

# **Convergence in ICT services: Emerging regulatory responses to multiple play**

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June 2008

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## **Acknowledgments**

This paper was prepared as part of the analytical work program of the World Bank Global Information and Communication Technologies Department ([www.worldbank.org/ict](http://www.worldbank.org/ict)).

The authors would like to thank a number of colleagues and peers for their support in carrying out the work for this report. We thank Bjorn Wellenius, Boutheina Guermazi, David Satola, Eric Crabtree, Gareth Locksley, Isabel Neto, Jerome Bezzina, Juan Navas-Sabater, Mark Williams, Mohsen Khalil, Paul Noumba Um, Peter Smith, Philippe Dongier, Robert Frieden, Robert Pepper, Tim Kelly, and Yongsoo Kim for their time and contributions.

For their help in collecting information and sharing ideas, the authors would like to thank staff from the Organization for Economic Cooperation and Development, U.S. Federal Communications Commission, the Australian Communications and Media Authority, the Telecom Regulatory Authority of India, U.K.'s Office of Communication, the Infocomm Development Authority of Singapore, the Canadian Radio-television and Telecommunications Commission, and Industry Canada.

The authors would also like to thank Paul Holtz, Sara Roche, and Lacinda Barrow for their editorial support. All errors remain our own.

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## Executive summary

Multiple play in the information and communication technology (ICT) sector refers to the provision of multiple services—such as voice telephony, broadcasting, and Internet access—by one operator over a single communications network, typically telephone or cable television. Examples of multiple play include the provision of voice telephony and broadband Internet services over cable television networks, video content and telephony over the Internet, and Internet Protocol television (IPTV) over telephone networks. Multiple play is a subset of a much broader trend in the ICT sector toward convergence, which involves reducing distinctions between previously separate market segments, services, and technologies.

These developments offer numerous potential benefits to customers, including lower prices, better services, and more choices among service providers. Multiple play also enables new business models and opportunities for increased competition and reduced costs. However, multiple play also involves risks—linked to the economies of scale of broadband networks and the potential for renewed monopolization in the telecommunications sector. Consequently, the benefits of multiple play are maximized when there is a level competitive playing field for substitute services provided over different networks.

Regulation is subject to complex challenges in the face of multiple play. Typically, legacy and pre-convergence regulatory frameworks have developed very differently for different market segments and technologies. They will now have to transition to treating similar services the same without regard to the underlying network, while taking into account the potential impacts of changes—both positive and negative—on stakeholders. Regulatory frameworks also have to mitigate the risks of reduced competition in service provision.

This report focuses on regulatory responses, typically by telecommunications regulators, to market-driven multiple play over broadband networks. It describes how regulatory frameworks for networks and services can accommodate and support the introduction and proliferation of multiple play business models. Indeed, the main task for regulators is to remove artificial barriers and restrictions that are remnants of legacy regulation—clearing the way for market forces to play out, promoting the public interest, and leading to the realization of the full range of benefits for users.

It describes experiences and responses from around the world, with the goal of deriving principles for best practice—enabling countries to devise responses suited to their situations—without being prescriptive or offering a universal solution. It is difficult if not impossible to offer such a solution to the regulatory and other challenges of multiple play because the challenges and issues involved are evolving—as are the technologies and services—and because of every country’s unique situations and political economies. Still, it identifies some emerging best practices for regulation that are globally applicable:

- **Promoting competition.** Multiple play can increase competition, lower prices, and drive growth—but can only begin in markets with low entry barriers. Regulatory frameworks that establish level competitive playing fields will thus provide the greatest benefits for users.

- **Relying more on market forces.** Regulation should move toward allowing innovation and competition on a level playing field, then step back from intervening unless there are market failures.
- **Allowing new technologies to contribute everything they have to offer.** Service providers should be allowed to fully use their networks and reduce costs—increasing business viability and making markets more efficient.

The report is based on an in-depth survey of six countries, academic and professional literature on multiple play, and conversations with regulators, service providers, and equipment manufacturers worldwide. It compiles information from these sources to describe the current range of regulatory responses and analyze emerging regulatory trends and principles.

The analysis begins with a discussion of competition and regulatory symmetry as the underlying principles for an enabling environment for multiple play. There is broad consensus that starting with these regulatory principles will promote multiple play and, more broadly, growth in the ICT sector. The report then identifies challenges to traditional regulatory frameworks arising from multiple play, focusing on four areas: authorizations, spectrum management, interconnection and access, and universal service. It also discusses the organization of regulatory institutions that oversee the sector. In each case, the report analyzes how traditional regulatory frameworks might restrict or conflict with evolving technologies and business models. It then identifies emerging trends in regulatory responses. In concluding, the report presents some best practice principles for regulatory responses.

Because this report focuses on the specific regulatory issues that intersect with multiple play, it does not discuss in detail strategic or policy responses to convergence. These responses are discussed in a separate but related paper. Further, the discussion in this report focuses on the regulation of communications networks and services. It does not focus on regulation of content, and so contains little analysis of media policy and regulation beyond carriage aspects.

## **Convergence in ICT services: Emerging regulatory responses to multiple play**

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### **1. Introducing multiple play**

In the information and communication technology (ICT) sector, multiple play refers to situations where a service provider uses a single communications network—typically a telephone or cable television network—to provide a combination of services such as telephony, media, and Internet access. Around the world, providers of communications services are adopting business models based on multiple play. In doing so, they are using their existing infrastructure to expand coverage, increase subscriber bases and revenues, and reduce costs.<sup>1</sup>

Multiple play is actually a subset of a much broader trend in the ICT sector toward convergence, which involves reducing distinctions between previously separate market segments, services, and technologies. It results in substitute or “converged” services, both within the telecommunications sector and between telephony, broadcasting, and computing, without regard to the underlying technology.

Almost every current form of content can be carried over high-speed Internet networks, including stored sound (such as MP3 music files), interactive sound (such as Internet telephony), streamed sound (which emulates broadcast radio), text (emails, instant messages, newspapers, and books), images (digital photos), video (such as wmv files), and mass audience streamed video (such as Internet Protocol television, or IPTV).

Multiple play significantly changes the modes of service providers’ operations and brings into direct contact two markets—telecommunications and media—that have been regulated very differently. These changes require that regulation adapt to new business models and the evolving ICT sector.

#### **1.1 Supply of and demand for multiple play are growing**

Delivering multiple services to consumers requires broadband connectivity—a precondition increasingly in place around the world. In 2007, broadband was commercially available in 166 countries, and nearly a quarter of the 300 million subscribers were in middle-income countries.<sup>2</sup>

Moreover, there is strong demand for multiple play and its related services. Skype, an Internet telephony service, has more than 250 million subscribers in 225 countries and territories (Skype, 2007), and in 2007 carried 4 percent of international telephone traffic (Telegeography, 2007). By late 2007 there were more than 30 million “triple play” subscribers worldwide—typically receiving telephony, broadcasting, and Internet services. With the increasing availability of broadband and growing user awareness of and interest in related services, multiple play will likely become increasingly popular.

**Box 1: Examples of multiple play in developing countries**

Over the past year, telephone and cable companies have been converging in **Brazil**. Telemar acquired Way television, while Telefónica bought a stake in television company TVA. These moves came in response to the introduction of triple play services by cable operator NET Serviços, which has an estimated 400,000 triple play subscribers.

In 2006, Telefónica **Chile** began offering IPTV and satellite television services to counter the decline in fixed line tariffs and subscriptions. Cable operator VTR has seen its triple play subscriber base double since 2006, and is considering acquiring a high-speed third generation (3G) telephone license to add mobile telephone services to its portfolio.

Telecom **Egypt** has begun upgrading its fixed line network to an Internet-based next generation network, allowing it to provide both telephone and Internet services. Its Internet service provider subsidiary, TE Data, introduced IPTV services in October 2006.

**India**'s public sector incumbent telecommunications operator, Mahanagar Telephone Nigam Limited (MTNL), introduced IPTV services in Mumbai (Bombay) in 2006. The service offers about 150 channels for about \$5 a month, and has 6,000 subscribers. A number of private operators have since begun providing IPTV services.

**Sri Lanka**'s Dialog Telekom offers telecommunications and broadcasting services. It has become a quadruple play operator – offering fixed and mobile telephone, television, and Internet services. Its satellite television service reaches more than 60,000 households, and its mobile service has 4.3 million subscribers and will soon include 3G services.

In March 2008 **Ukraine**'s Comstar began offering IPTV services over its fiber-based next generation network – making it the country's first provider of triple play telephone, broadcasting, and Internet services. Comstar will soon face competition from Golden Telecom Ukraine and fixed line operator Ukrtelecom. The IPTV offerings follow broadcaster Viasat's plans to introduce digital satellite television services later in 2008.

Service providers are seeing multiple play as a way to enter new markets and break down traditional boundaries between telecommunications—including telephony and Internet communications—and media services. Operating beyond their long-standing models of cable television or telephone services, for example, companies are now offering all types of communication services over their networks. In the United States, Comcast (2008, March) as 24 million cable television, 13 million broadband Internet, and 5 million digital telephone customers. In May 2008, it joined a consortium that plans to deploy wireless broadband services as well (FinancialWire, May 8, 2008). Similarly, France Telecom is the world's largest broadband television provider, with 1.1 million subscribers, followed by Verizon in the United States (Telecommunications Management Group, 2008, April). Service providers in developing countries are also beginning to invest in similar business models (**Box 1**).



## **1.2 Multiple play challenges legacy regulatory frameworks**

Legacy regulatory frameworks may impede implementation of multiple play services in two main ways. First, frameworks can impede new service providers from entering markets. Second, different legacy rules may apply to different operators providing different services—a situation where the competitive playing field is not level.

Obstacles to new entry can include the possibility of not allowing existing service providers to expand the range of services they can offer—that is, failing to authorize network owners to provide services that their networks are capable of delivering. Many countries' regulatory frameworks permit only specific services on a network. Cable television companies and Internet service providers are often not permitted to provide interconnected voice telephony, while telephone companies cannot offer broadcasting services. In some cases there might not be a complete restriction on market entry, but service providers might face high entry barriers or delays in acquiring licenses or resources, such as telephone numbers or spectrum.

Such impediments to market entry prevent competition in service provision and diminish the economic performance of the ICT sector—and the entire economy. Disallowing the full use of networks also reduces their financial viability. Delays in permitting expanded or better service choices to customers slow innovation and make network investments less attractive.

In terms of competitive playing fields, adhering to legacy frameworks might create situations where operators provide the same or similar services but are regulated differently because they operate under different rules. These differences arise from the separate development of the regulatory frameworks that have traditionally governed telecommunications, broadcasting, and Internet services.<sup>3</sup> Now, as service providers enter new markets, fairness and efficiency require that similar rules apply to similar services to safeguard competition regardless of the underlying network.

Telephone service providers have traditionally had to follow local loop unbundling regulations, pay into universal service funds, or follow price controls. These rules might not apply to cable television operators even if they provide the same or similar services as telephone service providers, allowing the cable television operators to benefit from lower costs or higher efficiencies. Such differences in the regulatory environment are based purely on legacy frameworks and undermine competition.

Efforts to overcome the non-level playing field give rise to a number of questions: Should broadband-based providers of telephone services pay the same contributions to universal service funds as do traditional telephone service providers? Should they be subject to the same price controls? And how do traditional price controls work when services are bundled?

Table 1 presents some examples of how traditional regulatory frameworks can impede multiple play and have negative implications for the ICT sector.

**Table 1: Some examples of regulatory impediments to multiple play**

<b>Impediment</b>	<b>Implication</b>
<b>Restrictions on new entry</b>	
Internet service provider with its own network authorized to provide Internet service but prohibited from providing voice service (VoIP).	The regulatory environment prevents networks from delivering all their capability to customers. The financial viability of network investment is damaged, and deployment of services restricted.
An incumbent telephone company invests in a high speed broadband network, but faces delays in obtaining authorization to provide video content services such as cable TV or IPTV service.	The regulatory environment has delayed implementation of expanded service or service choice to customers, and damaged the attractiveness of network investment.
<b>Non level playing field</b>	
An incumbent telephone company may have regulatory obligations such as local loop unbundling, payment to universal service funds, or price control that do not apply to cable TV operators, or re-sellers, providing the same or similar services.	The regulatory environment is not providing a technology neutral level playing field. As a result, customer choices are distorted and there is a loss of economic efficiency.
An incumbent telephone company may have better access to public rights-of-way than cable TV operators.	The regulatory environment is not providing a technology neutral level playing field.
Radio spectrum is available at a nominal price to some users (such as broadcasters) but is only available to others at commercial prices that reflect scarcity value (such as cellular mobile or broadband wireless access operators).	As convergence progresses, with more video content distributed over mobile or broadband wireless access networks, the need to progress all commercial users towards a common system of economic pricing for spectrum becomes more important.

### **1.3 What role should regulatory frameworks play?**

Thus, regulatory frameworks have an important role in the era of multiple play. First, they have to remove such impediments to the full play of market forces and technological innovation. Second, they can facilitate the realization of benefits from innovation and competition, and reduce the risk of creating dominant market power. Consequently, regulatory frameworks have to adapt to multiple play.

**Box 2: Consultations can build support for and strengthen regulatory responses**

Regulatory reform is often difficult and complex. It typically proceeds in a piecemeal fashion, overcoming specific resistance at different stages of the process. Hence, careful and strategic planning, along with consultations and transparent discussions, enables a smoother transition – even if it takes more time to build momentum. This approach enables reformers to build support and have an open, transparent reform process.

Consultations are also important because investors will lose confidence if the government is seen as taking unilateral steps – even if they might have positive outcomes. If government initiatives are seen as damaging, they might undermine efforts to develop an enabling regulatory regime that supports investment and growth.

Consultations and discussions are also proven mechanisms for regulators and ministries to understand the varying potential challenges and opportunities that are part of the reform process. Opening discussions to all stakeholders and maintaining ongoing, clear communication makes the process more effective. Transparency also ensures that regulatory reforms consider and satisfy public interests and that the process occurs through without bias to any one segment of the market. Moreover, exchanging ideas in an open, transparent setting helps regulators develop effective relationships with stakeholders and increases their capacity and knowledge – making it easier to counter potential resistance.

For regulatory frameworks to create an enabling environment, they will have to remove artificial restrictions and promote competition on a level playing field. Ensuring an enabling regulatory framework will require that the tools and approaches used for authorizations, spectrum management, interconnection and access, and universal service facilitate the free play of market forces and the deployment of new technologies. If regulatory frameworks allow the market to function without impediments to innovation and competition, they will support the introduction of advanced technologies, new investments, and enable growth.

Legal responses, broadly construed, usually lag technical developments. Only in some cases do governments make strategic and policy decisions ahead of time to champion multiple play that regulators are then required to implement. Typically, regulators will be confronted with and need to make decisions about multiple play after it has already been introduced by innovative service providers.<sup>4</sup>

In either case, regulators respond to market developments within an existing framework, or to changes in the policy and legal environment. The way that regulatory reform occurs can play an important role in creating positive perceptions and stable regulatory regimes. The speed, transparency, and strategy behind a regulatory response will greatly determine how the market perceives the environment. Further, experience suggests that when regulatory decisions are made through open and transparent consultations with stakeholders, it builds the regulator’s credibility in the market and better informs decision makers (**Box 2**).

**1.4 Implementing the regulatory response**

Given the growth in broadband-capable infrastructure and proliferation of IP-based networks, it is hard to justify any regulatory delay in responding to multiple play. Yet it is rarely possible to

implement radical reforms in one quick step. Reform often takes time and can be slowed by political obstacles. Still, in some cases there may be windows of opportunity to initiate reform.

When such opportunities present themselves, governments can identify reforms that will do the most to achieve their goals. As such, there will be a gradation of responses—from “greatest impact” to “important” to “desirable but not essential.” Thus regulatory reform, even with limited political capital and technical capacity, can have significant impact if it is prioritized.

Given its primacy in allowing service providers to offer multiple play, the authorizations regime may be a good starting point for such reform. Acting within the existing policy and legal framework, the authorizations regime can be amended to accommodate new business models and operators immediately. Such a move initiates regulatory reform and allows market forces to operate, even if partially.

By contrast, another common approach—often overemphasized—is creating new agencies or modifying laws to accommodate multiple play. Doing so takes significant time and political capital that might deflate willingness to implement further reforms in the sector. Having a “converged” institutional framework is perceived as being desirable and has potential efficiency benefits (García-Murillo, 2005, p. 21). Yet, it is not essential. Some countries create “converged” institutions simply by combining their telecommunications and broadcasting equivalents. But success in moving toward multiple play depends more on coordination between agencies and their ability to function in a way that enables new business models and operations.

## 2. Crucial principles for an enabling regulatory environment

An in-depth survey of six countries formed the starting point of this report’s conclusions. A summary of these countries’ regulatory responses to multiple play is presented in Table 2.

Two regulatory principles are discernible from the range of regulatory responses to multiple play. First, regulatory frameworks are looking to promote competition. The ways in which authorizations are allocated and spectrum is assigned, for example, clearly indicates a trend towards openness, flexibility, and market mechanisms. This enables easier market entry by nontraditional service providers.

Second, regulatory frameworks are being set up to ensure that markets, not regulation, pick winners. This requires regulatory symmetry—the application of similar rules to service providers offering similar services, to create competitively level playing fields. Interconnection, universal service, and spectrum assignment, for instance, are becoming competitively neutral.<sup>5</sup>

The general trend in authorizations, spectrum management, interconnection and access, and universal service is to have a framework that supports competitive service provision and applies similar rules to similar services regardless of technology (that is, are technology neutral). A pro-competition regulatory framework supports service growth and user benefits, while symmetry creates a level playing field. Together these underlying principles inform much of the analysis in the rest of this report.

**Table 2: Summary results of survey of six countries**

	<b>Authorizations</b>	<b>Spectrum</b>	<b>Interconnection and access</b>	<b>Universal service</b>
Australia	Converged licenses for telecommunications facilities and services; broadcasting separately licensed	Trading is allowed, market mechanisms for assignment	Opposition from incumbent to open access; now government is building national network	A minimum data service is guaranteed and subsidized
Canada	General authorization, with a technology neutral regime for telecommunications, on a notification basis unless spectrum is needed	First-come-first-serve for bands in low demand, auctions for bands in high demand; technology neutral; flexible use in some cases	Ex-post regulatory involvement; unbundling only for essential facilities	Wireless services have no obligation; universal service for fixed telephony; cable TV to reach all residences
India	Technology neutral licensing for telecommunications; specific IPTV conditions	Technology specific, service specific licensing; spectrum is included in the service license	Service specific interconnection	Broadband and mobile telephony have been added to the program
Singapore	Converged carriage licensing regime; but needs specific licenses for IPTV and mobile TV	Broadband wireless access spectrum can be used for voice telephony	Currently tendering an “open access” fiber optic network	-
UK	Technology neutral and flexible use general authorizations for telecommunications	License auctions and trading are common, digital dividend will be available for mixed use	Incumbent undertook functional separation, local loop unbundled	-
USA	Multiple levels of licensing; federal authorizations, more specific licenses at state and city level	Spectrum freed by the move to digital TV allocated on a service and technology neutral basis	Rural telephone operators have to connect with “interconnected VoIP” providers	VoIP providers are required to contribute

## **2.1 Promoting competition is an essential part of multiple play**

There is a strong interplay between multiple play and competition. Multiple play will emerge only when regulations allow easy market entry by service providers. Thus, the extent to which multiple play enters and affects a market greatly depends on the overarching competition policy. Cable television companies have entered the Internet or telephone services market because governments have liberalized them. It was thus possible to acquire authorizations.

Similarly, telecommunications companies can add video services to their offerings only if a country's competition policy allows entry into cable television or general broadcasting and media markets. Such a move promotes competition and results in a reduced tariffs, increased coverage, and better quality of service (**Box 3**). It also allows firms to operate without restriction and use their networks more efficiently.

While multiple play might lower entry barriers, there is also a risk that it could lead to monopolization. First, multiple play might also reduce competition because only those service providers that can invest in multiple service provision can successfully compete in the market. Second, if a service provider is able to achieving increased efficiencies, it might become a dominant player in the converged market by leveraging its position in one of these markets. Third, multiple play may significantly weaken incentives for investing in new facilities. Just one service provider might now serve areas that previously did not have any infrastructure in place. As a result, multiple play might also create monopolies.

Hence, an enabling environment for multiple play requires a pro-competition regulatory framework that allows entry into new markets and checks against the creation of harmful monopolies.

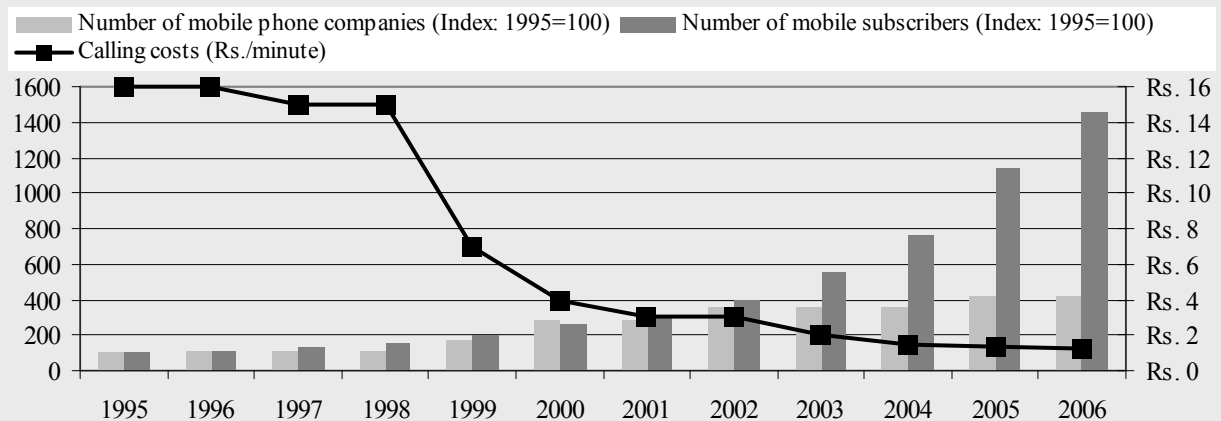
Regulators will also have to rethink their approaches to regulating competition in light of multiple play: with the boundaries between cable television and telephone companies breaking down, regulators will have to ensure that the ICT market as a whole remains competitive. Consequently, definitions of "market power" for example, which typically focus on the subscriber base or revenues of only telephone or cable television companies might have to expand their focus to include all the relevant firms.<sup>6</sup>

Yet, it is important that the drive to check monopolies should not hurt innovation, good business models, or organic growth. As a result, regulators are now moving from "ex ante" to "ex post" competition regulation. Before intervening, they look for evidence of anticompetitive behavior. This is a significant change from before-the-fact restrictions on what constitutes anticompetitive behavior, such as limits on ownership or market share. This more flexible approach allows innovation and new business models while keeping a check on their impact on market efficiency (ICT regulation toolkit, "Advantages and disadvantages of ex ante versus ex post regulation").

### Box 3: How does competition in telecommunications affect growth and consumer costs? Lessons from India and the United States

Over the past two decades, liberalization of telecommunications has shown that competition is the most effective mechanism for spurring sector growth. For example, India's growing number of mobile telephone service providers has driven growth in subscribers and pushed down calling costs (box figure). India is now the world's fastest-growing mobile telephone market – and, like many other countries before it, benefiting from increased competition due to an enabling regulatory environment.

**Figure: Competition in the Indian mobile telecommunications market has driven growth**



Similarly, a 2004 report by the U.S. Government Accountability Office (GAO) of 12 domestic markets found that entry by competing broadband service providers – offering combinations of telephone, cable television, and Internet services – induced incumbent cable television companies to provide more and better services, lower rates, and offer promotional deals. Incumbent telephone providers did not show a similar response, but indicated to the GAO that incumbent cable television companies were their main competitors in the high-speed Internet market.

The GAO survey found that expanded basic cable television rates were 15–41 percent lower in five of the six markets with competing broadband providers than in similar markets without such competition. Almost all the incumbent cable operators said that they lowered their cable and high-speed Internet prices to compete. Consequently, the report concludes that competition results in substantially lower prices for consumers.

*Source:* Telecom Regulatory Authority of India data; GAO, 2004, “Wire-Based Competition Benefited Consumers in Selected Markets,” Report to the Subcommittee on Antitrust, Competition Policy and Consumer Rights, Committee on the Judiciary, U.S. Senate, Washington, DC. Available at: <http://www.gao.gov/new.items/d04241.pdf>



## **2.2 Regulatory symmetry is important—but has exceptions**

Legacy regulatory frameworks have different rules for cable television, radio, fixed telephony, and so on. These differences lead to asymmetric regulations across communications sectors. When multiple play brings together these sectors, it is no longer possible to distinguish between them—exposing the asymmetries in legacy regulatory frameworks and creating uneven playing fields (Bar & Sandvig, 2000).

Regulatory asymmetry is harmful when it creates confusion and distorts markets. Asymmetries can lead to overlaps and conflicts that increase regulatory risks and raise the cost of capital by up to 6 percentage points.<sup>7</sup> This slows investment and blocks full competition in infrastructure and services. Asymmetries can also enable regulated firms to game regulatory processes to secure artificial competitive advantages. Thus in some cases regulation may not be picking winners as much as firms skilled at exploiting regulatory processes.<sup>8</sup>

If multiple play allows competition between service providers that did not previously compete and have been subject to different regulatory regimes, “the various regulatory regimes will have to be reformed and harmonized or else run the risk of creating distortions” (Katz, 2000, pp. 29-30). Regulatory symmetry can rectify and prevent such outcomes.

Symmetry is a simple notion: fungible services should be regulated under the same terms and conditions. In addition to appealing to notions of fairness, symmetric treatment promotes efficiency (Ismail, 2004). If substitutable services are treated the same, service providers with better-quality services and business models will prevail in the market.

This report considers regulatory symmetry to be synonymous with technology neutrality, where regulations do not concern themselves with the technologies used to provide a given service.<sup>9</sup> Many countries, including India, Kenya, Singapore, and Uganda, have adopted technology-neutral licensing regimes, allowing licensees to deploy any technology as long as they follow technical guidelines. This approach allows service providers to choose the most efficient technology for their purposes, clearing the way for deployment of advanced communications systems and enabling future technological evolutions to enter the market with the fewest regulatory restrictions.

At the same time, in some cases clearly defined and predictable asymmetries can ensure competition and foster growth in new technologies. Regulators often apply stricter or more rules to dominant service providers to ensure that they cannot abuse their market power. For instance, these rules often require providers to unbundle their local loops and interconnect with competing service providers. Sometimes, regulations mandate incumbent mobile telephone service providers to offer national roaming facilities to new entrants for a limited time in order that the new entrant can compete effectively even as they deploy their networks.

Thus, the regulatory principle is to ensure symmetry unless there are justifiable reasons not to do so (Ismail, 2004). Supporting or creating opportunities for firms to game the regulatory framework will slow investment, destabilize the regulatory regime, and impede multiple play. Any intentional asymmetries should be transparently applied, and regulation of dominant operators should not focus on specific companies but follow predefined criteria.

### 3. Authorizations

This section discusses various regimes for authorizations and their impact on multiple play. In some cases these regimes have been the result of regulatory responses to multiple play, while in others they existed before multiple play.<sup>10</sup> Authorizations include all the legal instruments—such as licenses or concession agreements—that allow service providers to enter markets, and define the rights and obligations of authorized parties (ICT regulation toolkit, “Authorization”).

The authorization regime is a top priority in creating an enabling regulatory environment that facilitates a market-driven transition to multiple play. Service providers can lawfully provide only those services that fall within the scope of their authorizations. As a result, even though technology permits multiple play and service providers’ business models could benefit from it, authorizations may hold them back.

Mechanisms for awarding authorizations also have significant implications for the market effects of multiple play. Regimes that allow easy entry by new service providers or permit older service providers to enter new market segments will facilitate the introduction of multiple play.

Recent trends have been for regimes to move from technology- or service-specific authorizations to open and flexible regimes, as in Kenya and Uganda (Table 3). Some countries, such as Malaysia and Singapore, have moved to class licensing for some services. Now there is an emerging trend requiring only simple notification for some services (as in Finland, Japan, and Moldova) or, in the future, toward de-licensing.

**Table 3:** Evolving license types to authorize service providers' operations

Type	Description	Example
Specific license	Licenses are developed and awarded to individual service providers, with specific terms and conditions.	Many initial fixed and mobile telephone licenses.
Uniform license	All similar service providers have the same licenses, terms, and conditions.	Many current telephony regimes.
Unified license	Licenses are combined into a single license covering a wide range of services, effectively technology- and service-neutral.	Kenya's licensing regime uses a unified, technology-neutral licensing framework that allows any form of communications infrastructure to be used for any communications service.
Class license	Technology-neutral licenses that include broad types of services under a single license.	Malaysia's framework consists of 4 class and technology-neutral licenses, down from 31 in the older setup.
Notification	Operators are free to provide services subject to regulatory obligations and only have to notify the regulator before, or shortly after, initiating service.	EU members are moving toward an authorization regime using minimal regulatory intervention and requiring individual licenses only if strictly necessary (as with the use of finite available resources such as radio frequencies and telephone numbers).
No license	No license is needed to provide communications services.	In some countries value added or Internet services do not require licenses.

Source: ICT regulation toolkit, "Main Types of Authorization Regimes," <http://www.ictregulationtoolkit.org/en/Section.544.html>

### 3.1 How do authorizations affect multiple play?

Governments typically authorize telecommunications and media service providers before allowing them to begin delivering services. These authorizations typically specify who can build communications infrastructure or offer communications services. They also define the scope of services that licensees are allowed to offer.

Authorizations have traditionally specified the types of technologies and services that licensees can provide. The separate histories of telecommunications and media have led to very different terms and conditions for service providers.<sup>11</sup> For example, governments have licensed telephone

companies to offer voice telephony using specific technologies, beginning with wireline and then moving to cellular and wireless local loop systems. Licenses for media service providers have focused on the provision of radio and television services over terrestrial and cable networks using specific technologies for, say, radio broadcasting or cable television.

But beyond the content of authorizations, the licensing process also controls market entry, allowing government to manage which service providers can enter and operate in which market segment. Regulatory frameworks create other entry barriers, such as requiring telecommunications providers to pay significant entry fees and ongoing taxes. Similarly, cable television networks or terrestrial broadcasters have to meet social and cultural obligations related to content and service. Such requirements determined entry barriers for and profiles of service providers. Thus, the mechanism for allocating authorizations strongly influences market structures and competition levels.

The mechanism and scope of authorizations have perhaps the greatest impact on multiple play. A restrictive mechanism for or scope of authorizations severely restricts market entry and the ability of service providers to offer combinations of services. At the same time, multiple play has a significant impact on the authorization regime—challenging the traditional separation between telecommunications and media providers, and putting pressure on systems with different allocation mechanisms and scopes of service.

This section focuses on two challenges that multiple play poses to authorization regimes. First, multiple play makes it possible for service providers to expand their scope of operations. While allowing existing service providers to operate in new markets, it challenges traditional restrictions on market entry. Second, with different service providers operating in the same markets, it is difficult and likely counterproductive to maintain asymmetric operating conditions. For instance, if telecommunications firms do not have to adhere to content regulations common to those for media licenses, or if broadcasters do not have to follow service quality guidelines common to those for telephone and Internet service providers, it will lead to confusion for consumers and unequal regulatory burdens. This section examines how regulators have reduced market entry barriers, increased the scope of operations, and mitigated unequal operating conditions.

#### *Restrictive authorization regimes slow the introduction of multiple play*

Multiple play disrupts carefully planned controls on market entry. By upgrading their network infrastructure, telecommunications and broadcasting firms can enter each other's markets with relative ease. For example, since the introduction of VoIP services many policymakers and regulators have grappled with how to respond to this new means of providing telephone services. Although new entrants increase competition, they can also reduce the revenues of incumbent providers.

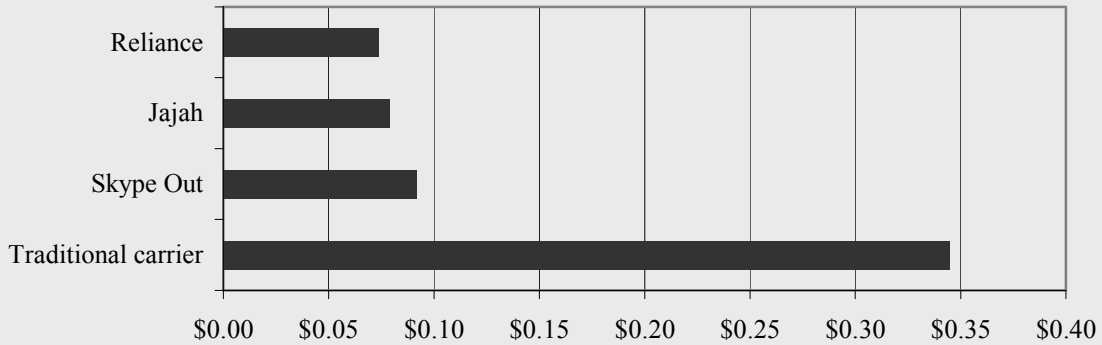
But countries that believe restricting VoIP will prevent the loss of revenues for incumbents should bear in mind that illegal grey market traffic also causes losses (ITU, 2006, p. 18). For example, Nigeria's Nitel estimates that before its lowered the costs of international calls in 2004, 90 percent of such calls went through the parallel or grey market that used VoIP (ITU, 2006, p. 13). Policymakers and regulators need to understand that it is unproductive to restrain market

**Box 4: The benefits of an open licensing regime: the case of Voice over Internet Protocol (VoIP)**

VoIP based Internet telephony services such as Skype Out makes it possible to have long-distance telephone conversations that are much cheaper than traditional long distance services. Lower costs are also possible with telephone-based services conducted over Internet networks – such as Jajah, which uses the Internet to carry phone-to-phone conversations. If all the international calls made to just the top 10 destinations from the United States used Jajah, the savings would top \$2.5 billion.

If a country’s licensing regime prevents the entry of VoIP based providers or restricts the type of technology they can use, it reduces the benefits of convergence for consumers. Moreover, countries that have banned these technologies have also undermined their technological competitiveness. Failure to legalize VoIP prevents entrepreneurs from developing into a core of fast-growing information technology (IT) startups – which tends to happen in countries where VoIP is legal.

**Box figure: VoIP service providers offer significantly lower costs (U.S. cents per minute from the United States to India)**



Source: Authors’ estimates based on tariff data from service provider websites; Telegeography traffic estimates; Economist Intelligence Unit, “Africa: Tariffs Tumble, VoIP Rises,” 8 March 2007.

forces and technological developments using regulation. In trying to do so, they also risk restricting potential benefits for consumers and the economy (**Box 4**).

Accordingly, many countries are simplifying mechanisms for market entry. Instead of seeking high license fees, these countries are moving to simple authorizations with low fees. Some countries have started adopting open and flexible licensing regimes, allowing service providers to use any technology to offer a wide range of services.

Some countries, especially in Europe, are eliminating licenses—preferring automatic authorizations for operators that do not require spectrum or telephone numbers. For example, the European Union’s 2002 Authorization Directive states that:

The least onerous authorization system possible should be used to allow the provision of electronic communications networks and

services in order to stimulate the development of new electronic communications services and pan-European communications networks and services and to allow service providers and consumers to benefit from the economies of scale of the single market...Those aims can be best achieved by general authorization of all electronic communications networks and services without requiring any explicit decision or administrative act by the national regulatory authority and by limiting any procedural requirements to notification only (European Commission, 2002).

The underlying goal of such authorization regimes is to enable competition through easy market entry. Thus service providers should be subjected to the fewest burdens when entering markets. Enabling competitive entry introduces new business models, investment, network deployments, and services into markets. Service providers can then enter nontraditional sectors and offer service bundles—reflecting the possibilities of multiple play.

*The scope of authorizations determines the extent of multiple play*

Another aspect of the authorization regime is the scope of the license involved—what it allows a service provider to do. This is probably the most important aspect of regulation for multiple play. If a licensing regime is too restrictive, it will prevent service providers from offering multiple services, automatically restricting multiple play. If networks are capable of providing multiple services on one platform, and service providers are seeking to implement such models, an authorization regime that restricts these possibilities will impose artificial constraints on the market, resulting in underuse of existing infrastructure, lower investment, and reduced economic growth and benefits.

In Singapore, SingTel's efforts to move into IPTV services and offer triple play services were slowed by its need to seek authorization from the broadcasting regulator, the Media Development Authority (MDA). Seeking to expand its businesses and shore up revenue, SingTel planned to invest \$40 million in an IPTV operation as early as October 2005 (Straits Times, October 1, 2005; Business Times Singapore, November 9, 2006; Straits Times, November 20, 2006). The MDA offered SingTel a trial IPTV license in November 2006, then created a new IPTV licensing regime in January 2007 (Straits Times, January 16, 2007). Thus about 14 months passed between SingTel's initial approach to the MDA and the approval, during which cable operator and competitor StarHub increased its subscriber base and saw its profits jump by more than 60 percent (AFX Asia, February 14, 2007). Even though the MDA saw IPTV as a way to boost competition in the pay television market, its introduction was delayed by the time it took to pass through the bureaucratic motions of creating a new license.

Also in Singapore, when third generation (3G) cellular operators wanted to broadcast television content over their networks in 2007, the MDA proposed that cellular mobile television service providers obtain media service licenses before transmitting television services to their customers (MDA, November 21, 2007, p. 9). The operators countered this proposal, stating that their 3G licenses included the right to offer broadcasting services. They claimed that after spending significant sums acquiring their 3G licenses, they should not be subject to additional licensing.

And these examples come from a regulatory regime that is globally considered forward-looking and responsive, overseeing a vibrant and advanced market.

Issues of scope are intertwined with approaches to market entry. For example, India has 70 million households with cable television, making it one of the world's largest markets for subscription television services (Deutsche Bank, September 20, 2007). Rules governing cable television operators are separate from telecommunications and Internet licenses and legislation. Licenses for cable television and Internet providers are effectively free and unlimited—a strategy adopted to encourage their growth. But national telecommunications licenses cost about \$400 million. As a result, while many cable television companies are Internet providers, none offers competitive telephone services. Enabling them to do so affordably could double the number of fixed telephone subscribers and spur growth in broadband subscriptions as a result of bundling and lower costs.

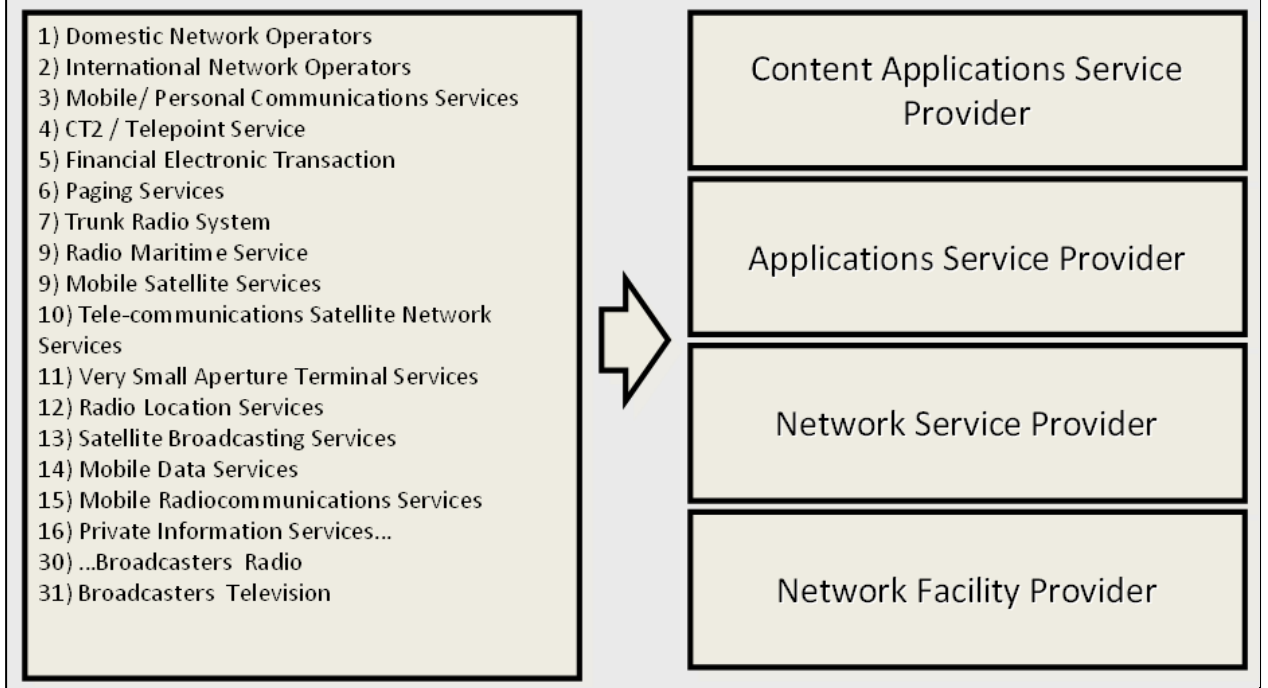
Most countries do not have a completely converged authorizations framework that includes both telecommunications and media services. Even countries that are advanced in adapting to multiple play make distinctions among services. For example, Australia and Singapore have regimes that support multiple play. For telecommunications, they have two sets of technology-neutral licenses—one for infrastructure providers and one for service providers. But they have a different licensing regime for media services. Now that mobile television is entering these markets, both governments are considering the technology's regulatory status.

The emerging trend is for flexibility in authorizations to allow a range of services, opening as many as possible to competition (Burdon, 2006). Many countries have started to respond to multiple play and convergence in their authorization regimes. The U.S. Federal Communications Commission recognizes the need for flexibility, allowing firms under its jurisdiction to provide any combination of voice, broadcasting, and Internet services. Economies such as Hong Kong (China) and India have also implemented unified licensing, allowing service providers to offer any service using any technology.

**Box 5: Malaysia’s simplified licensing framework**

Malaysia adopted a new licensing framework in 1998, reducing the number of licenses involved from 31 to four. This move has made licensing more efficient and reduced possibilities for conflict and overlap in the regulatory framework – significantly improving market efficiency and performance by reducing arbitrage opportunities among service providers.

**Box figure: In 1998 Malaysia dramatically reduced the number of licenses required for ICT**



Still, it is not necessary for countries to offer unified licenses. Different types of licenses might be required as long as entry conditions—that is, acquisition of new and different types of licenses—are not restrictive. As in Malaysia, a country might have multiple types of licenses that still represent a simplified regime (**Box 5**). But to make this system work effectively it is essential to have low entry barriers in terms of process or pricing, as in Singapore.<sup>12</sup>

The 2002 EU Authorization Directive points in this direction, explaining that:

Convergence between different electronic communications networks and services and their technologies requires the establishment of an authorization system covering all comparable services in a similar way regardless of the technologies used. (European Commission, 2002).

Thus the EU directive suggests that member countries should have a technology-neutral authorizations regime and treat all comparable services similarly. Such a regime would enable market forces to determine the best technology to use for a given purpose and avoid the creation of sector-specific, asymmetric rules and conditions that might hinder competition.



Indeed, technology neutrality has become a common theme of authorizations regimes in many countries. As noted, India, Kenya, Singapore, and Uganda, among others, have implemented licensing regimes that focus on the services being offered—not the technology used to offer them. And in 2006 Nigeria introduced a unified access-service license that allows telecommunications firms to:

construct, maintain, operate and use an international gateway and a network consisting of a cellular communication system, a fixed wireless access telecommunications system, fixed wireline telecommunications system or a combination of any of these systems comprising radio, cable or satellite or their combination, in the designated license area, deployed for the purpose of providing point to point or switched/un-switched point to multipoint communications for the conveyance of voice, data, video or any kind of message (Nigerian Communications Commission).

As technology neutrality and authorization flexibility become more common, regulators can consider further simplifying their regimes. In March 2008, Moldova promulgated a new ICT law that envisages a simplified authorization regime requiring only notification. The law replaces three licenses required for mobile, fixed, and Internet communication services. Only when spectrum is needed does the law require specific licenses. Similar notification schemes, where the service provider only has to inform the regulator and then assume license conditions, are in effect in Finland and Japan. In fact, Finland allows for notification through a website. Japan, on the other hand, limits the size of networks allowed to use simple notification. Beyond that, service providers must seek licenses. More liberal regimes might require only that service providers follow a set of rules; there is no need even for notification.

### **3.2 Symmetric licensing terms support an enabling regulatory environment**

The approaches used to allow entry into new markets by nontraditional service providers point to the significance of asymmetries in licensing conditions. For example, cable television companies are typically not bound to connect with emergency services, offer number portability, or contribute to universal service funds. If they begin to offer telephone services, they can escape these and other regulatory burdens—unlike traditional telephone service providers. Similarly, telecommunications companies that enter the media market can often skirt content codes or have different (and typically higher) limits on foreign investment than do cable television or other broadcasting service providers. These differences create arbitrage opportunities that bias the market and undermine a level playing field. To encourage competition, regulators should ensure a level playing field in licensing terms and conditions.

Even a liberal market like that in the United States has not been free of the problems that multiple play creates for the authorization regime. Telephone services are traditionally licensed at the state or national level. Now that telecommunications companies are entering the media market, they are subject to licensing regimes at the city level. This disparity creates opportunities for firms to exploit different rules if they find themselves in a conflict between regulations and agencies.

One example comes from the U.S. state of Connecticut, where telecommunications operator AT&T had plans to invest \$336 million and employ 1,300 workers to operate its IPTV service, U-verse (Associated Press Newswires, October 31, 2007). In May 2006 AT&T secured a statewide franchise on the basis that its service was not cable television and thus not subject to city-level franchising. But the cable television industry and the state sued AT&T, alleging that this tactic was illegal and that the firm was trying to avoid coverage obligations and content codes (such as being required to carry local and public service channels). A July 2007 court ruling ordered AT&T to seek cable television licenses, saying that IPTV was not significantly different from traditional cable television. After a long court battle, in November 2007 AT&T secured the right to statewide franchising. Along the way the company almost canceled its investment and employment plans, threatening significant lost economic opportunities for the state.

Another example from the United States involves telephone services. IP-based services grew throughout the 1990s, with the Federal Communications Commission holding back from regulating them. As a result traditional telephone companies had a number of obligations that VoIP operators did not. Today cable television operators and standalone VoIP operators account for about 13 million telephone subscribers, or 10 percent of U.S. households (Telegeography, 2007). The Federal Communications Commission has begun to require that VoIP operators that interconnect with traditional telephone services ensure connectivity to emergency services, provide consumers with number portability and access for subscribers with disabilities, and contribute to universal service funds (FCC, 2005, 2006, 2007). Such requirements have a significant impact on operators' business.

Different types of licenses also have significant differences in their entry fees, annual license fees, rollout obligations, universal service obligations, interconnection, and other conditions. Some of these conditions are common across license types, while others are specific to certain kinds. For example, while rules on foreign ownership may be the same, rules on interconnection or license fees may differ. (Some of these aspects of ICT regulation are discussed below.) Yet, as a general principle, following from the idea of symmetry, it is important for regulators to ensure a level playing field for all operators offering similar services.

### **3.3 Two basic options for reform**

There are two basic options in reforming the authorizations regime. Reform can proceed in a piecemeal way—fixing some current problems without significantly altering authorizations regimes. Or it can proceed directly to new regimes that fix current problems and prepare the sector for the future.

The problem with a piecemeal approach is that it does not address larger problems, making authorizations susceptible to challenges from a market that is rapidly innovating and moving toward multiple play and new services. The communications industry is already experiencing intense innovation and convergence between services and technologies. It will become increasingly difficult to discriminate among these converging networks and services.

Further, when rules or regulatory frameworks overlap or conflict, regulatory risk increases and the cost of capital rises. These obstacles slow investment and impede competition in

infrastructure and services. Thus regulators need to move toward a stable, predictable licensing regime—yet one that has the flexibility needed to accommodate new technologies and business ideas.

Hence, regulatory frameworks that move the ICT sector to a new authorizations regime would have to account for current challenges and address future concerns. Moving to a liberal, flexible regime that accommodates future technological developments and is market-friendly will drive growth, lower regulatory costs, and reduce burdens for operators.

Restrictions in a licensing regime might keep service providers from extending their services, making investments, or providing services of the desired quality. While it is difficult to determine the exact costs imposed by restrictive regimes, international experiences have shown that less restrictive licensing often drives growth and investment. India implemented unified access service licensing in 2003 and 2004. The license was technology neutral and allowed flexibility in services. The introduction of this regime ended a number of disputes between operators about different license terms and conditions. Investments and growth increased after this reform, with the subscriber base increasing exponentially – from 10.6 million in 2002 to 76 million in 2005 (Wireless Intelligence, 2008).

### **3.4 Designs of authorizations regimes are changing**

Emerging trends indicate a preference for simpler, more flexible authorizations regimes that are technology neutral, accommodating the provision of multiple services and easy market entry. Many countries are adopting unified regimes, class licenses, or even delicensing (see again Table 3 on page 13). The only exception typically is when service providers require the right to use finitely available resources such as radio frequency.

Reform also involves many other considerations, including:

- **Migration.** Although flexible or open licensing might be desirable, introducing a new licensing regime requires careful planning to be successful. Service providers are often resistant to changes that might affect their interests. Hence it is useful for regulators to engage with stakeholders to ensure transparency, understand the issues and concerns involved, and reach consensus. Still, regulation should aim to achieve flexible or open regimes—resistance from incumbents should not result in more restrictions or maintain the status quo.
- **Licensing fees.** Some licensees may have paid large sums for their licenses, while others have paid little or nothing. In many cases the differences are significant.
- **Spectrum charges.** To maintain a level playing field, the method of assigning spectrum must be the same for different licensees (see below). And given the possibility that a licensee can use any spectrum for multiple services, pricing can depend on the spectrum assigned, not the technology used or service offered.
- **Other license terms and conditions.** A number of other license terms and conditions require attention for different licensees to face equal regulatory burdens and costs. For example, universal service fund collections and disbursements, rollout obligations, and telephone numbering plans can be technology-neutral fashion. It might also be necessary to change any technology-specific service quality conditions to a service orientation.

Some of these changes need not be linked to licensing reform (such as numbering plans), but will create a clearer framework and might be easier to achieve as part of the larger process than in a piecemeal fashion.

- **Validity of new licenses.** Regulators will also have to decide how long new licenses are valid. The basic choice is between whether a new license continues for the period of the older one or is renewed for a full term.

## 4. Spectrum management

This section analyzes the links between multiple play and radio spectrum management. It discusses how appropriate spectrum management can facilitate wireless multiple play. Management is moving away from traditional administration, which involved allocating spectrum to specific uses, toward more flexible, open spectrum management regimes.

To optimize the performance of markets and establish a level playing field for spectrum in a multiple play environment, spectrum management needs to increase the role of market forces in allocating spectrum among uses, assigning it to users, and pricing its use. That may involve a number of arrangements. Some economies use auctions as a market mechanism to assign spectrum—for example, Germany, Hong Kong (China), Singapore, the United Kingdom, and the United States. At the same time, countries such as Australia and New Zealand are developing markets for tradable spectrum rights. Several countries are also opening parts of the spectrum to unlicensed use, an approach that has encouraged the growth of Wi-Fi networking worldwide.

### 4.1 Wireless networks can advance multiple play

Just as multiple play is possible over cable television or telephone networks, it can also be provided over broadband wireless access networks. The proliferation of broadband access is one of the driving forces behind multiple play, and the same is true for wireless multiple play. But the latter will be possible only if regulatory frameworks for spectrum support wireless broadband.

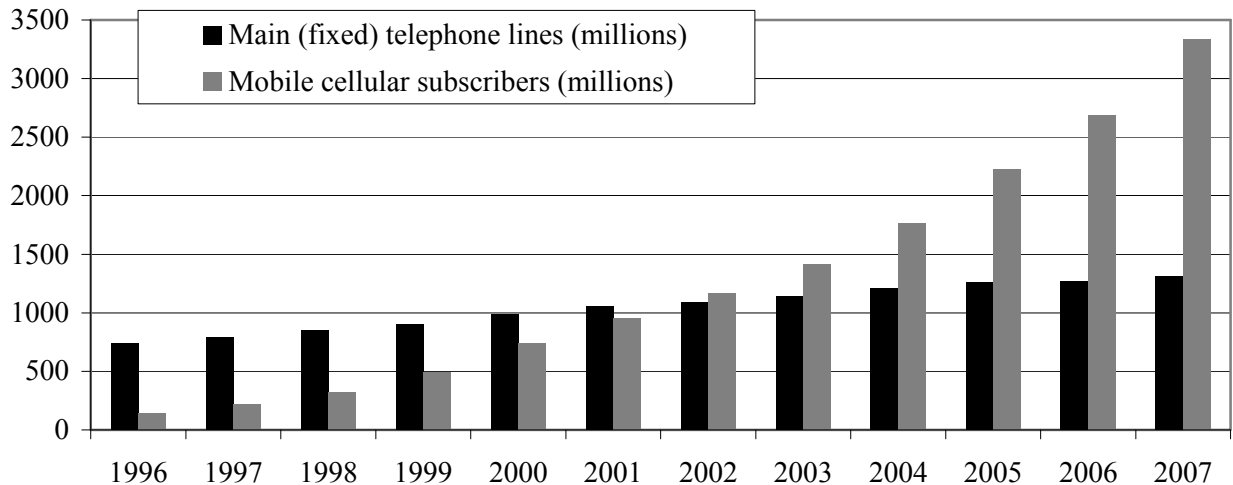
With multiple play becoming technically possible, service providers are using their spectrum to carry more than just its originally intended use. In addition, a number of countries are looking to use their “digital dividend”—that is, freed spectrum from the transition to digital broadcasting—to offer telecommunications services. Yet many countries’ spectrum management regimes do not allow flexible use of spectrum. Such limitations prevent service providers from implementing advanced services and hold back the evolution of technical capabilities and, more important, most people’s ability to benefit from multiple play.

For these technical possibilities to emerge, traditional methods of managing spectrum will need to be reviewed. The discussion below outlines possible ways for regulators to increase access to wireless broadband and so increase the penetration of wireless multiple play.

*Wireless communications offer enormous potential*

The past decade has seen a significant shift in the global telecommunications industry, moving from wireline to wireless communication. In 2002, the number of mobile telephones overtook fixed lines (Figure 1).

**Figure 1: The number of mobile telephones surpassed fixed lines in 2002**



Source: Author estimates based on ITU and Wireless Intelligence data (2008).

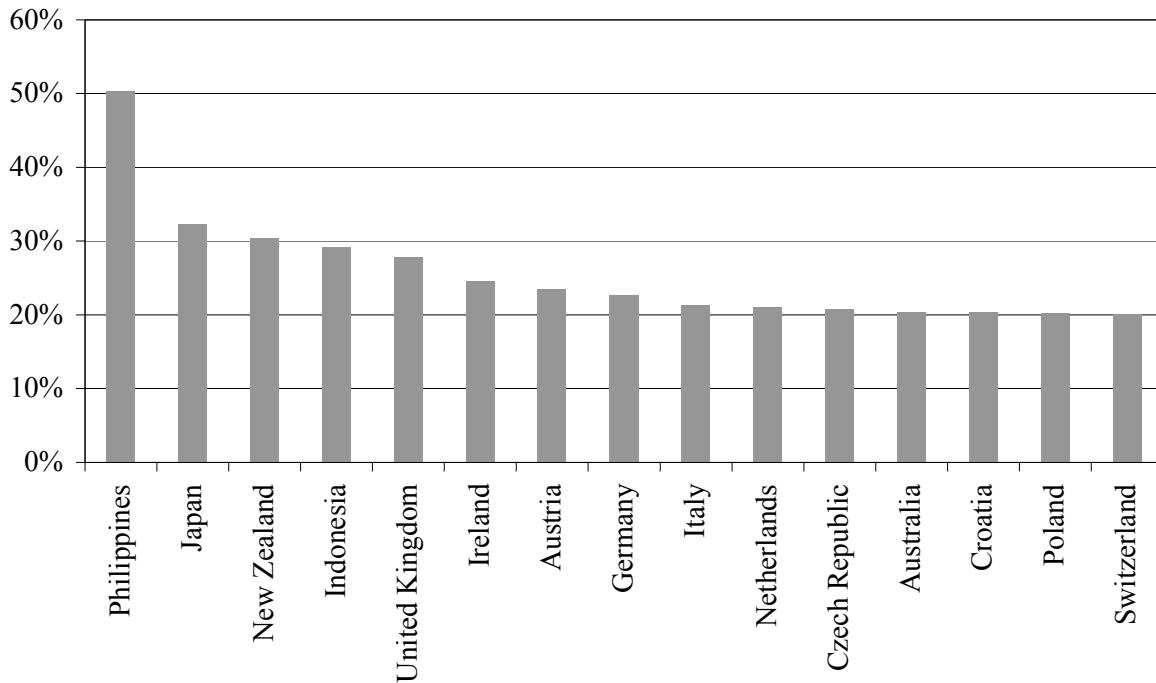
By late 2007, there were 660 million wireless telephone subscribers in the fifty least developed countries, accounting for a fifth of the global total and a third of adults (15–64 years old) in these countries.<sup>13</sup> The reach of wireless communications today indicates that it will likely be the first mode of access to advanced communication services for much of the world. Hence, ensuring access to spectrum will be critical to supporting the spread of multiple play in the developing world.

*Broadband wireless enables multiple play*

Providing multiple services over wireless networks requires broadband capability. Now, the number of broadband wireless networks, amenable to providing multiple play services, is rapidly increasing worldwide. There is growing interest in using VoIP over wireless local access networks; when Singapore allocated spectrum to broadband wireless service providers, it also allowed this spectrum to be used to provide telephone services (IDA, May 2008). Similarly, a number of 3G operators have begun to offer their subscribers video on demand.

There are also indications that demand is growing for non-voice (data) services over wireless networks. In 2007, cellular operators in at least 15 countries—including Indonesia and the Philippines—derived a fifth or more of service revenues from data services (Figure 2).

**Figure 2: Many cellular operators derive a large share of revenues from wireless data services, 2007**



Source: Wireless Intelligence (2008).

Markets are also growing for content and services provided over mobile telephones. For instance, revenues from games played over mobile phones are already more than \$4 billion and by 2010 are expected to reach \$17 billion. Similar growth is expected in multimedia distributed over cellular telephone networks (SSKI Report, June 2007).

Markets are also beginning to see the effects of multiple play on the spectrum originally reserved only for broadcasting. This effect manifests in two ways: growth in digital television and the resulting spectrum dividend, and growth in mobile television services. Countries around the world have begun to move toward digital audio and video broadcasting. Some have already begun the switch, while others—like Chile, Hungary, Slovenia, and Venezuela—are planning to move toward digital television.

More efficient digital broadcasting techniques free up valuable spectrum in the VHF and UHF bands. The U.K. Office of Communications (Ofcom, 2006) estimates that its digital switchover program will free about 112 megahertz (MHz) in the UHF band. Similarly, the clearing of the 700 MHz band in the United States was partly made possible by the transition of incumbent television broadcasters to digital systems, which freed up 108 MHz of spectrum (FCC). An opportunity is missed if the service authorization does not allow multiple play. Hence, to be meaningful, spectrum management regimes and service authorizations must be aligned.

Another trend arising from the digitalization of broadcasting is the evolution of mobile television services. A number of countries have seen significant uptake of mobile television—as in the

Republic of Korea, which has more than 2 million subscribers and investments of over \$500 million (The Economist, September 8, 2007). Economies like France, Germany, Hong Kong (China), India, Kenya, and Nigeria have mobile television services in testing or ready for commercialization.

#### **4.2 Expanding the scope of spectrum licenses enables multiple play**

Earlier spectrum allocation defined one set of frequencies for one service (voice, data including broadband, and broadcasting). Now new technologies enable multiple services on one network, and the wireless version of multiple play broadens potential uses of spectrum—changing the value of the resource and challenging assumptions about allocating spectrum for specific uses.

Wireless multiple play goes against the traditional classification of spectrum, which divides the entire range of commercial spectrum into bands meant only for specific services. Such conditions are often embedded in a service provider's license. For example, in 2004 the European television broadcasting spectrum had about 450 MHz, while cellular telephony had 365 MHz (Aegis, Idate & Independent, June 2004).

Traditional classifications allowed regulators to levy different fees, use different assignment mechanisms, and impose different conditions on different types of spectrum licenses. For example, most countries have assigned broadcasting spectrum for free and through administrative licensing, and since the 1990s have assigned telecommunications spectrum through market mechanisms. If there is no longer any difference between these types of spectrum, such asymmetries cannot stand.<sup>14</sup> Instead, spectrum assignments will need to be—and are increasingly becoming—flexible.

As a global resource, governments adhere to general guidelines set out in the radio spectrum management frameworks such as those of the International Telecommunication Union (ITU). These guidelines provide member countries with some flexibility in allocating spectrum bands for one or more uses. Now, with multiple play possible over wireless networks, it might be necessary for a review of these guidelines to align them with emerging technological and market developments. Such a review will ensure the continued benefits of global spectrum coordination and harmonization, while allowing greater flexibility and utilization that is more efficient.

#### *Technology neutrality*

Even as some countries have moved toward technology-neutral spectrum management, others continue to define which technologies service providers should use in a given band. In India cellular networks must use either the GSM or CDMA standard. Now, with advanced wireless systems such as 3G networks and broadband wireless, countries are defining specific broadband wireless or 3G technologies for use in specific bands, such as the 2.5 gigahertz (GHz) band, where both these technology families lay claim.

Changes in technology are also important to consider when allocating spectrum. One of the starkest examples is from developments in 3G technology. Because 3G cellular systems appeared a long time after 2G, many countries gave them new bands in which to operate. The most common was the 2.1 GHz band. Many service providers spent a lot of money to acquire this spectrum. But 3G technologies are now available for commercial deployment in the bands

used by 2G systems. This development is creating debates about fairness in these countries. Service providers that paid large sums to acquire spectrum in the 2.1 GHz band for 3G services now have to devalue their spectrum holdings and face higher capital costs because lower 2G frequencies have better propagation characteristics. For instance, one Australian 2G operator estimates that it can cut capital costs by 40 percent using the lower frequencies.<sup>15</sup>

The change in the valuation of 2.1 GHz spectrum is an important example of changes in the market and technology and their implications. The International Telecommunication Union's 1992 World Radiocommunications Conference defined the 2.1 GHz band for 3G services. Then at the 2000 conference the 800, 900, and 1,800 MHz bands were defined for 3G services, and by 2006 manufacturers were beginning to develop WCDMA and CDMA EV-DO technology in these bands. Similarly, the 2.5 GHz band was originally marked for technologies including 3G and beyond. But the 2007 World Radiocommunications Conference added WiMax to the list of 3G (IMT-2000) technologies. Thus, regulators can try to avoid tying spectrum bands to specific technologies.

Regulatory symmetry will need spectrum assignments to be technology neutral to promote investment and growth. Otherwise, countries might lose investments and lag behind in growth simply because of their spectrum regimes. For example, 3G services have yet to take off in China, partly because it delayed spectrum assignment until its indigenous TD-SDCMA standard was finalized and ready for deployment (RealMoney, December 28, 2007).

### *Service neutrality*

Flexibility in spectrum use is becoming increasingly common, in the context of discussions about the digital dividend and the growing use of mobile television. Many countries are starting to pursue service-neutral spectrum allocations.<sup>16</sup> For example, the U.S. Federal Communications Commission has allowed service providers to use the 700 MHz spectrum for a variety of broadcasting and telecommunications uses (FCC):

flexible fixed, mobile, and broadcast uses, including fixed and mobile wireless commercial services (including FDD- and TDD-based services)<sup>17</sup>; fixed and mobile wireless uses for private, internal radio needs; and mobile and other digital new broadcast operations. These uses may include two-way interactive, cellular, and mobile television broadcasting services.

In the United Kingdom, Ofcom's 2007 statement on the digital dividend outlined how the agency decided that it would give "users the freedom to decide how spectrum is used and clear incentives to use it efficiently." It envisions the uses of this spectrum to be wireless broadband, mobile television, digital terrestrial television, and local television, but does not limit its applications. Ofcom expects that this approach will enable the introduction of innovative technologies and services, increase competition, and provide "a significant contribution to the UK, as the overall benefit from the use of the digital dividend is estimated to be £5bn to £10bn (\$9.8 to \$19.6 billion equivalent) of added benefit to the economy over 20 years" (Ofcom, December 13, 2007).



One concern about opening all spectrum to any use involves the balance between flexible new assignments and existing assignments to incumbents. For example, if a new mobile wireless broadband provider offers voice telephone services, it changes the business models and position of existing 3G-only operators, many of whom have paid significant sums—sometimes hundreds of millions of dollars—for their spectrum. Thus, regulators will have to consider how to manage the growing range of uses of previously allocated spectrum, as well as the balance between new spectrum allocations and incumbents' interests.<sup>18</sup>

*Spectrum management is moving to open, flexible models*

The ideal situation for spectrum management would likely be one where regulators do not specify which services are offered over a specific band of spectrum or which technology is used to offer them. Instead, regulators would focus on promoting competition and ensuring that spectrum users are following certain guidelines—such as non-interference in each others' operations.

A few regulators are actively organizing the spectrum as a “commons,” expanding on the idea and success of unlicensed spectrum. Supporters argue that a commons regime creates incentives to innovate and develop spectrally efficient technologies such as smart radios, which automatically detect and use vacant spectrum. Further, these efficient technologies reduce spectrum scarcity by creating more efficient systems such as mesh networks (Faulhaber & Farber, 2002). Commons regimes do not place restrictions on the network bandwidth assigned to specific networks—allowing those networks based on new ultra-wideband technologies, for instance, to provide high-speed connections not otherwise possible.

Indeed, a similar mechanism has already worked in many countries with unlicensed bands in the 2.4 GHz and 5 GHz spectrums. Aside from simple rules limiting the maximum transmitter power or defining the rights and responsibilities of spectrum users in terms of interference,<sup>19</sup> there are no technology or service limits. This open band has been credited with spawning Wi-Fi technology. Wi-Fi was among the earliest wireless technologies supporting wireless triple play. Similar outcomes are possible in an open and flexible environment for spectrum use.

Moving to these new spectrum allocation regimes will enable multiple play by supporting the development of new technologies, the entry of smaller or new service providers, and more efficient spectrum use. Thus efforts to link revisions to the spectrum management regime can be linked to moves toward a converged regulatory regime.

### **4.3 Separating spectrum licenses from service authorizations enables growth**

Most countries have traditionally bundled spectrum and service licenses. As a result spectrum management is often tied to authorizations. For instance, concerns about how spectrum is used—whether for broadcasting or telecommunications—might depend on the authorization that allows the operation of that service as well as use of associated spectrum. Hence, many of the problems discussed in this section might be relevant to discussions on authorizations.

Ultimately, restrictions on services translate into rigidities in the use of the spectrum assigned to them. Decoupling or unbundling these two authorizations enables the spectrum authority to remove technological and service limits on the use of assigned frequencies. Decoupling also

reduces demand for spectrum because not all operators (such as cable television or Internet service providers) want spectrum (Wellenius & Neto, 2008).

#### **4.4 Moving to market mechanisms also supports multiple play**

The move to market mechanisms has manifested as two important trends: assigning spectrum to operators using some sort of competitive means, and charging market-based prices for acquiring or using spectrum. Having a competitive, transparent means of assignment also gives service providers greater access to spectrum. In conjunction with a regime that allows flexible use of spectrum, such competitive assignment enables new models of service provision.

Spectrum trading is another important development. Implemented in countries such as Australia and New Zealand, this approach allows later entrants to a market to access spectrum by paying a market price for it. Thus, new service providers are not constrained by the timing of their market entry. Instead, they can acquire spectrum from other users. In the absence of market mechanisms for spectrum assignment, new service providers would have to wait for government-administrated assignment—slowing the rollout of new services, reducing the potential for competitive service provision, and lowering investments.

Despite the important advantages of moving toward more flexible arrangements for spectrum assignment and a greater role for market forces, there are also risks that in a poorly regulated environment some firms could establish or reinforce market power by controlling key high-value spectrum bands. Thus, it is critical to ensure that the outcome of moving toward market mechanisms is an increase in market competition, supporting the introduction of new services and providers. Moving toward market-based assignment, pricing, and use will allow new service providers to access spectrum competitively, allowing them to provide innovative services over wireless networks.<sup>20</sup>

## **5. Interconnection and access**

Ensuring interconnection and access to essential facilities is crucial to competition. Multiple play and the shift toward IP-based networking make obsolete the paradigm of technology-specific, switch-based interconnection based on per minute costs. Instead, the costs and mechanisms of IP networks require reviewing existing interconnection regulation. The shift is toward capacity-based, technology-neutral charging mechanisms, visible in Mexico, Thailand, and the United States, among other countries.

Access to essential facilities can enhance competition, allowing new service providers to offer their services without the high entry barrier of investing in entirely new facilities. For example, regulators in France, Hong Kong (China), Singapore, and the United Kingdom have implemented rules on unbundling local loops, allowing competitive service providers to enter the market.

### **5.1 Broadening the meaning of interconnection**

In the traditional sense, interconnection in the telecommunications sector has implied “linking with suppliers providing public telecommunications transport networks or services in order to

allow the users of one supplier to communicate with users of another supplier and to access services provided by another supplier” (WTO, 1996).

Traditionally, the complete separation of media and telecommunications networks allowed them to develop their own types of interconnection. Media interconnection focused on sharing revenue between content producers and distributors. Terrestrial broadcasting was vertically integrated from content production to distribution, and so needed few interconnection arrangements. The development of cable television required arrangements between content producers, multisystem operators, and local cable operators. In competitive media markets, access to infrastructure was also often important. For instance, competing broadcasters often sought access to towers and collocation to interconnect with cable networks. Yet traffic management was not a major concern, nor was transmission—the number of television stations has been relatively stable, and satellite broadcasting allowed wide coverage with no loading effects.

On the other hand, interconnection in telecommunications networks is more complex due to variability in traffic, the growing number of service providers in the post-liberalization market, and rapidly increasing volume. Multiple play now brings even more competition, and interconnection will have to ensure that all service providers and networks compete fairly. Further, the primacy of wireline media in the transmission and carriage of bulk traffic has meant that the locations of the points of interconnection are of great concern. Cost sharing between the originators and receivers of telecommunications traffic has also been a major topic of discussion.<sup>21</sup>

Now, with multiple play, there might also be agreements between telecommunications and media firms to share content and services, as well as costs and revenues. Indeed, the European Union’s access and interconnection directive alludes to such possibilities, covering “electronic communications networks and services,” including “telecommunications networks, cable television networks, networks used for terrestrial broadcasting, satellite networks and Internet networks, whether used for voice, fax, data or images.” However, the directive does not cover “sound or television broadcasting content” (European Commission, 2002a).

In this report, such commercial arrangements between telecommunications and media firms that cover the sharing of costs and revenues and may include technical agreements on the flow of data or services, are treated as falling within interconnection, broadening the definition beyond the telecommunications sector.

## **5.2 How does interconnection function in the era of multiple play?**

Multiple play creates challenges for traditional interconnection models—mainly because of technological developments, but also because of changes in the scope of markets where regulators intervene to ensure interconnection. The technical challenges result from a shift from switch-based to IP-based networking in telecommunications networks. The definition of a market might change because interconnection now also occurs between telecommunications and media networks. The interconnection regime often determines the success of competitive service providers. These shifts require regulators to reconsider the assumptions of the past while also trying to maintain the basic goal of interconnection regulation—enabling competition between service providers.

Multiple play has three significant implications for interconnection. First, service providers traditionally only had to provide interconnection or access to others that resembled them in operations and technologies. That is no longer the case. For example, telephone companies based on public switched telephone networks (PSTNs) now have to interconnect with broadband telephone networks that use VoIP. Similarly, cable television companies have to interconnect with telephone networks to distribute video content. These developments raise questions about the interoperability and security of networks and, consequently, whether regulators should be involved in regulating the nature of these interfaces.

Second, the cost structures that were well understood for telephone and broadcasting networks no longer apply. Telephone interconnection costs depended on circuit-switching costs—associated with a hierarchy of switches and transmission systems—which is not the case for IP packet-based networks. The use of IP technologies significantly reduces costs and if prices should reflect costs, then this calls into question the level of prices paid by networks and users. But the more complex issue is that IP networks are not location-based, so it is difficult to position network users—making it difficult to differentiate between local, domestic, and international VoIP calls for billing purposes. In addition, attributing costs to specific services is difficult because one converged network is used for multiple services, making it no longer possible to identify which packet carries which type of service, or what part of the cost of an IP router, for instance, is used for telephone traffic as opposed to video distribution. Traditional time-based interconnection regimes are also meaningless in packet-based, always-on broadband networks. As a result new models of interconnection and pricing will have to replace current arrangements.

Third, interconnection and access regulation often depends on definitions of market power. For example, dominant telecommunications service providers are typically subjected to additional regulation that requires them to publish reference interconnect offers (RIOs). The introduction of multiple play expands the relevant market, possibly re-categorizing previously dominant service providers and excluding them from such requirements (Gilbert & Tobin, & Charles River Associates, 2007). Further, if cable operators, for instance, are not included in the scope of interconnection regulation, it might be possible for telephone companies to reject interconnection or access requests. The consequences of multiple play for market structure and, by extension, identification of dominance and significant market power are not yet known. Some analysts believe that IP networking will eliminate the need to consider market power. Others take an opposing view, while others are not sure (Waverman, 2006; Marcus & Elixmann, 2007).

Thus the enabling regulatory environment for multiple play—which will require a move toward increased competition—will have to include a review of the interconnection regime. A simple, effective, pro-competition interconnection regime will support the entry of competitive service providers and the provision of multiple play services. Regulators will have to define relevant markets and measure and monitor for evidence of dominance, then apply remedies.<sup>22</sup>

### **5.3 Interconnection regulation is becoming technology-neutral**

One of the most relevant areas of the debate on interconnection and multiple play focuses on efforts by alternative telephone service providers to interconnect with traditional telephone networks as they begin offering VoIP services. For instance, in 2007 TimeWarner Cable in the

United States petitioned the Federal Communications Commission to allow its VoIP service to interconnect with PSTNs. The commission allowed this petition, with the chairman noting that the decision increased competition for telephone services and encouraged deployment of broadband facilities—and so lowered prices and expanded customer choice (FCC, March 1, 2007). In March 2007, the commission also announced that rural telecommunications companies must interconnect with cable television companies (FCC, 2007).

As these different types of networks begin to seek interconnection with one another, questions are being raised about the extent of regulation and the ways that nontraditional operators share costs. For example, a telephone network in Thailand has asked the regulator to impose network interconnection regulations on VoIP providers, saying that it was gaining nothing from carrying these firms' traffic. The problem was that while the telephone companies have to share revenues with each other, VoIP providers, who hold a different type of license and are not subject to these regulations, benefit from this imbalance (The Nation, February 16, 2008).

Similarly, but with the opposite effect, Mexico's Federal Commission of Telecommunications (COFETEL) recently ruled that a cable television provider is not entitled to special interconnection fees when handling telephone traffic from the country's largest fixed line operator, Telmex. The main sticking point was the "bill and keep" rule, established in October 2006, which abolished interconnection fees. The cable television operator had argued that its relatively small subscriber base would not generate as much traffic as Telmex's, and that the interconnection regulation would unfairly burden it with higher costs.

In June 2005 Singapore's Infocomm Development Authority announced a new VoIP licensing and numbering policy. The intention was to enable competition, possible because of the low costs of VoIP. Eight telecommunications firms acquired numbers for this service, but by 2007 none of them had begun providing commercial services. Reports suggest that the delay was due to disagreements in commercial negotiations on interconnection between the firms (Business Times Singapore, July 24, 2006).

Given these complexities, some analysts are suggesting that regulators adopt a technology-neutral approach to interconnection. Regulators would then focus on whether service providers follow broad competition-enabling rules and allow nondiscriminatory interconnection (Bezzina, June 2005). Thus interoperability is ensured by enforcing competition rules—meaning that no network can refuse interconnection as long as both parties use the same standards and technologies for the interface.<sup>23</sup>

Multiple play does not necessarily mean that the nature of services is changing. The telephone, media, and Internet services that consumers have used will continue. Delivery platforms are changing, as is the roster of service providers. Still, discussions about interconnection and interoperability need not deviate entirely from their current form. Rather, they can take into account the presence of new service providers and ensure that interconnection terms are fair and nondiscriminatory.

#### **5.4 New models are emerging for allocating costs and ensuring competition**

If technology-specific regulation is undesirable in the context of interconnection in a converged era, two significant issues remain. The first relates to cost and revenue sharing arrangements between interconnecting operators. The second relates to which service providers and networks are subject to regulation, which depends on the definition of the relevant market and the expansion of interconnection regulation across traditionally unregulated sectors. Thus there is a need to reconsider interconnection in terms of the sharing of costs and revenues and the protection of competition.

##### *Cost and revenue sharing arrangements*

Three basic models of cost and revenue sharing emerge at the wholesale level. The first is the calling party's network pays (CPNP), a more traditional model of interconnection—the calling party's network pays the terminating network a per minute charge based on the cost of terminating the connection. The second model is the receiving party's network pays (RPNP). Here the receiving network pays for incoming traffic. These regimes face the challenges in a converged era discussed earlier: the allocation of costs, determination of origination, and nature of traffic have changed.

The third is the bill and keep model, used extensively in the interconnection arrangements underlying the Internet. In this model the traffic-originating party pays the originating network for data transport, and that network keeps the payment. There is no payment from the originating network to the terminating network, allowing simple allocation of costs. The concern for service providers with the bill and keep model is that if they are net receivers of traffic, they will not be able to recover all their costs. Consequently, variations on the bill and keep model have been suggested and adopted, allowing local networks to recover the costs of local facilities from receiving consumers. Although the payment was traditionally only for transporting data, and not services, there have been discussions about service-based payments as well. In this scheme users would pay more for different levels of service quality or content.<sup>24</sup>

All these models are in use around the world—and in some cases multiple models are used in the same country. For example, the United States uses CPNP for calls to incumbent wireline telephone operators, and bill and keep for mobile-to-mobile calls and calls from one non-incumbent fixed provider to another (or to a mobile operator). Similarly, Singapore uses a U.S. - like system, with CPNP for calls terminating on the fixed network and bill and keep for calls terminating on the mobile network (ITU, 2007). There are also a number of arrangements in the Internet hierarchy. While backbone operators tend to use bill and keep among themselves, their arrangements with tier-2 operators tend to be RPNP (Gilbert & Tobin, & Charles River Associates, 2007).

Another shift occurring in interconnection regimes involves a move from per minute to capacity-based models. The U.S. Federal Communications Commission is considering moving from the time- and circuit-based interconnection regime to a capacity-based regime. This follows the realization that always-on broadband connections—which will likely be the dominant type of retail connection in the future—are difficult to model on a time basis.

**Box 6: Japan’s move to an IP-based environment**

In October 2005 Japan’s Ministry of Internal Affairs and Communications created a Study Group on a Framework for Competition Rules to Address the Transition to IP-Based Networks. The group developed a framework for interconnection and tariff policies and issued a final report in September 2006. The report mainly addressed the changes in the competitive environment required to transition to IP-based networks and the need to revise competition rules. The report noted that “market integration in the transition to IP-based networks has been eroding the traditional distinction among service categories.” The ministry formulated the following basic principles for competition policy in the transition to IP-based networks:

- Ensuring fair competition in telecommunications (comprising the physical network and telecommunications services).
- Ensuring fair competition, with a focus on a vertically integrated business model.
- Ensuring competitive and technological neutrality.
- Protecting consumer interests.
- Ensuring that competition rules are flexible, transparent, and consistent.

Source: Scott, M.J. & Elixmann, D. (2007). “Regulatory Approaches to NGNs: An International Comparison.” Presented at the Telecommunications Policy Research Conference, Alexandria, VA.

Internet bandwidth is already provided at the wholesale level on a flat rate basis, with fixed monthly fees and capacity-based rather than usage-based charges. A number of countries are seeing interconnection charges fall significantly due to regulatory decisions to move to new mechanisms of interconnection and revenue sharing. Regulators in Poland and Portugal have required incumbents to introduce capacity-based interconnection. Spain was an early adopter of this model, and more than half of its fixed access and termination interconnection are now capacity-based.

These arrangements indicate a shift in the mode of allocating and recovering the costs associated with providing networks and services to retail consumers. Moreover, regulators are beginning to move to interconnection regulation that seeks to enforce competitive safeguards instead of technical or operating conditions. Japan is one such example (**Box 6**).

*Targets for regulation*

Interconnection regulation typically requires that operators with significant market power provide interconnection to all competitive networks on a nondiscriminatory basis. In the United Kingdom this principle has been termed “equivalence.” For British Telecommunications it has meant that the regulator has required the functional separation of its wholesale and retail businesses. Now BT Openreach owns all last mile networks, BT Wholesale controls transit networks, and BT Retail buys capacity and access from both companies—which treat it like any other customer. Full separation might not be necessary or possible. But at the minimum, separating the accounts of different business lines is useful because it makes the allocation of costs and revenues explicit, allowing fair interconnection.

Another consideration is minimizing opportunities for arbitrage. In a capacity-based, technology-neutral interconnection regime, a service provider offering telephone services pays the same rate regardless of whether it uses VoIP, cellular, or PSTN technology. This approach follows the law of one price: that similar goods or services should cost the same. Given the shift to lower-cost operating networks and growing traffic volumes, these rates might be reduced—lowering tariffs and increasing usage.

The regulatory questions posed by multiple play include whether interconnection can be mandated and ceilings on wholesale and retail tariffs can be imposed. The answers to these questions depend on the local political economy and a country's experiences with its incumbents and competitive operators. But the trend emerging from many countries is for regulators to clearly indicate their power to set such requirements if justified. This approach falls within the broad rubric of *ex post* regulation—that is, regulation that responds to market failures.

But careful thought will need to be given to which service providers are included. In a technology-neutral environment, regulators might not care whether the telephone service provider asked to honor interconnection agreements is a cable television company or traditional telephone company. Still, regulators will likely have to reconsider definitions of significant market power and dominance given the growing field of participants, and apply interventions accordingly.

## **5.5 Access to facilities supports competition, innovation, and multiple play**

Access is the use by one service provider of certain capabilities of another service provider as a component of its own services, in support of its own subscribers (Marcus & Elixmann, 2007).

Many countries will see benefits in allowing new entrants to access existing facilities, because these entrants would otherwise face significant and probably insurmountable entry costs to provide services. Providing wholesale access to facilities in the last-mile segment of networks plays an important role in a converged market. Pro-competition access policy significantly reduces the costs of service provision for new entrants and spurs deployment of converged services.

Thus access regulation allows these entrants to climb up a “ladder of investment” (Cave, 2005), beginning by using incumbents' facilities and reselling services, then scaling up their services and finally investing in their own facilities. A powerful example of this effect comes from France, where the unbundling of France Telecom's local loop enabled growth of new service providers. By 2006, 40 percent of French households had broadband service, and multiple service providers have benefited from unbundling (Hazlett & Bittlingmayer, 2003). Now these providers have begun to invest in their own facilities.

One of the most common ways of enabling access is by unbundling the local loop. Incumbents have a dominant position due to their ownership of the local loop, and competitors might find it economically unfeasible to construct new ones. As a result a number of regulators have moved to regulate these facilities and require that incumbents unbundle.

Such access is provided in wireline networks such as British Telecom's Openreach, as well as wireless networks, where a virtual network operator leases capacity from 2G or 3G cellular



network operators and provides services. Cable television and telecommunications networks can also be unbundled. There is an extensive literature on unbundling and its outcomes.<sup>25</sup>

In Hong Kong (China) the Office of the Telecommunications Authority (OFTA) defines two types of interconnection. Type 1 refers to interconnection between networks and services so that users connected to one network may communicate with or gain access to other users or services connected to other networks. Type 2—what this report refers to as “access”—refers to interconnection by one operator to the customer access networks (such as local loops) of another, enabling it to reach its customers. Hong Kong (China) did not unbundle network elements other than local loops, expecting that new entrants would build their own backhauls, switches, and trunks, so that Type 2 interconnection would facilitate the emergence of facilities-based competition. Further, the Type 2 interconnection rules applied only to local loops constructed by the incumbent during its period of monopoly, and have not been extended to optical fiber or wireless access networks. This type of interconnection opened up the narrowband fixed network market to competition, and by 2005 about 11 percent of local telephone line users were served by new entrants through Type 2 (Au, 2006).

But multiple play raises important questions about access regulation. It is now possible for any infrastructure to be used for any service, and a number of alternative last-mile facilities might exist. In the past, “a copper wire pair to the home was in some sense an ‘essential facility’ as it could not be easily replicated by entrants. Today, most businesses and homes have alternative paths—cable, cellular phones, fixed wireless and, potentially, satellite and power lines” (Waverman, 2006, p. 159). These developments have challenged the basic rationale for regulating last-mile facilities—monopoly status.

The twin issues of access and unbundling must be addressed early and clearly. Investments in facilities are significant: estimates suggest that investments in next generation networks will exceed \$300 billion over the next decade and, as with all investments, are made assuming certain rates of return that in turn depend on tariffs. Investors might seek out regulatory holidays or exemptions, claiming that their business models will suffer if they are forced to open up their networks at low fees.

In Germany, for example, Deutsche Telekom challenged a move by the European Commission to require it to open its last-mile facilities, claiming that the €3 billion (\$4.64 billion equivalent) it had invested would not be recovered under a regulated tariff or access scheme (Telecom Policy Report, August 14, 2006). Similarly, Australia’s Telstra tried to negotiate with the regulator on access rules so that its new network would not be subject to the unbundling regulations imposed on its legacy network. It had planned to build a US\$2.3 billion fiber optic network for high-speed broadband services, but could not agree on access rules with the regulator and abandoned the project in 2006 (Global Insight Daily Analysis, August 22, 2006). But after the Australian government announced a tender to build a US\$4.4 billion network—which will have to be open access, allowing regulated and nondiscriminatory access—Telstra reconsidered and now plans to bid (Global Insight Daily Analysis, April 11, 2008).

Singapore’s experience also shows that when governments implement clear access rules for networks, operators that might previously have been reticent quickly seek to participate. This is because there is strong business potential in selling access. In April 2008 Singapore’s regulator,

the Infocomm Development Authority, announced that it wanted to tender two different companies to operate the network's active and passive infrastructure. The government is willing to provide \$700 million in support as part of its efforts to seek open access for all retail service providers. The selected operator company has to be operationally separate from service providers. This well-designed program was well received: 21 bidders have expressed interest in the different functions, including incumbents such as British Telecom, Japan's NTT, and Deutsche Telekom (Global Insight Daily Analysis, April 8, 2008).

Access rules also find their way to cable television networks. In 2007 the U.S. Federal Communications Commission initiated discussions on regulating access to cable television channels. It proposed a rule, currently under discussion, that would require cable television companies to lower the prices they charge television content producers to lease access to cable channels (FCC, 2008).

Another aspect of access to facilities is related to the sharing of passive infrastructure. Instead of investing in building towers for mobile telephone services, or trenches and ducts for cable television, many countries are looking to regulate access to such infrastructure. Given that a significant portion of network deployment costs comes from the building of passive infrastructure, such sharing can cut costs and increase the viability of network deployment.

In conclusion, for countries with limited facilities, it is useful to consider using access regulation to enhance competition and begin new entrants on the ladder of investment. But such moves are to be considered in the context of countries' network infrastructure, the possibility of using multiple access platforms to reach subscribers, and the need to balance investor concerns with increased competition. As with interconnection, the most important decision for regulators is how they plan to enforce specific rules for dominant service providers. Any move to an asymmetric regime, making specific rules for a subset of the market, should be clearly defined in advance.

## 6. Universal service

Many socially desirable goals cannot be achieved by relying solely on markets. Hence governments often introduce universal service programs to attain goals such as increased coverage, access for poor or socially vulnerable groups, and provision of cultural and educational content and services.

Universal service programs provide support, through either financial means or an improved regulatory environment, for developing and deploying ICT networks in areas and to groups that they otherwise might not reach. With the spread of broadband, regulators will have to reconsider the goals of these programs and ensure that obligations and support apply equally across technologies. They can also add new services as targets for support, such as data services—as Australia has done.

A well-designed universal service program that reconsiders its goals and targeted services will advance deployment of multiple play. The United States now requires that interconnected VoIP service providers pay into the universal service fund. Further, there is a trend toward supporting the deployment of passive infrastructure, with a recent auction in India proving very successful.

Funds are also increasingly being allocated using competitive approaches, with a number of countries now holding competitive subsidy auctions for universal service provision.

## **6.1 Universal service programs are changing**

Universal service programs exist in both the telecommunications and broadcasting sectors, though with different meanings and mechanisms. In telecommunications the traditional model of universal service developed around the telephone. Large incumbents subsidized telephone services in high-cost areas or for low-revenue subscribers by overcharging urban, high-revenue, or long-distance callers. With the liberalization of telecommunications, this implicit—and typically nontransparent—mechanism gave way to the explicit universal service funds that are now commonplace. Further, the focus of many programs has begun to shift from telephone to broadband services and, beyond that, to building the backbone or passive infrastructure that supports these networks and services.<sup>26</sup>

In broadcasting, universal service programs have aligned, but with different goals than in telecommunications. Many countries see the need for universal access to news and information, and mandate a publicly funded or operated broadcaster for this purpose. These public service broadcasters provide socio-culturally or educationally valuable content and aim to reach the widest possible audience. Even private broadcasters have universal service requirements. For example, cable television operators are often required to follow must-serve guidelines, providing services in all neighborhoods and preventing them from serving only high-income areas. Many countries have rules requiring television to be accessible to people with hearing disabilities, and numerous regulations govern access to local content—so-called must-carry guidelines.<sup>27</sup> Indeed, broadcasting spectrum was often assigned for free to entities that followed these guidelines.

In light of multiple play, governments might want to review these programs to ensure that they maintain their relevance. Multiple play presents two direct challenges to traditional universal service programs, and provides an opportunity to review a third, indirect question. First, new platforms can offer the services targeted in universal service programs. Thus regulation will have to ensure that universal service programs are competitively and technology-neutral.

Second, multiple play allows multiple services to be provided on one platform, raising new possibilities for these programs. Whereas the traditional target service used to be wireline telephony, governments are moving toward funding mobile telephony and even broadband services. Thus regulators will need to reconsider the design of universal service programs for telecommunications to accommodate new technologies and service providers.

The third, indirectly related issue, involves funding for universal service programs. The issue for regulators is whether they want to continue with older mechanisms of managing universal service programs or move to new mechanisms. This move could support the rollout of passive infrastructure and provide fiscal incentives to meet service provision goals, supporting the rollout of broadband and other advanced services and indirectly supporting the spread of multiple play.

## **6.2 The goals of universal service programs could change**

Realigning universal service programs to address these challenges will require attention to two issues. The first is recognizing that new platforms are providing the services covered by

universal service programs. Thus, regulations will have to apply equally to different platforms and eliminate arbitrage opportunities. For example, telecommunications networks now carry media services that might not be covered by existing content and service requirements. If IPTV-based video provision is regulated as a telecommunications service, it might be excluded from content guidelines, must-carry, or must-serve requirements. Similarly, symmetry in the media sector dictates that must-carry and must-serve rules should apply equally to different broadcasters, regardless of the technology they use.

But as a recent OECD report finds, “Most...member countries impose must-carry regulations on cable television operators but these have not been extended to telecommunication firms” (OECD, 2006). In the United States, a significant debate arose about the entry of telephone companies into video services. Cable television companies alleged that these providers were not subject to the same must-serve requirements as they were, and so would be free to “cherry pick” neighborhoods—serving only high-income areas (TelecomWeb News Break, August 7, 2007). Remedying such asymmetries will be important to ensure that socially desirable coverage goals are met for both infrastructure and content. Otherwise, such discrepancies could distort competition and undermine the level playing field.

Second, multiple play creates the need to reconsider the goals of universal service programs in light of new possibilities for delivering services. The extension of coverage is possible because any communications infrastructure can carry any service. For example, while wireline telephone service might not reach everyone, the rate of subscription to wireless services might reduce the need for a universal service program focused on voice communications; it is more likely that access to the Internet or broadband data services is a concern. Moreover, if cable television is widely subscribed to, it might be useful to include the provision of telephone or Internet services over those networks in considering goals and outcomes. Moreover, providing multiple services over a single platform leads to lower costs and higher revenues—both of which improve coverage and access. This is another reason to review the goals and rationale for universal service programs.

This means that regulators, policymakers, and governments can reconsider the definition and scope of universal service programs. They can identify what gaps remain in the provision of ICT to their populations, taking into account the complete range of available services and infrastructure. They will also have to review the goals of their programs to address gaps, leveraging the possibility of increased coverage, lower prices, and wider range of services due to multiple play.

### **6.3 Options are emerging for redesigning programs**

While voice telephony is on its way to becoming ubiquitous around the world, broadband and Internet services are less diffused. Multiple play allows multiple platforms to offer consumers the same or similar services. Thus the provision of one service to rural and remote subscribers offers the possibility of providing other services over that same infrastructure, and universal service programs can support services beyond voice telephony—especially Internet—by making expanded use of existing infrastructure (Stern & Townsend, June 2007).

Initially, one goal of most universal service programs was to encourage deployment of network facilities to support telecommunications services (typically voice). With the advent of multiple play, this outcome is only part of the possible new picture. The scope of universal service programs might have to go beyond supporting only telecommunications firms to include media networks. In India, cable television is available to just 10 percent of rural households. Converged services such as cable Internet or VoIP could increase the penetration of wireline telephony in rural households from 6 percent and Internet from less than 0.5 percent. Electricity networks could also be used to deliver broadband—20 percent more households have access to grid-based electricity than cable television or telephones.<sup>28</sup> Hence, instead of relying on greenfield deployments, regulators can look to enabling innovation, supporting upgrades, and generating demand by subsidizing services. Developing countries have an option to consider multiple facility-service combinations and optimize support to achieve universal service faster.

A number of countries have included data services in their universal service programs. Since 1999 everyone in Australia has had access, on request, to a data service with 64 kilobit per second digital data capacity. This is known as the Digital Data Service Obligation (DDSO). For those who cannot access wireline data services, a special DDSO includes an industry-funded rebate that offsets the costs of satellite equipment and installation (ACMA, 2007). The European Union has specified that member countries define a minimum bandwidth for Internet services as a way to ensure connectivity. In 2001, the French government set a target of providing affordable 2 megabytes per second (Mbps) connections by 2005. The connection cost was an estimated €4.57 billion, and the government acknowledged that telecommunications firms were unlikely to cover the entire cost alone. Instead, the project allowed local communities to use cheap government loans to build the infrastructure (Paul Budde, 2007).

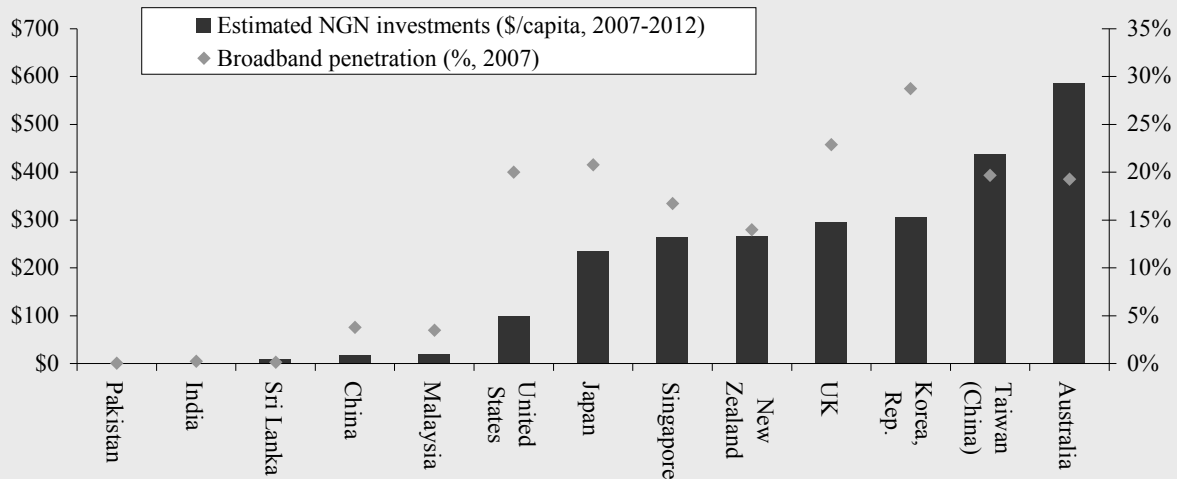
In 2006, the Ofcom began discussing a proposal to make broadband Internet access available to every household in the country. The country's current universal service obligation covers only fixed line telephony. However, Ofcom found that nearly all U.K. households were within reach of broadband networks, and that 39 percent had broadband access (Global Insight Daily Analysis, December 1, 2006).

More recently, the U.S. Federal-State Joint Board on Universal Service said that broadband and wireless services should be part of its efforts, marking the first time the board has said that the program should cover broadband (State Telephone Regulation Report, September 21, 2007). Similarly, in 2007 India announced a new stream of universal service funding to provide broadband connectivity in rural areas. The government also began discussing support for the rollout of wireless broadband networks.

**Box 7: The potential gap in next generation networks**

Investments in next generation networks – that is, all-IP, high-speed networks – are not equally distributed worldwide. Service providers, governments, and equipment manufacturers in countries such as Japan, the Republic of Korea, the United Kingdom, and the United States are making significant investments in the fiber optic networks and broadband technologies that constitute next generation networks. However, countries that do not have significant broadband penetration are not yet investing in its rollout (see box figure).

This is an interesting situation. Instead of investing more in their broadband and converged networks, countries with lower penetration tend to spend less, while countries with high broadband penetration are investing heavily. Such a trend points to the creation of a new digital divide, this time based on access to advanced all-IP networks. A review of universal service programs and their goals can help developing countries avoid such a divide.

**Box figure: Expected investments in next generation networks and broadband penetration in various countries**

Source: International Telecommunication Union data; analyst reports

Indeed, developing countries may consider such programs. Countries that are leading in broadband penetration are the same ones with the highest investments in next generation, all-IP high-speed networks. As a result, countries with low broadband penetration now can consider investing in or subsidizing the construction of backbone networks to avoid falling into a next generation network gap, which would simply be the next stage of the digital divide (Box 7).

**6.4 Funding mechanisms can draw on and support multiple play**

One of most common debates on changes to universal service programs due to multiple play focuses on how to respond to the entry of nontraditional service providers in the voice telephone sector and the impact on funding. This is especially relevant in those countries that have traditionally collected contributions to universal service funds only from PSTN-based wireline telephone companies. More recently, the growth of wireless telephony led governments collecting funds from these service providers as well. Now, with the growth of VoIP services,

regulators are considering adding them to the list of providers required to pay into universal service funds.

For example, in a 2006 review of its rules for universal service fund contributions, the U.S. Federal Communications Commission noted that the revenues of traditional wireline telephone contributors had fallen by 6 percent even as their disbursements had grown 29 percent over 2003–05. Yet wireless and VoIP services grew enormously during this period, with VoIP subscribers growing by 28 times (FCC, June 14, 2005). The commission concluded that excluding these providers from universal service contribution requirements was inappropriate, especially given that they were competing directly with traditional contributors. Thus it added all “interconnected” telephone providers to the list of contributors, including VoIP providers. Now the commission is seeking to develop a contribution methodology, based on end-user telecommunications revenues, that is competitively neutral. This approach would avoid distorting how carriers choose to structure their businesses or the types of services that they provide.

Reviews of universal service programs can enable countries to reconsider their goals and identify ways to use funds to expand broadband and other high-speed networks. This brings up the issue of what expenses such programs can support. While traditional programs aimed at greenfield operations, cable television operators might already have built their infrastructure and need support only for the incremental investment needed to enable VoIP services. Further, some countries are supporting the construction of passive infrastructure such as ducts, cellular phone towers, and dark fiber. The regulatory question is then how to use available funds to support not just the active or complete infrastructure, but also the passive infrastructure that will enable broadly based sector development.

In addition to specific programs, regulators should note that the creation of an enabling regulatory environment often spurs network growth without other interventions. Enabling multiple play can advance the market frontier, leaving less of the population to cover with traditional universal service programs.<sup>29</sup> A shift toward technology-neutral, flexible, broad, efficient universal service programs will at least support—if not directly increase—access to ICT and multiple play service delivery.

## 7. Regulatory agencies

The establishment and mandates of regulatory agencies are policy issues. But given the importance of regulatory agencies in the ICT sector, it is relevant to consider the impact of multiple play and the different organizational models in use. Every country has its own organizational structure for the ICT sector. Typically there are line ministries, regulators, and affiliated authorities or bodies that directly oversee the sector.

Many countries have reorganized their regulatory agencies in response to convergence. This section analyzes emerging trends in the organization of regulatory agencies in an era of multiple play. Under the traditional model, telecommunications and broadcasting each have their own regulators—while the converged model combines oversight for both in one agency. But the analysis finds no direct link between organizational structure and regulatory effectiveness.

Rather, instead of a converged regulator, it is more important for relevant government agencies to have a collaborative mindset.

## **7.1 Regulatory structures vary**

Traditionally, most countries have had multiple institutions overseeing the telecommunications and media sectors. According to the International Telecommunication Union, as of 2006, 149 countries had separate regulatory authorities for the communications sector—covering telecommunications, radio communications, media, and in some cases postal services (ITU, 2008).

More recently, there has been a growing trend toward creating converged regulators. This can be done either by creating converged regulators for telecommunications and broadcasting infrastructure and content (as in the United Kingdom, and the United States) or by creating converged infrastructure regulators (as in Estonia and Singapore).

In the United Kingdom the Office of Communications (Ofcom) replaced five offices exercising regulatory responsibilities in the communications sector.<sup>30</sup> A converged institutional design puts all communications services under one agency. Like a single-sector telecommunications regulator, a converged communications regulator tends to be strong in specialized engineering skills in the communications sector—an important core expertise when dealing with complex network issues.

The main rationale for regulatory convergence is that as services converge, it is increasingly difficult to identify which regulator has the competency to deal with them. For example, if a cable television operator starts offering VoIP services, the telecommunications regulator might not have the authority to regulate the cable operator directly. However, a more common problem is overlapping authorities—in the example above, the telecommunications and broadcasting regulators might assert that their rule overwhelms the other's. In such a scenario the possibilities for forum shopping, where a party can choose between different agencies with overlapping jurisdictions or competencies, increases substantially, both of which make regulation less efficient and impose burdens and costs on service providers.

Further, it is possible that separate institutional frameworks with separate telecommunications and broadcasting regulators can create obstacles or need to coordinate to avoid conflicts. For example, in the Republic of Korea a dispute over competencies between the Ministry of Information and Communications, the telecommunications regulator, and the Korean Broadcasting Corporation delayed the introduction of IPTV services. In early 2008 the country completely overhauled its regulatory institutions and merged the two agencies into one that combines their previously separate functions.

Other countries have taken different approaches, including putting telecommunications regulation under the mandate of a multi-sector utilities regulator. Multi-sector regulators are also useful if regulatory capacity is weak—as in many developing countries. These regulators are one way to use scarce regulatory resources efficiently (Schwartz & Satola, 2000).

Other countries have chosen to rely on the application of competition and antitrust rules beyond the communications sector (ICT Regulation Toolkit, “Institutional design options”). For



example, Germany has a cross-sector regulator that goes beyond the communications sector, to include a variety of network infrastructure. The country's Federal Network Agency regulates telecommunications, post, railways, gas, and electricity. It focuses on ensuring competition in these sectors by enforcing nondiscriminatory access and efficient use of system charges (BnetZA, 2005).

Below are presented three examples from countries which adopted very different strategies in organizing their regulatory agencies in response to multiple play, and more broadly, convergence. While Malaysia completely reorganized its agencies into one, Singapore brought both the telecommunications and media regulators under one ministry to enhance coordination. On the other hand, India has created a "converged" ICT infrastructure regulator, but has a different content regulator, and continues to have two different ministries.

### *Malaysia*

In 1998, Malaysia moved from a complex licensing regime with more than 31 licenses to a "converged" regulation model that unified the communications and multimedia industry. The Communications and Multimedia Act 1998 set out a new regulatory licensing framework for a convergent communications and multimedia industry and the Malaysian Communications and Multimedia Commission Act (1998) created a new regulatory body, the MCMC. Indeed, Malaysia was one of the first countries in the world to create such a regulator.

Malaysia's move to create a converged regulator was seen as a positive step towards enabling innovation and investment in the sector. The MCMC replaced the Department of Telecommunications and undertook its policy and regulatory functions. The MCMC is now responsible for the entire ICT sector in the country. It oversees content as well as infrastructure regulation, and is responsible for licensing, spectrum management, and universal service (MCMC).

### *Singapore*

In Singapore, the Infocomm Development Authority (IDA) has the task of regulating the telecommunications market. IDA is responsible for competition regulation – including interconnection and access – in addition to licensing and spectrum management. However, the tasks related to the regulation of media infrastructure and content fall with the Media Development Authority (MDA).

The MDA often has specific requirements from telecommunications service providers if they seek to provide media services. In the case of IPTV, the MDA required that fully licensed service providers must seek specific licenses (Media Development Authority, March 10, 2008). Now that mobile telephony providers are planning mobile TV services, the MDA is also consulting stakeholders on a licensing framework for that service.

Such a move might be interpreted as resisting multiple play because it requires new licenses for these services even though the IDA's telecommunications licenses are technology neutral and allow a wide range of services. However, the level of consultation and responsiveness from the regulators, along with a high level of coordination, has reduced time for decision-making and made the process transparent. This maintains some level of certainty in the sector.

For example, as a move to assist in the coordination between these agencies, the government has put both the IDA and MDA under a new Ministry of Information, Communications and the Arts (MICA). In the case of spectrum, the IDA and the MDA must co-operate to ensure that sufficient spectrum is made available for broadcasting purposes. In the case of Internet services, the IDA and the MDA impose separate license and regulatory requirements on ISPs, who must comply with both sets of requirements (ICT Regulation Toolkit, “Institutional design options”).

### *India*

The responsibility for regulating the telecommunications sector originally fell with the Telecom Regulatory Authority of India (TRAI) in 1997. Since then, the regulator has also been given the additional responsibility of regulating broadcasting carriage; it has the power to set tariffs, regulate interconnection, and ensure quality of service for television and radio services.

However, the management of spectrum, licensing, and universal service are not with the regulator. It has the power to make recommendations to the Ministry of Communications and Information Technology – which performs all these functions. TRAI exercises its power primarily in tariff setting, consumer protection, quality of service, and interconnection regulation. It also does not regulate content, which is the responsibility of the Ministry of Information and Broadcasting.

Since 2000, the government has contemplated at various times setting up a “converged” regulator to oversee both the telecommunications and broadcasting sectors. However, efforts in this direction have not yet been successful.

Now, on issues of convergence, TRAI has a greater role as the infrastructure regulator. Part of this reason is that most of the telecommunications service providers have a technology neutral license that is also flexible on services. In specific issues related to, for example, the regulation of content on IPTV or mobile TV platforms, TRAI defers to the content regulations. In this manner, India has been able to implement an **ad hoc** converged regulatory structure.

## **7.2 Agency structure is not as important as the mindset**

Countries seeking to have enabling policy and legal frameworks for their ICT industries may achieve efficiency gains by having converged regulatory institutions (Henten & Tadayoni, 2002). But there is no direct relationship between changes in institutional frameworks and regulatory effectiveness, or the success of multiple play business models.

In the above cases, Malaysia, Singapore, and India have all had their successes and challenges in dealing with multiple play. All three have responded to the introduction of IPTV, for example, even if with varying efficiencies. However, they have also faced difficulties in regulating new services such as mobile television in Singapore, interconnected VoIP in India, and

More crucial than a converged agency is the mindset of decision makers. For example, if two ministries are willing to work with each other and the regulator, their efforts toward convergence can be far more effective than if the appropriate ministry is unwilling to coordinate with the regulator. Singapore has two regulators in the ICT sector, one for telecommunications and one for broadcasting. There have been a number of issues related to multiple play that both have

worked together to resolve. Similarly, Canada has a single regulator for both telecommunications and broadcasting, but two different ministries. Yet coordination has been strong—with the result that the Canadian market is seeing strong growth in triple play availability and subscriptions.

Thus multiple play can be dealt with by separate institutions or by one converged institution, as long as the parties involved have mechanisms for coordination and are willing to find common ground. Hence, instead of immediately recreating the institutional framework, regulators can look toward developing meaningful institutional relationships, even if they cannot overhaul their institutional frameworks. Such moves will likely lead to as good, if not better, outcomes.

## 8. Global principles, local solutions

Around the world, there has been a diverse range of regulatory responses to multiple play in the ICT sector. Regulatory frameworks have responded and adapted differently, depending on specific circumstances and legacy factors. So, even though the technologies and possibilities of multiple play are universal, specific implications and appropriate responses will vary by country. Moreover, the experiences of many developed countries suggest that regulatory frameworks need to be revised as technologies, business models, and market conditions evolve. Thus regulatory responses to multiple play will be specific to both location and time.

Recognizing that every country has different strategic and political priorities and faces different circumstances, this report has tried to avoid prescribing how regulatory framework should respond to multiple play.

Nevertheless, this report has identified some of the issues that are likely to arise from the introduction of multiple play in a market, and discussed some of the many possible regulatory responses. Several emerging trends are clear:

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Authorizations	There is a clear trend from narrowly to broadly defined authorizations for service operators. Some countries have reduced license requirements to a minimum, opening the market to free entry if spectrum or other finite available resources are not required.
Spectrum management	Spectrum management is moving away from traditional administration that involves allocating spectrum to specific uses. The trend is toward allowing a greater role for market forces in assigning spectrum and defining its uses. Open access spectrum regimes are also emerging.
Interconnection and access	The old paradigm of circuit-switched interconnection and switch-based cost allocation mechanisms is being replaced by capacity-based IP interconnection for multi-service networks. Countries are pushing for open access to essential facilities for greater competition.
Universal service	Trends are toward competitively neutral mechanisms (such as universal service funds) and a wider scope of universal service (including mobile and broadband access). There are also examples of government

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partnerships with incumbents to extend and accelerate deployment of broadband networks.

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**Institutional design** The design of regulatory institutions is moving toward increased coordination or integration of previously separate functions, with several models in use. Some of these only involve involving increased coordination between regulatory agencies; others feature converged agencies.

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This report also identifies some global best practice principles for regulatory frameworks to respond to multiple play.

- **Create regulatory frameworks that promote competition.** Service providers can deploy multiple play services only if regulators lower entry barriers and allow innovation—and, by doing so, increase competition, lower prices, and drive growth. But it is equally important that regulators prevent market failures and do not allow monopolization. Hence regulatory frameworks that establish level competitive playing fields will provide the greatest benefits for users.
- **Rely more on market forces and less on regulation.** Maintaining unchanged legacy regulatory frameworks will likely stifle the growth of multiple play. Instead, regulation can move toward allowing innovation and competition on a level playing field, then step back from intervening unless there are market failures.
- **Allow new technologies to contribute everything they have to offer.** Regulatory frameworks that are technology neutral and allow flexibility in service provision will encourage investments and innovation. Service providers can fully use their networks and reduce costs, increasing business viability and leading to more efficient markets. Users will benefit from lower prices, more choices, and increased competition.

Experiences thus far suggest that regulatory frameworks based on these principles will remove artificial and unnecessary restrictions. Increased competition on a level playing field promotes investment and innovation and creates the conditions for growth of multiple play.

The analysis in this report also highlights the importance for regulators to consider how to implement their agendas. It is not necessary to do everything at once when responding to multiple play. Instead, politically or capacity-constrained regulators might choose a first step that will have the greatest impact. Given the primacy of the authorization regime, its review and amendment might be a useful such step.

In today's era of multiple play, the emerging role of regulators is to allow service providers to fully exploit the use of communications networks. This goal might best be achieved by promoting market competition and innovation and reducing the role of regulation in favor of market forces. Experiences to date suggest that regulatory frameworks based on these principles will remove artificial and unnecessary restrictions, accommodate increased competition on a

level playing field, allow flexibility, and promote innovation—all conditions crucial for the growth of multiple play.

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## Notes

- <sup>1</sup> Multiple play can also be provided by bundling, where combinations of services are offered as part of one package or customer relationship. Bundling does not require these services to be provided over one network, or even by one provider. It is a commercial or business arrangement, as opposed to a technological solution. This report does not discuss multiple play through bundling, but focuses on the provision of multiple play over one network, typically using IP networking technology.
- <sup>2</sup> Estimated from Internet World Stats, 2007; <http://www.internetworldstats.com/dsl.htm>; ITU, World Information Society Report, 2006
- <sup>3</sup> Each of these regulatory frameworks developed independently, with different assumptions and objectives informing them. While telecommunications regulation focused more on the technical and economic aspects with the intention of network development, broadcasting regulation responded to cultural and political objectives. Internet services often developed in a regulatory vacuum, or with the intention of promoting innovation and competition in services, not networks.
- <sup>4</sup> A detailed analysis of the different policy options to respond to convergence is presented elsewhere. Rajendra Singh & Siddhartha Raja (2008). *Nothing endures but change: Thinking strategically about ICT convergence*. World Bank. Available at: [http://siteresources.worldbank.org/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/282822-1208273252769/Nothing\\_endures\\_but\\_change-policy\\_responses\\_to\\_convergence.pdf](http://siteresources.worldbank.org/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/282822-1208273252769/Nothing_endures_but_change-policy_responses_to_convergence.pdf)



- <sup>5</sup> The report focuses on these areas because they include many of the key regulatory issues associated with multiple play. A number of other issues—such as the assignment of telephone numbers and quality of services—have not been addressed, because the debate and discussion on them do not fundamentally shift in the era of multiple play. Moreover, the services provided retain their unique identities (for example, numbering of telephone subscribers may follow the same numbering plan whether a cable television or telecommunications provider offers telephone services).
- <sup>6</sup> A related development is an emerging regulatory agency model with a competition commissioner or authority that is responsible for a number of sectors. In this model, these sectors are regulated to maintain a level playing field for all service providers, and protect consumer interests. Further, sector specific regulation is undertaken by sub-divisions or separate focused agencies with significantly less scope than the traditional ICT regulator.
- <sup>7</sup> See, for details, Smith, W. (2000). *Regulatory Infrastructure for the Poor: Perspectives on Regulatory System Design*. World Bank; Kirkpatrick, C., D. Parker & Y.-F. Zhang (2006). “Regulation and Foreign Direct Investment in Infrastructure: Does Regulation Make a Difference?” *Transnational Corporations*, 15: 1; Jamison, M. A., Holt, L., & Berg, S. V. (2005). “Measuring and Mitigating Regulatory Risk in Private Infrastructure Investment,” *The Electricity Journal*, 18: 6; Estache, A. & Pinglo, M. E., (2004). *Are Returns to Private Infrastructure in Developing Countries Consistent with Risks Since the Asian Crisis?* World Bank Policy Research Working Paper No. 3373.
- <sup>8</sup> The authors thank Professor Robert Frieden for this comment.
- <sup>9</sup> Symmetry can also apply to content regulation. For example, many countries impose must-carry provisions on cable or satellite television networks, mandating that cable networks carry a certain number of public interest or local channels. But these rules are not always imposed on telecommunications service providers. When telecommunications firms enter the broadcasting market, asymmetric access to and regulation of content might strengthen or weaken their position depending on the market’s preference for public interest or local content.
- <sup>10</sup> The discussion here focuses on four distinct services: mobile telephony, wireline telephony, video and television services, and Internet services. Together these services form the basis of most multiple play business models.
- <sup>11</sup> For example, telecommunications licenses incorporate network rollout requirements and technical specifications, while broadcasting licenses include references to content codes and coverage requirements. There might also be conditions on foreign ownership, market power and competition regulation that differ between these sectors. These differences are highlighted on page 9.
- <sup>12</sup> Similarly, in Brazil, when telephone company Telefonica attempted to acquire a stake in pay television provider Way television, regulatory approval took about 6 months because there questions about foreign ownership of broadcasters.
- <sup>13</sup> Author estimates based on IDA, World Bank, and Wireless Intelligence data.
- <sup>14</sup> Further, the provision of data or even voice over traditional or alternative wireless networks was not a major disruption. However, the trend around the world has been for regulators to see the provision of video services over wireless networks as a problem. For instance, the introduction of mobile television and video broadcasting over “telecommunications” networks, for example, has led to significant hand wringing among many regulators. The primary cause for this is the stricter control governments seek over media and broadcasting than telecommunications. Even many countries that have adopted multiple play-friendly regulations are still maintaining older distinctions.
- <sup>15</sup> Operators can upgrade CDMA2000 networks in the 800 MHz band to data-centric CDMA2000 EV-DO networks. This has happened in 28 countries (e.g. Brazil, Cameroon, Indonesia, and Morocco). Further, even the GSM evolution to 3G, WCDMA, is now available in the 900 MHz band. France, Finland, Australia, and the UK have plans to, or have already seen commercial deployments of WCDMA in this band.
- <sup>16</sup> For an in-depth study of spectrum management and reform in developing countries, see Wellenius & Neto (2008, March).
- <sup>17</sup> FDD is Frequency Division Duplexing, where transmission and reception channels operate simultaneously, but at different frequencies. TDD is Time Division Duplexing, where transmission and reception are over the same frequencies, but at different times.

- 18 Similarly, the allocation of telephone numbers, another finite resource, is important for the growth of VoIP services. For example, if only telephone companies are allowed to acquire blocks of telephone numbers, it will restrict the entry of cable operators into the market even if there are no other barriers. In Japan, a set of area codes was set aside for IP telephony services, with more flexibility given to those services that connected to emergency service numbers. We do not deal in detail with numbering here. Source: [http://www.apricot.net/apricot2005/slides/T12-4\\_2.pdf](http://www.apricot.net/apricot2005/slides/T12-4_2.pdf)
- 19 For example, the FCC's Part 15 rules on how "intentional, unintentional, or incidental radiator may be operated without an individual license" states that: "Emanations from the device shall be suppressed as much as practicable, but in no case shall the emanations exceed the levels specified in these rules... Parties responsible for equipment compliance should note that the limits specified in this Part will not prevent harmful interference under all circumstances." As such, a device using the unlicensed spectrum has the responsibility to reduce their harmful emissions as much as possible, and minimize the possibility of interference with other devices. On the other hand, it has no right to be protected from harmful interference from another device. See 47 CFR Part 15, available at: <http://www.fcc.gov/oet/info/rules/part15/part15-9-20-07.pdf>.
- 20 For a detailed analysis of spectrum management in developing countries, refer to Wellenius, B. & Neto, I. (2007). *Managing the Radio Spectrum: Framework for Reform in Developing Countries*. World Bank.
- 21 The next generation of technical developments will further challenge regulators. Dynamic circuit switches and utility computing, as well as the potential for an end to the termination monopoly are some of these potential developments.
- 22 Here, it is worthwhile to point out that asymmetric regulation is potentially beneficial. If all operators are regulated in the same manner, dominant market powers might exert a negative influence on their competitors.
- 23 For example, the interface between the CDMA and GSM mobile networks in countries like India and the United States are not regulated.
- 24 This discussion is covered under the rubric of "network neutrality". Fundamentally, network neutrality seeks to ensure that a network treats different types of traffic or content the same. There are a number of views on the issue, and the debate about whether network neutrality is a useful or harmful tool are on-going. The reader can find some of these views represented in Wu (2003) and Peha (2007).
- 25 See, for example, Guiltinan, J. P. (1987). "The Price Bundling of Services: A Normative Framework." *Journal of Marketing*. 51: 2, 74-85; Adams, W. J. & Yellen, J. L. (1976). "Commodity Bundling and the Burden of Monopoly." *The Quarterly Journal of Economics*. 90: 3, 475-498.
- 26 An example is France, where the government has begun to subsidize the building of passive infrastructure, such as ducts and dark fiber to help cut the costs of network rollout. Similarly, Singapore is tendering for the rollout of passive infrastructure like cables and ducts in order to support Internet services at 1 Gbps (gigabit per second) and beyond to households and businesses.
- 27 Given the focus on this paper on infrastructure, it does not proceed on an analysis of content guidelines.
- 28 Author's analysis based on United Nations Human Development Indicators, 2007
- 29 Indeed, this is the idea behind the market gap/access gap model.
- 30 These were the Broadcasting Standards Commission, Director General of Telecommunications, responsible for running the Office of Telecommunications (Ofcom), Independent Television Commission, the Radio Authority, and the Secretary of State's non-military radio spectrum manager.

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