attached to this approach. In many countries, there are special requirements and user protection rules regarding telephony provided on the fixed public network. But telephony can also be provided over the Internet – yet, Internet telephony[10] is not subject to the same rules as circuit-switched telephony, which a totally technology neutral regulation would require. Also, the levels of competition in the different infrastructure areas may differ, for instance, with greater competition in mobile services than in fixed. Such differences may require the continuation of different forms of regulation in the two areas.

## 7.5 Converging Content Regulation

It is an open issue as to the extent regulation in the different content areas should converge. In the broadcast area, many countries have public service provisions of some kind, though they may be very different from one another. Some broadcasters have responsibilities for providing services under certain quality obligations but have, at the same time, a number of privileges in terms of, e.g., frequencies for terrestrial transmission. In other media areas, for instance print media, there are no such arrangements. And when content can be used across different infrastructure platforms, the question is what the implications will be for the specific public service provisions in the traditional broadcasting area. It will surely be more difficult to maintain a central position for public service broadcasters, but will public service provisions necessarily disappear? Conversely, is it possible and desirable to extend public service provisions to the Internet web in the sense that public service broadcasters become obliged to develop web pages with a public service type of content? (for a discussion see Samarajiva 1997b).

Another example of a similar question relates to the media responsibility rules for print and electronic mass media. Authors / journalists and editors are in most countries responsible for what is printed and broadcast. However, such rules seldom apply to information on the web, and the issue is whether it is possible and desirable to uphold such rules in a situation with a growth of information spread over the web, or whether it is possible and desirable to extend rules for content responsibility to new media platforms at all.



## 7.6 Other Content Issues

Privacy protection takes on a new dimension in a converged Internet environment. Not only is it much easier to transmit files with personal information, it also becomes much easier to collect information about people, their interests and buying habits by means of automatic registration. Security problems involve both the security of information transmitted on networks, i.e. that personal information is not disclosed or tampered with, for instance, and the security of payments made on electronic networks. Consumer protection is also an important issue. When buying goods and services on networks, consumers must be protected against shoddy quality products, late delivery or simple fraud. In some countries, there are actually stricter rules protecting customers in e-commerce than ordinary commerce, but this does not apply to the great majority of countries where consumer protection is less, and there are certainly special problems in relation to international transactions (for a discussion see Samarajiva 1997b).

Intellectual property rights constitute another area where a converged Internet environment creates many new problems. The Internet provides new possibilities for spreading cultural products – which is a great advantage. But for the holders of intellectual property rights, these new possibilities create new problems with respect to protecting their rights against infringements. Finally, illegal information such as racist utterances and child porn can be spread much wider on the Internet, and the question is how to protect citizens against such information and how to hinder people from spreading it in an international Internet context (Hadley & Samarajiva 1997).

These issues are not new. They have not been created by the development of convergence in the media and Internet areas. However, convergence and the Internet create a new environment in which these known issues acquire major new dimensions. Parts of the issues and the regulatory rules that they give rise to, therefore are, connected with the issue of media convergence, and rules taking account of this will need to be developed. However, this does not necessarily mean that these issues should be part of a united convergence regulation nor that they should be dealt with by a single regulatory authority.

## 7.7 Converging Infrastructure and Content Regulation

Having examined issues that relate to all three sector levels from equipment / hardware and transport / software to content / services, or that relate either to the infrastructure segment or the content segment, the most fundamental question is whether infrastructure and content issues can best be dealt with under a common regulatory framework, or whether the issues are so different they can be best addressed by different specialised authorities. In the overview presented here, there are three types of issues that are related to all three levels: general information society policies, complementarities versus concentration, and access to networks and services. But none of these issues requires a common regulatory framework.

In discussions of the separation of infrastructure and content matters, it is often stated that there are companies covering the whole value chain from infrastructure to content provision and that, therefore, it is more appropriate if these companies are regulated by one common regulatory framework. There are companies that can leverage their power in one area to another, and it is true that there will be questions regarding the delimitation between infrastructure and content provision, in the sense that a software tool may encompass both infrastructure and content elements. However, it seems as if these problems are at the fringes of the issue and are relatively minor in comparison with the overall benefits of differentiating between infrastructure and content problems.

There is also the question of the influence of initiatives in one area on the other. When, for instance, the terrestrial broadcast infrastructure is dealt with in the same way as the telecom infrastructure, it may be difficult to uphold the preferential status of public service broadcasters. But this is mainly a question of coordinating the two sides of media and telecom regulation. However, there are problems of structural adjustment to be examined in relation to a separation of infrastructure and content regulation.

# 8. Regulatory Convergence: Organisational Aspects

To the extent that convergence between telecom, IT and broadcasting takes place technologically and in the market place, or to the extent that it is a political policy aim to promote such convergence tendencies, regulations of hitherto separate communication areas must at least adapt to or accommodate the new convergence environment. Whether this also must lead to regulatory convergence in terms of joining existing regulatory agencies or building totally new converged regulatory organisations is a matter requiring further examination. Although it is possible to regulate a converging market place by means of separate regulatory organisations, there may be a number of advantages in joining them together. But this

may also introduce serious problems. Advantages and problems of regulatory convergence are the primary matters reviewed in this section. Secondly, the scope and degree of regulation is examined.



## 8.1 Some Advantages and Some Problems

Tendencies toward convergence have been known through most of the history of communication and media, and it is important to distinguish convergence from simple monopolisation. Regulations have sometimes been implemented to avoid the establishment of too powerful communication and media conglomerates (see for example, Winseck 1998). Regulators covering a broader array of communication and media areas have been established for some time. In North America, for instance, telecom and broadcasting are regulated by single regulatory agencies – Federal Communications Commission (FCC) in the US and the Canadian Radio-television and Telecommunications Commission (CRTC) in Canada – but they apply very different standards of regulation. Furthermore, regulatory institutions even cover a broader range of utility areas as in the case of the US states Public Utility Commissions (PUCs).[11] In the North American cases, the different areas of regulation typically have been quite separate even though they have been dealt with by unified organisations. The issues of multisector utility regulation are examined in Sections 9 and 10 below.

The main thrust in recent research on convergence has been that the degree and character of convergence developments are distinct because of: (1) technology developments, first and foremost the digitalisation processes; and (2) the political liberalisation, including more liberal policies in relation to market convergences.[12] There is, consequently, an increasing necessity of a closer relationship in the regulation of the different communication and media areas. It is not sufficient simply to have the different areas under the same roof. The synergies between the different regulatory areas must be developed more proactively, encompassing the regulatory 'contributions' of the different areas. Telecom contributes with infrastructure regulation and access issues; broadcasting with access and content issues; IT contributes with, e.g., privacy and security issues; and together the different areas contribute with new regulatory issues such as Intellectual Property Rights (IPRs) and e-commerce regulation.

In a situation where these diverse regulatory areas converging, at least to a degree, there may be a number of potential advantages to be reaped when dealing with them in a unified regulatory institution. These would include the following:

- To the extent that markets are converging, it would be better able to apply the same provisions across different communication and media areas.
- In regulatory interventions, it is important to be able to build on a greater knowledge of corporations with activities in different

communication and media areas and to understand the inter-relationships between areas.

- To take advantage of the economies of regulation, especially economies of scope and coordination in the sense that some of the regulatory issues are the same across industry platforms.
- Possibilities for a greater political independence for the regulator in relation to implementing policy decisions, as there will be a greater diversity of interests across the ICT sector industries.
- One-stop-shopping for users of the regulatory institutions, as applications and complaints only have to be filed with one organisation.

The potential problems would include the following:

- More general and less clear regulatory principles because of the unification of different regulatory rationales, for instance, the unification of the infrastructure regulation tradition from telecom and the content regulation tradition from broadcasting.
- More bureaucratic working procedures with the enlargement of the regulatory organisations leading to slower processes and less clear decisions.
- Risk of less scope for independent implementation of policies as more than one ministry may seek to influence regulatory decisions and procedures.
- Opaque structure for the users of regulatory organisations, as they may not be able to 'see through' the organisational maze in unified organisations.

From the advantages and problems described it seems clear that it cannot in advance be determined whether the primary overall outcome of an organisational unification will be positive or negative. It depends very much on the specific circumstances and the ways in which the unified organisation is constructed and managed.

Clarity and flexibility are more important than ever in a situation where different areas are joined together organisationally. This implies that the different goals of regulation (remedying market failures, social concerns, and industry policy directions) must be clear in relation to the different communication and media areas. As a corollary, it must be recognised that infrastructure regulation and content regulation have partly different rationales and will have to be governed, to some extent, by different principles. The extent to which a unified regulatory organisation must adhere to different regulatory rationales, of course, depends on the specific combination of media areas included. The convergence of telecom and IT is changing the character of telecom issues and introducing new ones, e.g., privacy and security. The convergence of telecom and broadcasting is bringing together two industries with different regulatory rationales.

It is apparent that regulation of different communication and media areas cannot simply be joined together organisationally, expecting synergies to develop from the mere organisational unification process. It must be clearly determined how the different functions relate to one another. A type of matrix structure is likely to be necessary to reap the 'scope advantages' and for avoiding the development of a disjunct organisation.

It is fundamentally important to uphold the principles of independence and accountability if regulation is to be effective. In any new multisector regulatory environment, the specific independent character of the regulatory institution must be clearly defined. Finally, the organisation must be easily accessible to its users: network operators, content providers, end-users, and policy and administrative decision-makers. The fact that users only have to approach one, or a more limited number of organisations, when seeking a solution to regulatory matters, should be an advantage. However, if the organisational unification process leads to more complexity and to less transparency, special attention will need to be paid to access procedures and the public face of the organisation.

## 8.2 Scope and Degree of Regulation

The regulations of communication and media areas may take many different forms, both in terms of the scope of regulation, i.e. the different kinds of communication and media areas included, and the depth or degree of regulation, meaning how strongly regulated an area is. Taking telecom as the point of departure, it could be regulated in the following different settings:

- Light industry specific telecom regulation, focusing on scarce public resources such as frequencies, rights of way, and names and numbers, and relying on general competition law for support in other areas.
- Stronger industry specific telecom regulation, but also encompassing interconnection, universal service / access regulation ex-ante competition rules and price regulation for basic monopoly services.
- Convergence regulation encompassing telecom, and IT only.
- Convergence regulation encompassing telecom and broadcasting only, leaving IT and Internet issues to competition authorities and other agencies of government, e.g., justice, finances, fair trade, consumer protection.
- Multisector regulation, where telecom is joined together with other infrastructure utilities such as electricity, gas, water, rail, etc. (see below).
- Convergence regulation encompassing telecom, IT and broadcasting.

There is also another dimension of categorisation of regulation, namely the depth or degree of regulation. When crossing these two dimensions – scope and convergence versus the degree and depth of regulating the different kinds of regulatory settings can be illustrated graphically, as in Figure 6.

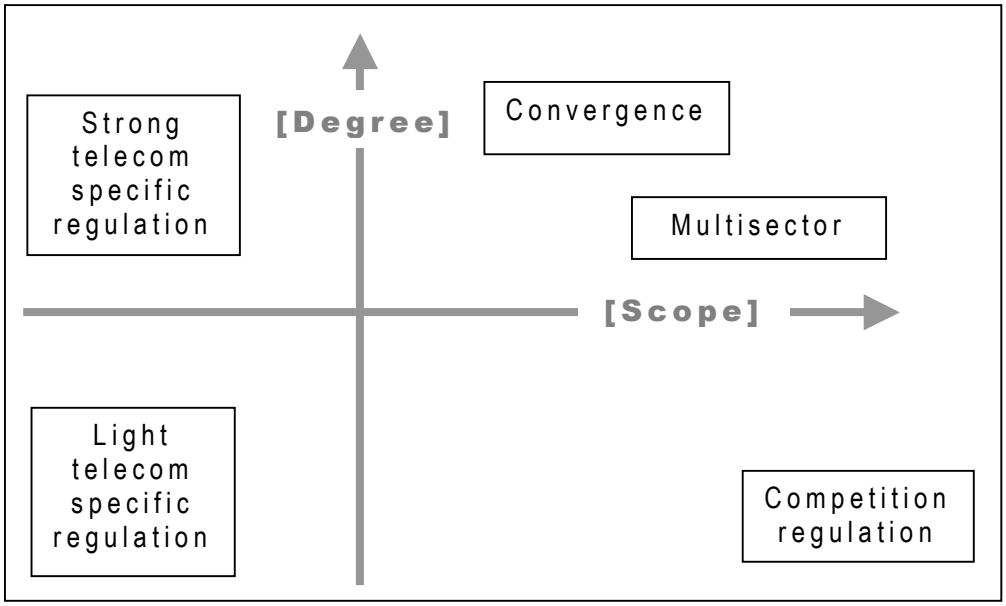


**Figure 6** – Regulatory settings

The figure illustrates that in the lower left hand corner, with a low scope of industry coverage and a low degree of regulation, we find 'light telecom specific regulation'. In the upper left hand corner, we find 'strong telecom specific regulation', as the degree of regulation is increased in this case. In the upper right hand corner, two regulatory settings are placed, *Convergence* and *Multisector*. The degree of regulation is often high in the case of convergence regulation, while with the inclusion of more sectors in the case of multisector regulation, the degree of regulation is typically lower, reflecting the diversity of the different sectors. Lastly, in the lower right hand corner, we find 'competition regulation' with a high scope of sectors but typically with a low degree of regulation. Competition can be included in any of the other regulatory settings, as a specific tool of regulation, usually ex-ante competition regulation. But taken by itself; it cannot be characterised as a strong regulatory setting.

# C. The Multisector Utility Perspective

## 9. Bases of Multisector Regulation

The multisector utility regulation perspective is based upon different trends, priorities and conditions than the convergence perspective. This section of the report examines next generation regulation from a multisector perspective. In common usage, multisector regulation is understood to be the functioning of a single regulatory agency that has responsibility for diverse sectors such as telecom, energy, water and transportation. The classic multisector regulatory agencies are the State Public Utility Commissions (PUCs) in the United States, most of which precede the Federal Communications Commission, often portrayed as the oldest telecom regulatory agency in the world. The original name of the association that represents the PUCs (now known as the National Association of Regulatory Utility Commissioners or NARUC) tells the tale of their origins—the National Association of Railroad and Utility Commissioners.[13] What were once independent agencies mandated to regulate the railroads, gradually accumulated mandates that included energy, telecom, other forms of transportation, water, and in some cases such as Virginia, even insurance.

A natural question that arises in relation to this historical process is why railroad regulatory agencies were given additional mandates. Was it because of commonalties in the object of regulation, or was it because of commonalties in the form of regulation? Leaving aside insurance, what is common in the objects of regulation such as transport, telecom and energy is the monopoly associated with essential rights of way. Common use of rights of way by different infrastructure sectors such as telecom, energy, water and sewage is perhaps a justification for multisector regulation.[14] Rights of way are scarce resources and most countries want them to be used efficiently. Many countries are bound to allocate them fairly because of their WTO commitments, among other things.[15] If indeed there is substantial common use of conduits and rights of way, and those common elements constitute a major portion of the supply chain, one might argue that the multisectors in this sense have converged, and that what exists in fact is a sector – an infrastructure sector.

### 9.1 Rights of Way and Conduit Sharing

Rights of way refer to the permissions granted by a property owner or government to dig, build, or otherwise use a specific stretch of land to install some form of permanent infrastructure (a road, railway line, telephone line, underground pipe, and so forth), and subsequently to maintain (and upgrade) that particular infrastructure as required.

Historically, rights of way have been granted to monopoly providers of infrastructure (either government or privately owned) because the provision of the service was important to the economy and society. The grant of rights of way was subject to conditions that the provider would not abuse, nor exploit the rights of way beyond the extent that it served the public interest of infrastructure provision, and that necessary compensation would be paid to affected property owners (Melody & Møller 1997). This regulatory framework with respect to right of way (radio spectrum) infrastructure has been evolving with the opening of infrastructure services to competition. The US *Telecommunications Act of 1996* requires non-discriminatory access to existing rights of way in specific instances between utilities – except when there is "insufficient capacity and for reasons of safety, reliability and generally applicable engineering purposes."[16]

The US Telecom Act of 1996 reaffirms "the authority of a state or local government to manage the public rights-of-way or to require fair and reasonable compensation from telecom providers, on a competitively neutral and nondiscriminatory basis, if the compensation required is publicly disclosed by such government."[17] Although subject to non-discrimination, municipalities are increasingly adopting strict conditions on the granting of permits due to considerations such as the cost of streets being torn up (in terms of inconvenience, safety and reduction in road life-span) and the sheer number of service providers wanting to lay cable and other conduits. In some US municipalities, telecom conduit space is said to be saturated to the point of causing danger to other conduits such as gas.

In many countries, multiple levels of government exercise authority over rights of way. Where government works well, this is not a significant barrier to effective operation of telecom and other utilities. However, where government is inefficient, dealing with multiple layers of government can prove expensive and frustrating. Where corruption exists, these problems are exacerbated. The assigning of sole jurisdiction over rights of way to a single regulatory agency may be is a solution, but its implementation depends on the specific Constitutional circumstances of a country.

Rights of way are a key asset for those who hold them, and access to them is essential for new entrants who will typically be competitors to the rights of way holder. Historically granted at minimal cost to encourage infrastructure development, they are becoming increasingly expensive and time consuming to acquire as more and more potential operators vie for them.[18] In the US, for example, rights of way permits can account for 20% of the cost of building a fibre optic line, and can take over a year to acquire.[19] And, of course, discriminatory access to rights of way is a barrier to market entry. Thus, in conjunction with legislation targeted at levelling the playing field in infrastructure markets,[20] there are also incentives for achieving viable technological solutions, in particular for last mile distribution to the end-user.

Utilities can share rights of way and conduits in two ways. *First*, companies can obtain the right to common use of rights of way from other utilities. This includes laying cable or conduits side-by-side or using the actual conduit in

common, as in the case of Power Line Telecom (PLT, or Power Line Carrier [PLC]). *Second*, many non-telecom utilities have their own telecom infrastructures in place (installed for operations, monitoring, maintenance and billing), which can be leased for use by others. The technical features of optical transmission which make it immune to interference from electromagnetic fields generated by electric lines has contributed to the proliferation of telecom capacity owned and operated by electricity utilities. Fibre is installed because of the non-interference qualities, but once installed the electric utility needs only a very small portion of the capacity, creating the incentive to lease the extra capacity for telecom use.

The recently heightened importance of rights of way and conduit sharing (including power line telecom, which is perhaps the ultimate expression of common use) is a subject of legitimate interest to regulators, not only in telecom but also in other sectors. The question of whether rights of way and conduits constitute resource inputs so important to the provision of infrastructure services that one must consider the possibility that the hitherto distinct sectors are in the process of converging is one that is currently under discussion.[21]

One must, however exercise caution with the argument that common use of inputs or economies of scope in the production of infrastructure services justifies common regulation. As Professor Arnbak has pointed out, the fact that SIM cards of GSM mobile terminals are being upgraded to function simultaneously as credit or debit cards does not necessarily justify a single regulatory authority for telecom and financial services (Arnbak 2002: 144).

The regulatory issues that are posed by these forms of common and joint uses of rights of way and conduits, include the prevention of anti-competitive behaviour (e.g., predatory pricing and cross-subsidy) by firms with significant market power in their "home" markets and ensuring non-discriminatory access by new entrants to rights of way and conduits. Consumer-protection issues such as energy disconnection caused by failures to pay telephone bills may be raised as well. These issues do not, by themselves, constitute a case for multisector regulation. However, they do make a strong case for increased cooperation and coordination among infrastructure regulators.

## 9.2 Market Trends and Strategies of Utility Companies

Mixed-infrastructure use of conduits is not a new phenomenon. In Canada, for example, at the beginning of the 20th century, telephone prices and interconnection issues fell under the purview of the Railway Act – justified by telephone and telegraph lines being part of railway operations. In the Netherlands during the 1990s, Nederlandse Spoorwegen (NS), the national railway monopoly, helped create a competitive fixed network telecom operator (Telfort) in a joint venture of NS and British Telecom. Grameen, the largest provider of telecom services in Bangladesh, used railway rights of way to build its national network. Most competitive telecom operators

around the world are using the rights of way of infrastructure providers in other sectors, rail, road, pipeline, electricity.

In the energy sector, utility companies are consolidating into larger operating companies within all utility sectors as well as across industry boundaries. The entry of these utility companies into the telecom market is considered by many to be a natural evolution. The prospect of expanding income and profits from existing assets has prompted energy utility executives to seek to exploit complementarities with telecom companies.

The rationales for participation by energy utility companies in telecom are varied. The primary reasons given for penetrating telecom markets range from the need to improve operational efficiencies to the overall strategic objectives of the company. It is generally assumed that improved efficiencies include economies of scale and scope, eliminating redundant or overlapping activities, efficiencies in procurement, production, marketing, and administration. Strategic objectives include remaining competitive in a rapidly changing environment, building core competencies, acquiring additional managerial and technical expertise, etc. When energy utility executives were questioned on the actual reasons for entering into the telecom market, however, the three reasons provided were "sharing of infrastructure, bundling of opportunities and gaining experienced people."[22]

Most energy utilities became active in the telecom business by leveraging their under-used internal telecom assets (network, rights of way, construction expertise, etc.) and selling bandwidth to telecom service providers. The more adventurous companies look beyond mere wholesale provisioning and fibre leasing to direct participation in more profitable services.

Regulatory practice has long rested on the separation (ring-fencing) of specific regulated activities and the associated costs and revenues. Holding company legislation and requirements for separate subsidiaries and accounting separation have been among the regulatory instruments used to ensure the proper application of regulatory rules and the prevention of undue cross subsidy (Rosenberg et al. 1993; Bonbright & Means 1932). The contemporary efforts of utilities, in particular energy operators, to cross industry boundaries therefore pose a problem for regulators. The most obvious responses are unattractive. The conventional response of insisting upon separate subsidiaries is likely to generate criticism on the ground that regulatory convenience is preventing innovation and the realisation of economies of scope. The other alternative of regulatory jurisdiction following the regulated company could create jurisdictional overlap unless a multisector regulatory agency is created.

## 10. Multisector Organisational Issues

The most comprehensive case for multisector regulation is presented by Schwartz and Satola (2000). They concentrate on developing countries, but

their arguments also apply, to some extent, to developed countries that wish to create efficient regulatory organisations. The basic argument is that regulatory skills and the money needed to obtain the skills are in short supply in developing countries (and were possibly in short supply in the US states where multisector regulation first emerged in the 20th century). In light of this scarcity of regulatory resources, Schwartz and Satola see the necessity for multisector regulatory agencies. Multisector regulation may also prove useful for developed country governments seeking to economise on regulatory resources.

## 10.1 Are Regulatory Resources in Short Supply?

The market for regulatory skills is no different from other markets in the sense that they are significantly influenced by the forces of demand, supply and price. In a free market, the price is set by the interaction of supply and demand. Given the explosion of regulatory activities across the world in the last decade of the 20th century, it is reasonable to expect that persons with the necessary regulatory skills are in short supply in most countries, as the educational systems have not been geared up for increased production in the short-term. The prices for the persons with skills are being bid up by increased demand.

In addition, there is no world-wide market for regulatory personnel, except in the case of consultants and in a few exceptional cases such as Bosnia-Herzegovina, Hong Kong SAR and Singapore that have purchased skills on the world market. Because regulation is considered a core part of government, many governments have sought to staff their regulatory agencies with citizens. They have sought to purchase these skills from their domestic supply at local market rates rather than from the international market at international rates. When the market for regulatory skills is conceptualised as a series of insulated national markets, the mismatch between supply and demand becomes exacerbated, especially in developing countries where the educational systems are slower to respond and the overall depth of human resources is shallower than in developed countries.

But developed countries are not exempt from this problem. The proportionately smaller number of persons with regulatory skills will be able to demand much higher wages. The regulatory agencies that can pay these high wages will be able to recruit these persons. Alternatively, or in addition, they can invest in fast-track training to build up a skilled cadre. For this option to be sustainable, the trained persons would have to be paid adequate wages subsequent to training. Otherwise, they are likely to be attracted by higher-paying employers, particularly regulated firms, depriving the regulatory agencies of the benefits of their investment in training. Another alternative is to purchase regulatory skills on a short-term basis from international consultants through outsourcing. But here also the sustainability of the solution depends on a complementary effort to build up a permanent cadre of skilled people through recruitment and / or training. Effective use of consultants, requires a core staff capable of effective

procurement, and management of external consultants, as well as effective implementation of their work. All three solutions require the investment of funds in building domestic skills, i.e., investment in human capital.

Liberalised infrastructure markets result in dramatically higher levels of investment in the sector and typically generate enormous amounts of revenues both for the investors and for the governments. A small proportion of these revenues must be set apart for building and maintaining regulatory capacity, which is what makes the investment feasible and must ensure that the policy objectives of industry reform are implemented. The most common method of funding regulatory agencies world-wide, a levy on operator revenues and / or license fees, reflects this thinking. If this method of funding is adopted, the regulatory agency should have the resources to purchase the necessary skills, through direct recruitment, short-term outsourcing, and training combined with adequate salaries for the long-term.

While some regulatory agencies have the revenues, there are often barriers to spending the funds as suggested here. Most governments constrain the levels of government salaries with the good intentions of reducing expenditures on unproductive sectors of the economy and preventing inflationary wage spirals. Regulatory agencies are often included, so the wages regulatory agencies can offer are also constrained. In addition, in some countries procedures intended to prevent corruption and or archaic systems of public administration hinder the effective use of outsourcing. In most developing countries, outsourcing is possible only in cases where multilateral or bilateral technical assistance funds are available.

In sum, the scarcity of regulatory resources in developing countries is real, but it is made much worse than necessary by government procedures and policies that prevent relatively straight forward market-based solutions from being applied. Designers of regulatory instruments for developing countries must take scarcity of regulatory resources as a fundamental issue.

## 10.2 Case of Europe

Sector-specific regulation of infrastructure sectors is relatively new in Europe. Starting from the OFTEL in the UK in 1984, separate regulatory agencies have been created in most of European countries in telecom, and also in other infrastructures sectors in many countries.[23] Now that the initial task of establishing regulation is more or less complete, attention is beginning to be directed to the costs of regulation. In the absence of multicountry data, the costs of regulation in the country regarded to be the pioneer of sector-specific regulation in Europe, the United Kingdom, is considered in this section.

A recent study of regulatory costs, conducted for HM Treasury of the UK government by WS Atkins Management Consultants (2001), states that:

> The cost of regulation is rising well in excess of inflation, but it is still very small in comparison to the turnover of the regulated industries and to the benefits received by customers…. The operating costs of the four utility regulators [energy, telecom, water, railway] have doubled from about GBP 50 million in 1996-97 to roughly GBP 100 million in 2000-01, an increase of 84% in real terms. Between 1990-91 and 2000-01, the average annual increase in operating costs in real terms has been 16.6%, 6.8%, and 7.4% at Ofgem [energy], Oftel [telecom] and Ofwat [water] respectively. At ORR [railway], between 1996-97 and 2000-01 the increase has been 14.4% p.a. […] Across the regulators, support functions (HR, IT, finance, procurement, communications, quality assurance and estates) accounted for about 22% of total costs in 1999-2000. This is nearly double the figure for our comparator group of UK executive agencies and other regulators.

The above quotation illustrates what is likely to become a priority issue for European regulators in the coming years. Standards of efficiency and accountability are increasingly being applied to regulators and regulatory resources, as well as incumbent operators and the sector as a whole.

## 10.3 Shared Use of Regulatory Resources Across Sectors

Examination of the actual organisation of US state level multisector regulatory agencies, the Public Utility Commissions, does not provide much evidence in support of economies of regulation, except at the level of the decision-makers, or Commissioners. Generally, staff members specialise in a particular sector such as telecom or water and work within distinct divisions that are devoted to sector-specific regulation. Resources are shared at the levels of commissioners, who hear cases pertaining to all sectors, the senior staff who manage the agency as a whole, and the legal staff responsible for hearings and related procedural matters. Generally, the different divisions are located in common facilities and use common amenities such as libraries which may yield certain savings. The massive training and information sharing apparatus organised under the aegis of the National Association of Regulatory Utility Commissioners (NARUC) is organised on a multisector basis, which also may yield certain economies. For example, the basic two-week course on regulation that is offered at Michigan State University every August has plenary sessions that address topics that are of interest across all sectors and breakout sessions that deal with items of sectoral interest.[24] Most of the research reports that are generated by the National Regulatory Research Institute at the Ohio State University are sector-specific, but in a few cases, researchers from different divisions within the Institute collaborate to produce multisector reports.[25] It must also be noted that US PUCs do not have jurisdiction over frequency management, broadcasting, and cable. The former two areas are subject to federal jurisdiction, while municipal governments and the federal government share jurisdiction over cable.

The US PUC model may be useful if there is a shortage of persons suited to be decision makers at the top of the regulatory agencies. Careful analysis of the backgrounds of the approximately 200 commissioners of PUCs is likely to show that they are not selected primarily on expertise in

the various sectors, though there is a strong representation of former staff members and lawyers who have spent their careers engaged in regulatory activities.

A recent ITU survey shows that Europe is currently evenly split between collegial telecom regulatory authorities and single-person regulatory authorities, at least for the 34 countries reporting data (ITU 2001c). It is unlikely that there is significant difficulty in finding persons to serve as decision makers in regulatory agencies in most parts of Europe. The cross cutting skills of lawyers and managers may indeed be used in multiple sectors. However, it is unlikely that legal and specialised managerial skills are those that are most in short supply in developing countries. The case for multisector regulation will be strong if it can be shown that specialised regulatory skills such as those of accountants, economists and engineers engaged in interconnection, cost studies and tariff approvals can be used across sectors. At issue here is not only whether the needs are common across sectors, but also whether, for example, the workload patterns allow staff engaged in tariff reviews, usually an activity that exhibits peak-load characteristics, to engage in multiple tariff reviews that are evenly distributed across a year. If this condition is not satisfied, what is likely to happen is not savings on staff, but the bloating of divisions.

The US PUC experience shows that there may be significant economies in areas such as use of buildings, libraries, and training facilities in common. The Atkins report cited above suggests that the UK regulatory agencies at least could use some new ideas in terms of saving on these types of non-regulatory costs. This does not, however, justify multisector regulation as such, only close collaboration and facility and service sharing among sectoral regulatory agencies.

The other problem with the cost savings rationale for multisector regulation is the difficulty of actually realising the promised savings from the common supply of regulation to the different sectors. Unless several infrastructure sectors are reformed simultaneously, which is not the case in most countries, a multisector regulatory agency would not be created from scratch, but would have to be the result of merging several existing agencies, or the incremental growth in the first agency as other infrastructure sectors are added to its jurisdiction. In most countries it is not possible to dismiss employees in the course of such a merger, negating the realisation of the greatest potential economies of regulation. In addition, a merger of two going concerns could create significant morale problems, the avoidance of which may require additional expenditures (Towers Perrin 2001). The significant increase in the expenditures of the merged UK regulatory agency OFGEM, which combined the former Office of Electricity Regulation (OFFER) and the Office of Gas Regulation, reinforces this point (WS Atkins Management Consultants 2001).

Schwartz and Satola recognise the practical difficulties of achieving economies of regulation through a multisector agency. They propose either that a multisector regulatory agency be established in the first instance, even if only one sector is reformed, or that the first sector-specific agency

that is established be given added responsibilities and resources as the other sectors are reformed. They recognise the negative aspects of merging sector-specific agencies.

Despite these qualifications, the multisector regulation alternative may be a good one for some countries. Informed by the debate, it may be possible to devise innovative solutions such as, 1) keeping the regulatory staff separate but sharing decision-making bodies; 2) co-locating sector regulatory agencies and allowing and encouraging mutual learning and resource sharing; and creating a new category of regulatory organisations within government that would be subject to the most advanced forms of administrative controls and managerial incentives.



## 10.4 Pragmatics of Contemporary Sector Reform

One of the main advantages of multisector regulation, according to Schwartz and Satola, is the shield it provides against capture, both by industry and by special interest political forces. The argument is that a multisector regulatory agency is more likely to be independent and, therefore, give greater certainty to investors and better protection for consumers through good governance.

In approaching the problem of workable independence from government for the regulatory agency, it is useful to begin by asking whether the desirability of insulation from political pressures is unique to regulatory agencies. Efficient and unbiased public administration requires a degree of protection from day-to-day political pressures. The civil-service protections written into many constitutions and laws around the world testify to this. Clear separation of the policy-setting function and the implementation function, with political accountability for the former, and administrative / legal accountability for the latter, is a basic element of sound public administration. Additional insulation from political pressure is provided in certain exceptional cases such as investigative bodies dealing with corruption, attorneys general and central banks. Do infrastructure regulatory agencies warrant such special protection?

Added insulation from political pressure is critical where the government as a whole does not have efficient and effective government administration. In effect, the independence that is called for serves to protect the island of good governance that the regulatory agency is intended to be, from the surrounding ocean of less effective governance. This is generally seen as a developing country problem. However, closer examination of European regulatory agencies, especially countries where the government continues to hold controlling ownership shares in, and receive dividend income from, incumbent operators, shows that independence from undue government interference is an issue in Europe as well.

Experience has shown that there are two major threats to the independence of sectoral regulatory agencies from the government side. One is the line ministry, which previously combined the functions of policy

setting, regulation and operation, but following liberalisation has been left with only the task of policy setting.[26] The second is the ministry of finance or equivalent, which is engaged in the privatisation of the incumbent operator or is the major shareholder of the partially privatised incumbent.[27] The multisector solution, by definition, takes the regulatory agency out of the control of one line ministry (because there will be more than one) and will give it a reporting relationship to either a ministry devoted to economic reforms on the overall subject of finance, or the president, or prime minister, or the legislature. An alternative solution to the problem of line ministries is to abolish them altogether, as Senegal has done.[28] Japan, which has yet to create a separate regulatory agency, has replaced the well known Ministry of Posts and Telecommunications with a new Ministry of Public Management, Home Affairs, Posts and Telecommunications.[29] Following liberalisation, it is difficult to see the rationale for maintaining an entire ministry for policy setting in a single field like telecom. The Japanese reorganisation suggests that a single ministry is not justified, even where the regulatory function is retained.

However, the solution to the line ministry problem should not aggravate the finance ministry problem. Unless proper safeguards are set in place, the multisector regulatory agency may be interfered with by other parts of government with vested interests in multiple incumbent infrastructure suppliers.

The question of how the regulatory agency is structured cannot be divorced from a realistic assessment of the process by which reform occurs. Comprehensive sector reform requires one or more champions – those who will make the public case for it engage in debate with its many opponents and shepherd it through the appropriate governmental processes. Generally, infrastructure reform is championed by either the minister or by the senior civil servant in the line ministry. In cases of privatisation, the Privatisation Agency may assume a key role (e.g., see Rogozinski 1998), but even here, the process requires the participation of some important actors from the line ministry. Not all reform champions are altruists. Even those intellectually committed to reform think about their positions in the new order. In some cases opponents of reform may be converted to supporters on the basis of assurances of future roles.

The post-reform roles for the reform champions could be in the operating entity, the regulatory agency or in the ministry. Reform of the operator usually results in greatly reduced powers of direct involvement by the minister. Therefore, it is natural for the minister to seek authority over a specialised entity that will exercise oversight over the entire sector, namely the new regulatory agency. Generally, reform requires the installation of professional specialist managers from outside at the helm of the operational entity, limiting the opportunities for generalist civil servants. Therefore, it is also normal for the civil servants at the helm of the reforms to position the new agency in a way that would enhance their career paths. These factors create conditions that are conducive to the creation of sector-specific regulatory agencies, rather than multisector agencies. They do not determine the ultimate outcome, which is the result of multiple forces, but

tilt the balance toward agencies defined in terms of the pre-reform department / agency.

The decision to create a multisector agency improves the chances of creating a modern, competition-oriented agency that will not be beholden to incumbent operators. The possibility that the regulatory agency will be staffed more or less completely by people who have spent their entire careers in incumbent operators is a very real one. With a multisector agency there is no direct path from incumbent to regulatory agency. While some staff may be recruited from an incumbent, they will at least be balanced by staff from another incumbent. Hopefully, the new organisation will recruit economists, lawyers and other professionals from the private sector who are not impaired by government monopoly mindsets and who will be capable of balancing the recruits from the restructured incumbents in the various industries. The key to this of course will be the early decisions taken on organisational structure. If an industry-based structure is adopted, not only will it be more likely that government monopoly thinking will predominate, but also the desired economies of regulation will not be achieved. If a skills-based organisation with interdisciplinary teams being constituted for various regulatory tasks can be established, it is more likely that an investor and customer friendly organisation which enjoys economies of regulation will emerge.

# D. Conclusions and Open Issues

This report is based on a recognition that regulation of telecom and infrastructure utilities is necessary for the development of these industries, including broad public access by new operators and consumers. There are societal benefits to be gained by establishing a regulatory foundation for the development of these industries because of a broad range of market failures and the high degree of public interest to which they are subject (see Melody 2002b). The telecom reform process must be implemented and managed by independent regulators. The open questions are how best to structure regulation for the future in the ICT and media areas (convergence), and across utilities (multisector regulation).

The report deals with both ICT and media convergence regulation and multisector utility regulation, but does not preclude the possibility that both directions could be taken at the same time. In principle, they are not mutually exclusive; however, in practice it will be difficult to combine multisector infrastructure regulation with regulation of both infrastructure and content. However, close examination of the North American practice of convergence and multisector regulation would suggest that it may be feasible to structure a regulatory agency that is converged at the top, but organised in separate divisions that correspond to separate regulatory agencies specialising in specific industries.

The focus of attention generally, and in this report as well, in the ICT and media convergence area is on the object (substance) of regulation, i.e. the extent to which regulation of different areas should be combined, taking technical and market-based convergence developments into consideration. With respect to multisector regulation, the focus is mostly on the organisational aspect, the problem of achieving effective regulation. In the former, the subject matter is convergence regulation; in the latter, it is regulatory convergence. ICT convergence issues are primarily about improving the efficiency of market economies, and how changes in regulation can facilitate this process. Multisector regulation issues are primarily about establishing the efficiency and effectiveness of regulation so it can be a catalyst for network and economic development. They arise from initial diagnoses of different problems, and represent different priorities and pathways to achieving a very similar set of development objectives.

The research, dialogue and analysis of these issues leads to the following general conclusions:

1. ICT convergence that is upgrading the capacity and capabilities of telecom networks to information infrastructures raises many issues that next generation policy and regulation in all countries must address. It cannot be avoided. Although the scope of regulation may vary among countries, and all responsibilities for regulation – e.g., electronic commerce, information security, consumer protection – need not be assigned to the telecom regulator, it is important that

the specific role for telecom regulation in helping to manage the information infrastructure for the network economy be clearly defined, especially as many of these issues will require regional and international coordination.

2. Although the integration of telecom and broadcast media and its regulation is most often presented as a case of ICT convergence, it has more characteristics of multisector integration than convergence. Attempts at industry integration have not realised significant convergence benefits, and the major regulatory issues remain very different. And even from a multisectoral perspective, essential commonalities between telecom and broadcast media are not evident. The case for attempting to integrate next generation ICT / telecom regulation with broadcast media content regulation is very weak. Considering the risk of political interference in the regulatory process, inevitably raised with respect to broadcast media content regulation, the essential independence and accountability of ICT / telecom regulation could be compromised. Most countries are likely to find that the benefits of keeping telecom and broadcast media regulation separate will exceed those of integration.

3. The case for multisector regulation is not driven by convergence, but by the potential efficiency in regulating issues that are common to several utility sectors, and to the most effective design of regulatory institutions. Experience suggests that the potential efficiency gains are likely to be much less in practice than in theory, although still positive. For developing countries they will be greater because of major shortages of skills in the specialised technical disciplines of engineering, law, accounting and economics, and for that reason alone multisector regulation must be seriously considered. Although some experts expect multisector utility regulators to be structurally more protected from the influences of political and corporate lobbying, and more capable of implementing market liberalisation policies, this will depend on the circumstances in each country. Similarly, whether multisector regulation will tend to lift all utility sectors to the standards of the leading sector – in most cases telecom – or hold back the leading sector from more progressive development will be determined by local conditions.

This report does not provide definitive answers to the issues of next generation regulation that can be generally applied without regard to local circumstances. Each country will need to fashion a policy framework and a structure of regulation that is designed for its own specific conditions. This reference report will help to ensure that countries are more informed about the issues, the options and implications as they take up the challenge of establishing and implementing effective regulatory frameworks as a foundation for building their respective 21st century network economies and information societies.

# Endnotes

[1] A Framework for 21st Century Communication. *The Parliament Magazine*. 19 November 2001.
[2] For discussion of industry (or market) definitions, including the principles developed in US anti-trust case law, see Scherer & Ross (1990: 73-79).
[3] For a strong assertion of telecom-broadcast convergence, see OECD (1999b).
[4] This has been discussed, for example, in Winseck (1998).
[5] See e.g. the Department of Trade and Industry – UK (2001).
[6] Geoff Wheelwright, "North American Convergence Plays – Canadian convergence in doubt", *Communications Week International*, 24 September 2001. http://www.totaltele.com.
[7] Michelle Donegan, "Local Loop Sell-offs – all eyes are fixed on local network assets", *Communications Week International*, 10 September 2001. http://www.totaltele.com
[8] First raised in de Sola Pool (1983).
[9] See, for instance, the Danish Ministry for Research report, Det Digitale Danmark (Digital Denmark), (1999).
[10] Defined as telephony conveyed wholly or partly over the Internet, and distinguished from voice over IP (VOIP). See, ITU (2001b).
[11] The Idaho PUC, for instance, regulates electric, gas, telephone, water, pipeline safety, and rail. The Colorado PUC regulates electric, gas, pipelines, natural gas, rail, telecommunications, transportations, transportation, and water utilities.
[12] The whole discussion on convergence is based on the assumption that "something new" has happened, see for instance the so-called *1999 Communications Review* of the European Community (EC 1999).
[13] http://www.naruc.org/
[14] For example, South Africa has justified the mandated participation of the government-owned energy and transport companies in the planned fixed-access licenses on the basis of "optimisation of infrastructure" Hilary Gush, "South Africa plans two rivals to Telkom next year," *Total Telecom*, July 26, 2001. http://www.totaltele.com/view.asp?articleID=42260&Pub=TT&categoryid=627&kw=South+Africa.
[15] "Any procedures for the allocation and use of scarce resources, including frequencies, numbers and rights of way, will be carried out in an objective, timely, transparent and non discriminatory manner. The current state of allocated frequency bands will be made publicly available, but detailed identification of frequencies allocated for specific government uses is not required." (WTO 1997).
[16] FCC, *Telecommunications Act of 1996*. Sec. 703. Pole Attachments. ftp://ftp.loc.gov/pub/thomas/c104/s652.enr.txt
[17] FCC, *Telecommunications Act of 1996*. Sec. 253. Removal of barriers to entry. ftp://ftp.loc.gov/pub/thomas/c104/s652.enr.txt.
[18] http://www.fhwa.dot.gov/realestate/rowutil1.htm
[19] Kate Gerwig, "Can They Dig It?", *tele.com*, March 19, 2001. www.teledotcom.com/article/TEL20010319S0026. Previously, ROWs accounted for about 10% of a fiber build. The author notes that the rule of thumb for building a network is each mile requiring a separate ROW agreement.
[20] See the FCC, *Telecommunications Act of 1996*, noted above; and for example Directive 90/388/EEC. http://europa.eu.int/ISPO/infosoc/legreg/docs/90388eec.html as amended by Directive 96/19/EC. http://europa.eu.int/eur-lex/en/lif/dat/1996/en_396L0019.html

which requires that telecom network operators be granted ROWs on a nondiscriminatory basis.

[21] See, for example, the dialogue on "The next step in telecom reform: ICT convergence regulation or multisector utility regulation?" at http://www.regulateonline.org/theme2002.htm

[22] Bob Woods, "Most energy, telecom firms converging – KPMG". *Opticallynetworked.com,* April 2001. http://www.opticallynetworked.com/features/article/0,,10516_745781,00.html.

[23] http://www7.itu.int/treg/profiles2/cntryprfiles/guide.asp

[24] http://www.ipu.msu.edu/Camp%20NARUC.htm

[25] http://www.nrri.ohio-state.edu/

[26] See for example the continuing struggle between the Moroccan telecom regulatory agency, ANRT, which has been recognised as one of the exemplary regulatory agencies in the world and the Ministry, SEPTI. Ali Bouzerda, "Head of Morocco telecoms watchdog resigns." *Totaltele.com,* 11 Jan 2002. http://www.totaltele.com/view.asp?ArticleID=47597&Pub=TT&CategoryID=627; and Ali Bouzerda, "Moroccan regulator signals resignation," *Totaltele.com,* 3 December 2001. http://www.totaltele.com/view.asp?ArticleID=46417&Pub=TT&CategoryID=627

[27] See for example, the tensions in Sri Lanka between the Public Enterprise Reform Commission of the Ministry of Finance and the Telecom Regulatory Commission after the partial privatisation of the incumbent in 1997 (Samarajiva 2000).

[28] Pan African News Agency, "Workers in Communication Ministry ill at ease." May 24, 2001. http://allafrica.com/stories/200105140793.html.

[29] http://www.soumu.go.jp/english/index.htm

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