

## **GLOBAL RIVALRY IN INFRASTRUCTURE<sup>1</sup>**

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### **INTRODUCTION**

Three dynamics – technology change, expanding customer needs, and a revolution in government policy towards infrastructure – are feeding each other to revolutionize telecommunications and energy industries. Technology change creates new opportunities for companies and customers and renders traditional utility operations obsolete. The globalization of business and the rapid advancement of many developing economies have caused customers to demand higher quality services, ever more rapid technology development and adoption, and ever more progressive and liberal government policies. After many years of resisting pressures from customers and industry, governments in both developed and developing countries are embracing change and looking for ways to deregulate and promote private investment in infrastructure.

This revolution in infrastructure is changing the industry paradigms for both telecommunications and energy. Market and product boundaries are becoming multidimensional in some instances, and are disappearing in other instances. Competition is occurring in areas that industry experts once thought were natural monopolies. Service providers, which were once driven by service obligations, political pressures, and franchise obligations, are now customer and shareholder driven.

Differences among governments in their policies towards privatization, operator licensing, and market liberalization are causing companies to be opportunistic in their market entry decisions and to hold diverse mixes of assets and business relationships. Domestic political environments, economic needs, and infrastructure needs, along with changing international capital markets, affect numerous government decisions. These include the timing of privatization, requirements and processes for qualifying bidders and for choosing winning bids, and rights and restrictions included in operating licenses for new entrants and incumbent operators.

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<sup>1</sup> This paper is adapted from a chapter in Mark A. Jamison, *Pricing and Industry Structure: The New Rivalry in Infrastructure*, Kluwer Academic Publishers, 1999, Chapter 2.

Variations in these factors across countries cause countries to adopt different policies and to reform policies at different times. Because of this, a company that could be an efficient service provider for a particular country, or that may have a strong strategic interest in a country, may not be in a position to take advantage of a license opportunity when the country privatizes or issues new licenses. As a result, companies differ in their assets, customers, services, and business partners. Over time, as companies try to rationalize these mixes to form efficient businesses, they will engage in mergers and property exchanges that will raise issues of antitrust and competition.

The diversity that exists in the new industry paradigm often causes firms to face different sets of actual and potential rivals in each market. This diverse pattern of actual and potential rivalry is called multilateral rivalry, or MLR, and affects firms' choices of markets, products, quality, and prices.

MLR in infrastructure results from a redefinition of markets and products, changes in companies' roles in these markets, and changes in how companies join and remain in these markets. Governments redefine markets by dividing traditional products into their underlying components. These components generally include the commodity, backbone transport of the commodity, and customer access to the commodity. Loosely speaking, the commodities include natural gas, electricity, water, and information. Backbone transport includes gas and electricity transmission, and Internet hubbing and backbone. Customer access includes local distribution of electricity and gas, and wireless telecommunications networks. Previously, long distance telephone would have been considered backbone transmission and local telephone would have been considered distribution. However, local and long distance are losing their distinctiveness as products even though they are retaining their distinctiveness as components of business strategy. We explain the new infrastructure markets and companies' roles in them in later sections.

Product redefinition occurs when technology change is one of the drivers of market reform and when market redefinition creates new products. Telecommunications is the primary example where technological change is driving product redefinition. In energy, market reform is creating new businesses that play roles in creating markets and clearing markets. New regulatory rules, new market functions, new industry players, divestitures, and mergers affect companies' roles in the new markets. Governments are also establishing new rules for how companies can join and remain in markets by creating licensing and concession procedures, providing access to essential facilities, and changing service obligations to name a few.

This paper describes MLR in utility markets, explains how globalization drives MLR, and describes how MLR in turn causes firms to become even more global, as each firm strives to enter into markets further and further removed from its traditional markets. It first describes the industry transformations and market reforms, focusing on the telecommunications and energy industries. It then explains how governments are using competition to improve utility infrastructure.

## **THE NEW TELECOMMUNICATIONS INDUSTRY**

The telecommunications industry is becoming a global combination industry. A combination industry is an industry whose product combines with other industries' products before customers use it. Telecommunications is becoming a combination industry because its primary function – transporting electronic communications – is increasingly combining with computer, media, and publishing products before being sold to customers. (Jamison 1999a, p. 20)

There are several examples of telecommunications combinations. EDS offers communications networking with its data center management and reengineering services. America Online provides networking, news, online shopping, and entertainment. (Hoover's, Inc. 1999) The Japanese telecommunications giant Nippon Telegraph and Telephone (NTT) provides multimedia services as part of its global telecommunications business. (NTT 1999) The UK telecommunications company BT has partnered with computer companies to allow third parties to use BT's network intelligence to develop their own software and network applications. (British Telecom 1999) The world's largest entertainment and media company, Time Warner, owns Time Inc. (the largest magazine publisher in the US), CNN, TBS, TNT, Time Warner Cable (the largest US cable television system), and Time Warner Telecom (a telecommunications company). (Hoover's, Inc. 1999)

In this section, we describe the emerging telecommunications industry. We begin with a description of the traditional industry because this is the industry for which current regulations were designed. We then explain the emerging combination products and the strategic imperatives they create for telecommunications companies. Then we illustrate the MLR that is developing in telecommunications.

### **Traditional Telecommunications**

In this section, we describe traditional telecommunications. We begin by describing the networks. Lastly, we describe the basic products and sources of revenues.

#### *Traditional Telecommunications Networks*

Telecommunications networks consist of (1) lines or bands of radio spectrum that carry electronic communications, and (2) switches (or more recently, routers) to connect the transmission paths. David Sappington and Dennis Weisman (1996, pp. 17-27) explain that telecommunications companies use two main technologies for transmission: wireline and wireless technologies. As the name implies, wireline technology uses copper wires, coaxial cable, and fiber-optic cables to transmit communications. Wireless technology includes cell-based radio such as cellular

and PCS (personal communication service), satellites, microwave radio, and other forms of radio.

Until recently, all telephone switches were circuit switches, meaning that when switches connect customers' lines, the resulting circuit remains available exclusively for these customers' use until they hang up their telephone receivers. Circuit switching was the initial telephone technology and continues to be the most common technology today, although, as we explain later, the growth of data transmission is causing telecommunications companies to adopt a newer technology called packet switching. (Gibson 1999, pp. 12-13)

The original telephone networks were built city by city. Initially, the early telephone technologies dictated this city-by-city approach because the technologies were unable to transmit a voice over long distances. Once companies overcame this technology barrier, they continued to establish networks city by city because customers were concentrated in cities and, at least in the US, because cities were the franchising authorities. Also in the US, the dominant telephone company, AT&T, required its affiliated companies (collectively, the Bell System) to use AT&T for long distance and forbid them to build lines outside of their exchanges. Companies outside the Bell System initially used one of the independent long distance companies, but these companies soon gave up competing with AT&T, leaving the US with one long distance company. Then in the early 1900s, as AT&T was establishing its monopoly over US telephones, state governments began regulating telephone companies, as did the federal government. The regulators wrote local telephone exchange boundaries into their rules and, as the *quid pro quo* for regulation, let the companies have monopolies within those boundaries. (Brock 1981, pp. 99-176) These regulation-enforced local exchange boundaries remain in effect today and are now codified for the US by the US Telecommunications Act of 1996, even though they became outdated years ago. (Gibson 1999, p. 16; Jamison 1999a, p. 22)

Figure 1 illustrates the traditional telephone network.<sup>2</sup> Local exchange companies provide local calling and connections for long distance calling. Local exchange networks include the wires, called local loops, that connect customers to central offices. Central offices perform switching. Large cities might have more than one central office, in which case the local exchange company uses interoffice trunks to connect the central offices. The local exchange company might also use interoffice trunks to connect central offices for completing long distance calls if the central offices are not very far apart. Other long distance calls go through interoffice trunks to go to a toll office. The toll office switches long distance calls between distant central offices, using intercity transmission trunks to connect the cities.

In most countries, the long distance network was owned by the same company that owned the local exchange network. This was generally a state-owned company.

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<sup>2</sup> Figure 1 is adapted from Sappington and Weisman (1996, p. 22).

For example in 1995, the third and fourth largest telecommunications companies in the world, Deutsche Telekom and France Telecom, were government-owned monopolies providing all local and long distance services in their countries. (Jamison 1998, p. 698) The world's largest telephone company, NTT, was partially privatized in 1985. (Hayashi 1997, p. 201)

Prior to the break-up of AT&T in 1984, the US also had an integrated company providing both local and long distance. But beginning with the entry of MCI into the long distance business in the late 1970s, the US gradually adapted to a framework in which long distance and local services are provided by separate companies. Indeed, the divestiture agreement that broke up AT&T included a provision that restricted the divested Bell Operating Companies from providing long distance service that crossed LATA boundaries.<sup>3</sup> The US Telecommunications Act of 1996 vacated the divestiture agreement, but codified the restriction against the Bell Operating Companies providing interLATA service. The Act directs the US Federal Communications Commission (FCC) to lift the restriction once the Bell Operating Companies have satisfied certain requirements for opening their local exchange markets to competition.

#### *Traditional Telecommunications Products and Revenues*

Telecommunications companies traditionally have two major sources of revenues: local services and long distance services. Of the two, long distance services have been a primary source of income for most companies, including state-owned companies.

International long distance has been a key source of telephone company income in developing countries.<sup>4</sup> (Halprin 1997, p. 375) Martin Cave and Len Waverman (1998, p. 894) illustrate the developing country situation by contrasting international long distance call prices, domestic long distance call prices, dedicated private line prices, and residential connection charges for developing and developed countries. In 1995, international long distance prices were over 200 percent higher for customers in low-income countries than for customers in high-income countries.

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<sup>3</sup> The Modification of Final Judgement (MFJ) divided the US into 160 local access transport areas or LATAs. (United States v. Western Electric Company, Inc., 525 F. Supp. 1336, 1353-7 (D. D.C. 1981); hereafter, *MFJ*.) Under the terms of the MFJ, Bell Operating Companies are generally prohibited from carrying calls across LATA boundaries. (*MFJ*, 552 F. Supp. at 229, ¶IV.(K).)

<sup>4</sup> International long distance has effectively provided income to governments because the companies have been state owned.

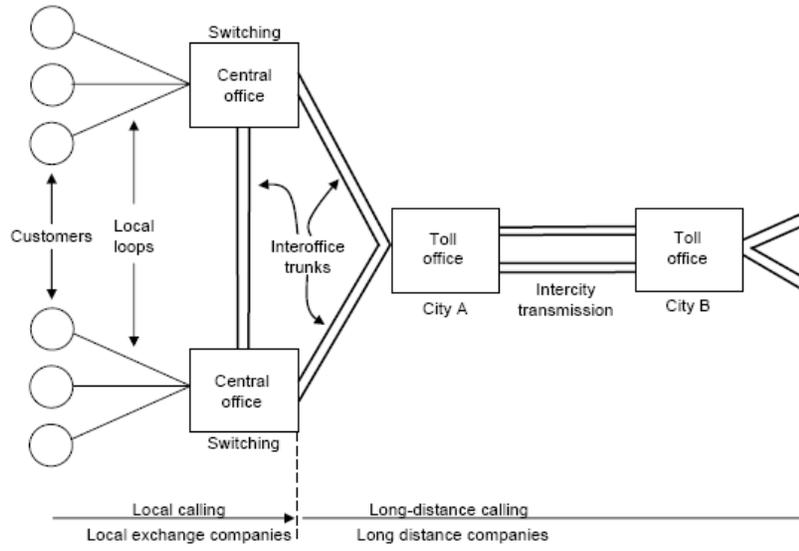


Figure 1. Traditional Telephone Network

Prices for international private lines in low-income countries were more than double the prices for comparable services in high-income countries. In contrast, residential connection charges were 40 percent lower in low-income countries than in high-income countries. Domestic long distance prices were about the same between the two types of countries.

Albert Halprin (1997, p. 376) describes how some countries have benefited from high international long distance prices, at the expense of other countries. There are three elements to international long distance prices -- collection charges, accounting rates, and settlement rates. The collection charge is the price the customer pays to the originating carrier. The accounting rate is an internal price that telecommunications carriers agree upon for completing calls that originate in each other's country. The settlement rate is the rate at which carriers share the accounting rate revenues. Generally, the settlement rate is 50:50. If there is an imbalance in the volume of incoming traffic between carriers in two countries, the carrier that has more outgoing traffic compensates the other carrier at the settlement rate.

Countries such as the US typically have a higher volume of outgoing traffic than incoming traffic, and so are net payers in the settlement process. Telecommunications competition, which the US has encouraged, has caused a decrease in collection charges for outgoing calls. These price decreases have stimulated demand. The lack of competition in other countries has left their collection charges high. The results have been large settlements deficits. For example, in 1991 outgoing international calls from the US (where long distance was competitive) to Germany (where long distance was a monopoly) exceeded incoming calls by 400 million. The resulting settlements deficit was \$3.3 billion, which the US companies paid to the German monopoly. (Halprin 1997, p. 376)

A similar pattern emerges from a comparison of domestic long distance prices and local telephone prices.<sup>5</sup> The US situation illustrates this pattern. In the US, long distance companies, including local exchange companies that provide long distance service, pay access charges to local exchange companies for completing long distance calls. Long distance companies pay access charges on both ends of long distance calls -- on the originating end of the call if the customer placing the call uses a local exchange company's network (e.g., a local telephone line), and on the terminating end of the call if the customer receiving the call receives it via a local exchange company's network. When a local exchange company is also a long distance carrier, it generally pays access charges only when the call originates or terminates on another local exchange company's network. US regulators have included in access prices several explicit charges for paying for the costs of local telephone networks. In total, these explicit payments accounted for 50% of the access charges that US long distance companies paid in 1993 and 1994. There are

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<sup>5</sup> In most countries, the cash flow from long distance to cover local network costs has been hidden because a single company provided both local and long distance.

also implicit mechanisms for collecting money through access prices to cover local network costs. For example, prices are generally averaged across both high cost and low cost areas. (Jamison 1995, pp. 518-523)

### **The Emerging Telecommunications**

In this section we describe the new telecommunications industry that is emerging. We begin by describing the technology changes that are occurring. We next explain telecommunications' role in combination products. Lastly, we explain business imperatives for telecommunications companies and provide some case examples of companies' markets and strategies.

#### *New Technologies*

There have been significant changes in the capabilities of telecommunications technologies. Yesterday's copper and microwave radio technologies, which used analog signals, have given way to digital computers, fiber optics, and other digital transmission technologies. Digital technologies have several advantages over analog technologies. The quality of digital signals does not decrease over long distances. Digital information is easily stored and forwarded. Digital computers are more easily programmed than analog computers. Digital data can be easily broadcast from one individual to millions, as on the World Wide Web. It can also be tagged with different levels of priority, so that, for example, video traffic for business conference calls can be given priority over computer data, which can be rerouted or delayed without decreasing quality or value. Digital information can be reformatted within the network so that it can travel over computer networks, telephone lines, cellular radio frequencies, satellites, or television cables to economically reach customers wherever they are. It can also be indexed, categorized, and searched to add value to communications services. It can be easily manipulated so that customers can integrate voice, video, and text, and change appearance and content. In the future, virtually all information will be in digital format. (Gibson 1999, p. 12)

The last two decades have witnessed tremendous drops in the costs of computer processing and communications transmission, two key inputs in telecommunications. Computer processing power today costs less than 1/3,300<sup>th</sup> of what it did in 1971. Computer memory is about 1/4,000,000<sup>th</sup> the cost. (Gibson 1999, pp. 12-14) The widespread adoption of fiber optics since the early 1980s has caused rapid decreases in the cost of transmission. The carrying capacity of fiber optics has increased 10-fold every four years since 1975. This capacity growth decreases unit costs. Unit costs decrease because much of the technology change that creates the capacity growth occurs in the electronics that reside on the ends of the fiber optic cables, allowing the costs of the fiber optic cable itself and its installation to be spread over larger volumes of traffic. (Huber et al. 1993, pp. 1.12, 2.73)

Communications have also become intermodal, making use of a mix of transmission mediums. (Gibson 1999, p. 14; Sappington and Weisman 1996, pp. 17-21, 57-60; Huber et al. 1993, pp. 1.16-1.25) Networks exist for wireless cellular, wireless spread-spectrum, traditional satellite, low earth orbit satellite, coaxial cable, fixed wireless, and fiber optics, all using digital technology. Furthermore, these networks interconnect so that customers and service providers can choose the features and functionality that they desire by choosing networks.

Digitalization and the growth of data are also changing the switching technology that links transmission lines and routes communications traffic. The UK telecommunications markets illustrate the growth of data. BT has begun to see more data traffic over its domestic network than voice traffic.<sup>6</sup> Robert Gibson (1999) explains the effects of data by using the Internet as an example.

"On the Internet, digital data is divided into distinct units of information called *packets*. Each packet has address information contained within it which (sic) carries identifying information such as source location and destination location as well as a variety of other tags. These packets are then dropped on the network, where they travel along the various nodes of the network, called *routers*. Routers are specialized, high-speed computers that are optimized to direct the flow of packets. Routers look at each of the individual packets, compare them to a table that represents the architecture of the entire data network, and pass them on to their correct destination. The ability to make individual routing decisions based on changes in the entire data network, be it temporary congestion in a certain area, or a broken data cable, lets routers dynamically adjust or 'self heal' to changes in the data network.

"Routers work somewhat like the neighborhood switchboard operators of yesterday. The key difference is when a switchboard operator connected two people on a phone line, that phone circuit could only be used for those two people. It did not matter if people were talking or not: as long as they were on the line, no one else could use that phone line...."

"In contrast, the Internet is a *connectionless* or *packet-switched* system. Individual packets travel along individual paths. Sometimes all the packets that comprise an e-mail message will take a single path to their destination, sometimes they will take multiple paths. Sometimes the packets will come in the right order, sometimes they will need to be re-assembled into the correct sequence. Most importantly, any number of end users or devices

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<sup>6</sup> "Data Beats Voice on BT Lines," *Financial Times*, 5 November 1998.

can send packets of information along the same path at virtually the same time.

"One benefit of this type of system is lack of the traditional 'busy' signal. Video packets, sound packets, e-mail packets, any type of packet can travel simultaneously to the same destination. The only limitation is the processor power and available information flow capacity to carry the data." (pp. 12-13) (*italics in original*)

### *A Combination Industry*

As we mention at the beginning of this section, the new telecommunications industry is a combination industry because its primary function -- transporting electronic communications -- is increasingly combining with computer, media, and publishing products. The other information industries -- computer, media, and publishing -- are also becoming combination industries. Computer companies are combining their traditional information processing with networking and content. For example, Microsoft Network provides online content and, with NBC, operates MSNBC. (Hoover's, Inc. 1999) Media and publishing companies combine their traditional entertainment and other content with networking and information processing. The world's largest entertainment and media company, Time Warner, is an example, which we describe earlier in this section. Also, newspapers such as the *New York Times* and the *Financial Times*, provide Internet-based databases and information processing.

The information industries' combination products mix and match four basic components -- customer devices, networks, network devices, and content. Customer devices are the devices such as telephones, PCs, and televisions that customers use to receive, send, and interact with information. Networks carry information from one place to another. Network devices, such as Internet host computers and voice mail hosts, process and store information for customers. Content is the electronic information and software that customers use. Examples include databases, music, videos, and electronic Yellow Pages. (Collis, Bane, and Bradley 1997, p. 160-164; Colombo and Garrone 1998; Jamison 1999a, p. 20)

As Tables 1 and 2 illustrate, being a combination industry redefines the telecommunications products and services that customers buy. Table 1 shows 1996 US consumer expenditures for most telecommunications, computer, media, and publishing products, and the primary components used to provide the products. Each row represents a product. The first column lists the products. The second column shows their respective per consumer annual expenditures. The last four columns indicate which components are the primary parts of each product. Content and network are the most significant components, making up almost 80% of the consumers' total expenditures for the products and services listed. (Jamison 1999a, p. 21)

Table 2 illustrates the trend towards combination products and services. The rows represent products. The columns headed “telecommunications,” “media,” and “computer” show the components that each industry provides. The first three product rows show traditional products. A single industry provides each. The bottom three product rows show examples of combination products. The first combination product, TV-Internet, was launched by NTL, a cable television and telephone company in the UK. The service allows customers to search the Internet within the context of television programs, and do online shopping, also within the context of television programs. The second combination product, Internet portals, provides Internet links to news, business information, directories, etc. One popular portal, *Infoseek*, has about 500 advertisers, including Bell Atlantic, Sprint, and Sony. Walt Disney owns 43% of *Infoseek*. (Hoover's, Inc. 1999) The last combination product listed Microsoft Network, allows customers to use services and search for and purchase, products through their computers.

**Table 1. Consumer Expenditures for Telecommunications, Computer, Media, and Publishing Products, per Customer, 1996<sup>7</sup>**

Products	Consumer Expenditures	Customer Devices	Network	Network Devices	Content
Long Distance and Other Telephone Services	\$504		M		
Electronic Devices	\$338	M			
Local Telephone Service	\$234		M		
Books, Magazines, Newspapers	\$170				M
Cellular	\$89		M		
Video Cassettes	\$77				M
Basic Cable Television	\$70		M		
Tapes, CDs, Records	\$57				M
Theaters	\$27				M

<sup>7</sup> Adapted from Jamison (1999a, p. 21). Sources: Treasury Department (1998, Tables 2, 723, 914, 921, 929, and 930); Federal Communications Commission (1998, p. 16); and Collis, Bane and Bradley (1997).

Pay Cable	\$21		M		M
On-line Services	\$20		M	M	M
Home Video Games	\$15				M
Home PC Software	\$4				M
<b>Total</b>	<b>\$1,627</b>				

Components in combination products can be both complements and substitutes. The components of PCs, networks, host computers, databases, and software that combine to provide Internet portals are complements because the service would be incomplete without any one of these components. However, they are also

**Table 2. Examples of Traditional and Combination Products from Information Industries<sup>8</sup>**

Example Products	Components	Telecommuni-cations	Media	Computers	
Traditional Products	Traditional Telephone Service	Customer devices	Telephones		
		Transmission	Telephone lines, switches		
		Network devices			
		Content	Customer conversations		
	Traditional Television	Customer devices		Televisions	
		Transmission		Satellite, cable, radio	
		Network devices		Cable headends, stations	
		Content		Film, ads, events	
	Traditional Data Processing	Customer devices			PCs, computer terminals
		Transmission			LANs
		Network devices			PCs, mainframes
		Content			Software packages
Combination Products	TV-Internet <sup>9</sup>	Customer devices		Televisions	Chips
		Transmission	Internet, telephone lines	Cables	
		Network devices		Cable headends	Host computers
		Content			Databases
	Internet Portals	Customer devices			PCs, digital cameras
		Transmission	Internet		
		Network devices	Internet host computers	Internet host computers	Internet host computers
		Content	Software	News, databases	Software
	Microsoft Network <sup>10</sup>	Customer Devices	Cellular phones		PCs, chips
		Transmission	Internet, wireless networks	Cables	
		Network devices	Switches	Cable headends	Host computers, e-mail servers
		Content		Video, music, news	Games, software, home pages

<sup>8</sup> Adapted from Jamison (1999a, p. 22).

<sup>9</sup> "Enjoying the Convergence Game," *Financial Times*, 9 June 1999.

<sup>10</sup> MSN 1999.

substitutable within certain ranges. In some instances, the number of network host computers can be increased to decrease the amount of transmission required, and vice versa. Software can be used to compress content to decrease capacity needs for transmission and host network computers. Software and other content on host computers can interact with software on users' PCs, personal digital assistants (PDAs), and other devices to conserve on transmission and host network computer capacity. The University of Florida's *Flex MBA* operates in this way.

Furthermore, means of transmitting and switching communications are becoming increasingly substitutable. Sappington and Weisman (1996, pp. 15-27, 44-46, 60-70) and Huber et al. (1993, pp. 2.1-2.78, 5.13-5.55) describe how cable television networks, satellites, fiber optics, copper wires, cellular and PCS mobile radio, and numerous other networks are substitutable for some services. Broadcast, circuit switching, and various cell-based technologies, such as packet switching, are also substitutable for some services. For example, some credit card verification services and airline reservation services have moved from using telephone networks to satellite networks. Some alarm services have moved from using telephone networks to wireless systems.

Furthermore, various news and information providers, such as Dow Jones, Knight-Ridder, News Corp., and Cox Enterprises, use not just a single network, but combinations of print, voice telephone, Internet, cable television, CD-ROM, broadcast, and satellite to transmit their products. Voice traffic, the traditional mainstay of telephone service, is also moving to alternative networks. In some countries, the number of mobile telephones exceeds the number of wireline telephones. Finland and Italy are examples.<sup>11</sup> Voice over the Internet is growing in popularity. Customers are substituting e-mail over the Internet for voice telephone calls.

### *Network Strategies*<sup>12</sup>

Telecommunications' new role as a component in combination products presents four challenges for telecommunications companies. First, these firms need to combine components in new and innovative ways in order to achieve economies of scale and economies of scope. The current trend in telecommunications to bundle services is an initial step in the evolution of combination products. (Yoffie 1997, p. 26) For example, most long distance and local exchange companies in the US plan to bundle local and long distance services once the Bell Operating Companies are allowed into interLATA long distance markets.

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<sup>11</sup> "Italians Fall in Love with Mobile Phone," *Financial Times*, 13 August 1999.

<sup>12</sup> Adapted from Jamison (1999a, pp. 22-26).

Bundling local and long distance will be a key step in what is called the death of distance. (Gibson 1999, p. 16) Distance means nothing for Internet communications and is losing its meaning in mobile communications, where companies such as Sprint and AT&T offer nationwide calling. Soon, telecommunications companies will ignore traditional local exchange boundaries and political boundaries because the costs are converging and customers have ceased caring about the boundaries.

Adapting to the new forms of rivalry and collaboration is also a challenge for telecommunications companies. Because products are combinations, rivalry in one industry or in one area spills over into another. (Greenstein and Khanna 1997, pp. 204, 212) Also, firms must develop new relationships, especially with packagers, and undo old relationships. A packager is any firm that combines components to provide a combination product. (Noam 1994; Colombo and Garrone 1998; Collis, Bane, and Bradley 1997, p. 170) Computer, telecommunications, media, and publishing companies can all play packaging roles. Also, new companies are forming whose primary business is packaging. America Online is an example of such a company. AT&T's recent entry into the Internet illustrates the difficulty of undoing old relationships. In purchasing TCI, AT&T obtained a contract that makes Excite@Home (formerly At Home) the exclusive online service for AT&T's cable customers through the year 2002. AT&T also obtained a large minority stake in Excite@Home. AT&T is rumored to be interested in establishing a relationship with America Online, but the Excite@Home relationship is in the way.<sup>13</sup>

A third challenge for telecommunications firms is their need to combine modes of transmission into a single product. Customers are beginning to no longer view wireline telephone, wireless telephone, and Internet as separate products. As a result, some telecommunications companies are bundling the products into a single price, or giving customers discounts for buying more than one. Sprint offers discounts for customers that buy Internet and long distance, or rebates for long distance customers that also buy Sprint PCS. Sprint also plans to integrate Internet access into its Sprint PCS service.<sup>14</sup> BellSouth offers a single bill for wireless, Internet, and wireline products. AT&T combines long distance, PCS, and Internet into a single package. SBC Communications Inc. (SBC) is preparing its own packages of telephone, satellite television, Internet, and cellular in response to AT&T's package.<sup>15</sup> Qwest Communications International bundles Internet and long distance.

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<sup>13</sup> "Inside the Tangles of AT&T's Web Strategy," *The Wall Street Journal*, 13 August 1999, Eastern Edition.

<sup>14</sup> "Sprint PCS Plans Wireless Data Net, Linking Cell Phones, Access to Internet," *The Wall Street Journal*, 12 August 1999, Eastern Edition.

<sup>15</sup> "SBC will Launch Service 'Bundles' in Two Markets," *The Wall Street Journal*, 24 August 1999, Eastern Edition.

The fourth challenge for telecommunications companies is to achieve a scale that matches their customers' communications needs. Scale involves both customer base and geographic reach. Customer base is the number, size, and type of customers that connect directly with the company's network. Customer base is important because it determines a network's value or strength for making markets and interconnecting with other networks. (Kramer and NiShuilleabhain 1997, p. 259; Yoffie 1997, pp. 25-26) For example, Time Warner's cable customers allowed the company to launch new networks such as HBO by providing a ready market. (Hoover's, Inc. 1999) Frontier Communications began as a local exchange company in New York and leveraged its local customer base to succeed in long distance. In 1997, Frontier provided local service in combination with long distance service, Internet, wireless, or calling card services to 40% of its local telephone customers. (Frontier Corporation 1998, p. 5) Incumbent local exchange companies in Finland had similar success when they began competing in long distance. Southern New England Telephone in the US had a similar experience when it entered the long distance market.

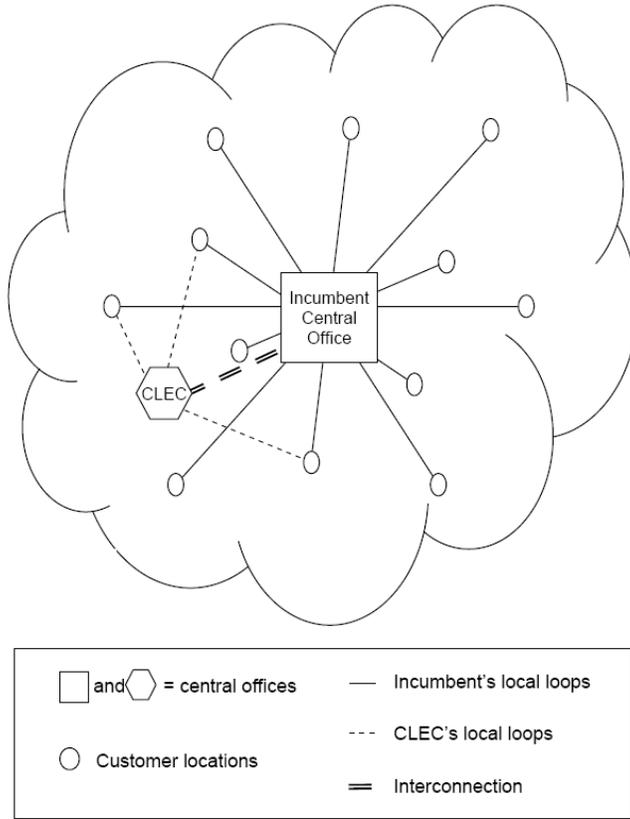
Many telecommunications firms develop global or regional networks by connecting local networks, called footprints. Large multinational customers often want a single network to provide them with end-to-end telecommunications across multiple countries. (Kramer and NiShuilleabhain 1997, p. 260; Antonelli 1997, p. 272; Jamison 1998, pp. 697, 705-706) Regional customers often have similar needs, but on a smaller geographic scale. These needs for end-to-end networking drive telecommunications companies to pursue local-to-global-to-local network strategies (MCI WorldCom 1998) or local-to-regional-to-local strategies. With these strategies, a telecommunications firm establishes its own local networks where its customers have business locations and connects these networks via its global or regional network. Some companies, such as MCI WorldCom and Cable & Wireless, apply the local-to-global-to-local strategy primarily by establishing their own local and global networks. Other companies do so through alliances and partnerships. Concert, which includes BT and AT&T, is an alliance formed to pursue a local-to-global-to-local strategy. Global One is a partnership that Deutsche Telekom, France Telecom, and Sprint formed to implement their local-to-global-to-local strategy. Yet other companies specialize in particular regions. For example, MTN and Bushnet focus on eastern and southern Africa.

Local-to-global-to-local and local-to-regional-to-local strategies change the paradigm of network competition. Figure 2 illustrates the traditional paradigm for introducing competition in telecommunications. The cloud-shaped outline represents the incumbent telephone company's exchange area and the rectangle represents the incumbent's central office. The small circles illustrate some of the customers in the exchange area and the solid straight lines represent the incumbent's local loops to these customers. The incumbent's network and customers constitute its footprint. The hexagon represents an entrant's central office. The entrant is called a competitive local exchange carrier or CLEC. Dashed single lines represent the CLEC's local loops, which connect to some customers. In this paradigm, the incumbent serves all of the market. The CLEC establishes a network to serve part

of the incumbent's market. The CLEC must interconnect with the incumbent so that the CLEC's customers can call the incumbent's customers. The dashed double line represents this interconnection. The incumbent views this competition as a zero-sum game in that the incumbent has all of the customers at the start of competition and loses customers as the CLEC grows. As a result, the incumbent has strong incentives to hinder the fledgling competitor.

Figure 3 illustrates entry when companies are pursuing local-to-global-to-local and local-to-regional-to-local strategies. In this scenario, there are three telephone companies --  $\alpha$ ,  $\beta$ , and  $\chi$  -- and three areas --  $A$ ,  $B$ , and  $C$ . An area may be a country, a region, or a city. Each telephone company is an incumbent in one of the areas and an entrant in the other two areas.  $\alpha$  is an incumbent in  $A$  and an entrant in  $B$  and  $C$ .  $\beta$  is an incumbent in  $B$  and an entrant in  $A$  and  $C$ .  $\chi$  is an incumbent in  $C$  and an entrant in  $A$  and  $B$ . Rectangles represent  $\alpha$ 's central offices, triangles

**Figure 2. Traditional Paradigm for Competition in Local Networks**



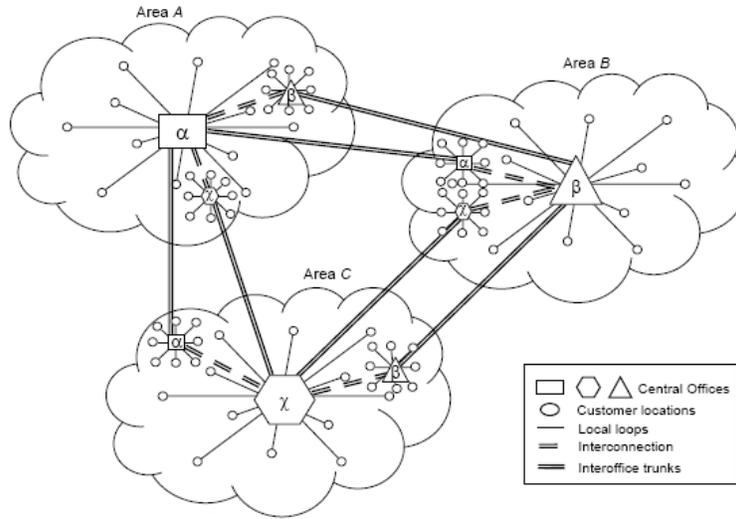
represent  $\beta$ 's central offices, and hexagons represent  $\chi$ 's central offices. Solid straight lines represent local loops. Small circles represent customer locations. Solid double lines represent interoffice trunks within a company. Dashed double lines represent interconnection.

Assume that large customers' interests in end-to-end services that cross area boundaries drive the telephone companies to enter each other's traditional markets. Now, without loss of generality, consider  $\alpha$ 's situation as it plays a local-to-global-to-local strategy.  $\alpha$  has a footprint in  $A$  that both  $\beta$  and  $\chi$  need to access to be able to carry the large customers' cross-border and in-area communications. Access to this footprint is highly valuable to  $\beta$  and  $\chi$ . As a result, if  $A$  could be viewed in isolation,  $\alpha$  would be able to extract interconnection payments from  $\beta$  and  $\chi$  that would compensate  $\alpha$  for the full value of its footprint if  $\beta$  and  $\chi$  were willing to pay that much. However,  $\alpha$  wants to enter  $B$  and  $C$ . In these areas,  $\alpha$  is an entrant and  $\beta$  and  $\chi$  are incumbents. Their footprints also have high value. These values offset the advantage that  $\alpha$  has over  $\beta$  and  $\chi$  in, making negotiations for entry more balanced than in the traditional paradigm.

Figure 3 illustrates symmetric multimarket contacts. Symmetry rarely exists in practice. As we explain in the next subsection, companies operate in diverse mixes of markets. Figure 4 illustrates a stylized situation with diverse market mixes. Figure 4 is different from Figure 3 in two respects. First, there is an additional country,  $D$ , and an additional firm,  $\delta$ . Second, the firms have different market contacts. Each firm is in three markets, but no two firms are in the same three markets. Figure 4 illustrates MLR with respect to footprints in telecommunications. As in Figure 3, the bargaining positions for interconnection in Figure 4 are still more balanced than in the traditional paradigm.

Figure 4 illustrates MLR only in terms of footprints. In reality, MLR occurs along several dimensions. In telecommunications there are global players, regional players, national players, and local players. Because these players match their reach and capabilities to different types of customers in different locations, each company is different in terms of footprint, customer type, network, and products. Because the products differ, the packagers involved in the products differ, too.

Some developing country situations are different from the paradigms shown in Figures 3 and 4. Both of these figures show the entrant as being small compared to the incumbent. This may not hold in countries where the incumbent's network is not well developed. In Uganda, for example, the entrants, MTN and Celtel, are comparable in size to the incumbent, Uganda Telecom Limited.



**Figure 3. Local Network Competition with Local-to-Global-to-Local and Local-to-Regional-to-Local Strategies**

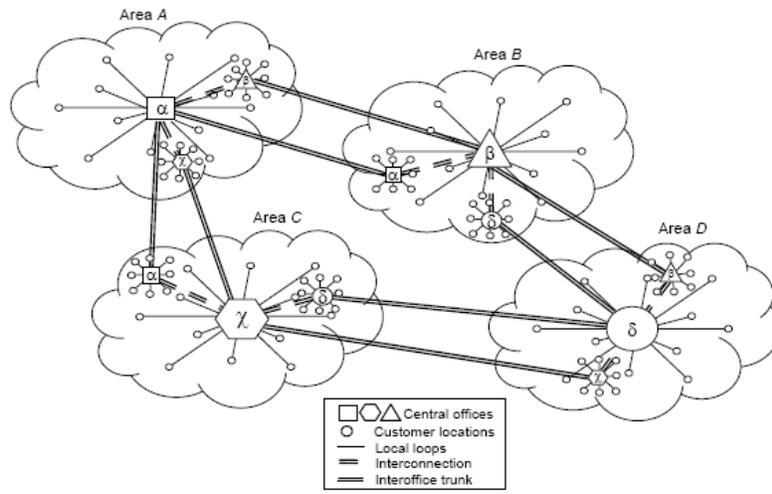


Figure 4. MLR with Local-to-Global-to-Local and Local-to-Regional-to-Local Strategies

*Case Studies in Telecommunications MLR*

MLR exists when firms are diverse in their market contacts and potential market contacts. Figure 5 provides a stylized illustration.<sup>16</sup> The rows of the table in Figure 5 represent firms and the columns represent markets. The "Xs" show points of rivalry. The shaded boxes illustrate which firms actually compete in which market. "Xs" without shading indicate potential points of competition. One property of MLR is that firms' markets (including potential markets) incompletely overlap or intersect -- i.e., firms have different market contacts; for example,  $\delta$  provides rivalry for some of  $\alpha$ 's markets, but not for others;  $\chi$  provides rivalry for some of  $\delta$ 's markets, but not for others; and so on.<sup>17</sup>

**Figure 5. Illustration of MLR with Actual and Potential Rivalry**

MLR can occur in telecommunications when companies follow different patterns when extending outside their traditional markets. Eli M. Noam and Alex J. Wolfson (1997, pp. xxv-xxxiv) list numerous examples that existed at the time of their writing:<sup>18</sup>

- AirTouch (US cellular company) has investments in Sweden, Germany, Belgium, and Portugal.
- Ameritech (US local exchange company) has investments in Hungary, New Zealand, and Poland.
- BellSouth (US local exchange company) has investments in Australia and Germany.<sup>19</sup>
- Cable & Wireless (an international carrier) has investments in the US, Asia-Pacific, Portugal, Caribbean, Pakistan, UK, Latvia, Germany, Philippines, Sweden, South Africa, Australia, Colombia, and France.

<sup>16</sup> Figure 5 is adapted from Porter (1985, p. 354).

<sup>17</sup> For a more complete discussion, see Jamison (1999b).

<sup>18</sup> Investments listed represent stakes greater than or equal to 20% ownership.

<sup>19</sup> Since then, BellSouth has made several major investments in Latin American cellular markets.

- France Telecom (French incumbent carrier) has investments in Global One, Sweden, Belgium, Ivory Coast, India, Greece, Senegal, Vanuatu, and Poland.
- SBC (US local exchange company) has investments in Chile.
- Singapore Telecom (Singapore incumbent carrier) has investments in Indonesia, Sri Lanka, Australia, Philippines, and Belgium.
- Sprint (US local exchange, long distance, and wireless company) has investments in Global One, Canada, Bulgaria, Argentina, Russia, France, and Poland.
- Telefonica (Spanish incumbent carrier) has investments in Puerto Rico, Romania, Chile, Peru, Colombia, and Argentina.

MLR also occurs when new entrants develop across market boundaries. Table 3 lists examples of firms with diverse market contacts that occurred in late 1998 and early 1999. Some are examples of new companies that have developed and whose products reflect the new economics of telecommunications.

In each of the following three subsections, we provide a case study of a telecommunications company, focusing on which markets each company is in and its market contacts. The telecommunications companies are SBC, AT&T, and Deutsche Telekom. The subsection following these descriptions describes their different mixes of market contacts.

#### *SBC Communications Inc.*

By 1999, SBC, formerly Southwestern Bell, was the second largest local exchange company in the US, behind Bell Atlantic. SBC has 37 million local loops in Arkansas, California, Connecticut, Kansas, Missouri, Nevada, Oklahoma, and Texas and 7.1 million wireless subscribers. In 1999, SBC received permission from regulators in the US and European Union (EU) to buy Ameritech. When consummated, this could make SBC the US's largest local exchange company, depending on what happens with the proposed Bell Atlantic/GTE merger. (Hoovers Inc. 1999; SBC 1999a) SBC's primary lines of business are organized in four

**Table 3. Examples of Communications Firms Extending into Diverse Markets<sup>20</sup>**

<b>Firm</b>	<b>Market Entry</b>
AOL	Enters Internet market in Latin America.
Apple Computer	Teams with AOL to offer instant messaging.
AT&T	Enters cable television market in Japan.
	Enters cable television in US.
	Enters worldwide Internet market.
Bell Atlantic	Begins marketing satellite television.
BT	Enters China market for large businesses.
	Enters South Korea mobile radio market.
Commonwealth Telephone Enterprise <sup>21</sup>	Enters Bell Atlantic residential markets in Pennsylvania.
First Pacific	Enters Philippines long distance market.
Global TeleSystems Group Inc.	Creates pan-European telecommunication network.
Intel	Enters Internet services market through investment In World Online International.

<sup>20</sup> "StarMedia to take Internet Craze to Latin America with an IPO," *The Wall Street Journal*, 12 May 1999; "AOL and Apple Team Up to Offer Instant Messaging," *The Wall Street Journal*, 30 July 1999, Eastern Edition; "Time Warner Sells Stake in Titus," *Financial Times*, 2 July 1999; "MediaOne Accepts \$54 Billion AT&T Bid," *The Wall Street Journal*, 3 May 1999, Eastern Edition; "AT&T to Pay \$5 Billion for IBM Network," *The Wall Street Journal*, 9 December 1998, Eastern Edition; "Antennae Attract Vies to Satellite TV," *The Wall Street Journal*, 1 December 1998, Eastern Edition; "BT, China Telecom Sign Pact," *The Wall Street Journal Europe*, 15 June 1999; "Mobile-Phone Companies Target Korea," *The Wall Street Journal*, 9 November 1998, Eastern Edition; "Why is Bell Atlantic Leading the Cheers for New Local Rival?" *The Wall Street Journal*, 13 January 1999, Eastern Edition; "HK Conglomerate Confirms Stake in PLDT," *Financial Times*, 3 November 1998; "GTS to Purchase Esprit Telecom for \$645 Million," *The Wall Street Journal*, 9 December 1998, Eastern Edition; "Intel Strategy Moves Ahead," *Financial Times*, 7 July 1999; "Microsoft to Buy 11% Stake in Globo Cabo," *The Wall Street Journal*, 17 August 1999, Eastern Edition; "Microsoft-AOL War heats Up Over Net Access," *The Wall Street Journal*, 5 August 1999, Eastern Edition; "Microsoft Invests \$200 Million in Qwest," *The Wall Street Journal*, 15 December 1998, Eastern Edition; "Enjoying the Convergence Game," *Financial Times*, 9 June 1999; "Qwest is Set to Announce Accord with KPMG for Services on Web," *The Wall Street Journal*, 21 June 1999, Eastern Edition; "Qwest Agrees to Invest \$90 Million for Stake in Advanced Radio," *The Wall Street Journal*, 2 June 1999, Eastern Edition; "Cablevision Files Suit Alleging Violations by BEC Energy Unit," *The Wall Street Journal*, 15 December 1998, Eastern Edition; "Enron to Unveil Pact Involving RealNetworks," *The Wall Street Journal*, 21 January 1999, Eastern Edition; "Sony Offers Wireless Local Loop," *The Wall Street Journal Europe*, 21 June 1999; "Groups Sign 'Minor' Phone Deals in Brazil," *Financial Times*, 19 January 1999; "9 Telecom Takeover," *Financial Times*, 29 October 1998; "Telefonica, IDT Form Venture," *The Wall Street Journal Europe*, 13 August 1999; "Sweden, Norway Set to Sign Pact to Merge State Phone Carriers," *The Wall Street Journal*, 29 March 1999, Eastern Edition; "AirTouch Set to Decide Winner in \$55bn Battle," *Financial Times*, 16-17 January 1999.

<sup>21</sup> Commonwealth Telephone Enterprise was previously a rural telephone company operating near Bell Atlantic's exchanges.

Microsoft	Enters Latin American Internet market through investment in Globo Cabo, a cable television company in Brazil.
	Launches MSN Mobile to offer Web services for cellular phones. Invested \$600 million in Nextel.
	Invests in telecommunications carrier Qwest.
NTL	Combines cable television, telephone, and Internet into single product that allows Internet searches and online shopping based on television programs.
Qwest Communications International <sup>22</sup>	Develops partnership with KPMG to offer business services over the Internet.
	Enters wireless local loop market in US.
RCN Corp.	Teams with energy company to offer telecommunications in Boston.
RealNetworks	Enters video and Internet market for large businesses in US.
Sony	Enters telecommunications market in Japan by offering wireless local loop.
Sprint	Enters long distance market in Brazil.
Telecom Italia	Enters fixed line market in France.
Telefonica	Forms a joint venture with IDT to provide telecommunications to Spanish-speaking people in the US.
Telia	Sweden and Norway telecommunications companies merge.
Vodafone	Creates international mobile radio firm.

operating segments: Wireline, Wireless, Directory, and Other. According to SBC,

"The Wireline segment provides domestic landline telecommunications services, including local and long-distance voice and data services, network access services, Internet access, and customer equipment for both voice and data applications.

"The Wireless segment provides domestic local and long-distance wireless telecommunications services and handset equipment.

"The Directory segment sells advertising, publishes yellow and white pages directories, and provides electronic publishing.

"Other includes SBC's international investments and other domestic operating subsidiaries." (SBC 1999a)

<sup>22</sup> Q West Communications International is a new entrant that initially provided international fiber optic networks.

SBC's international operations, in which its ownership is at least 20%, include wireline, wireless, and video services in:

- Canada (through Ameritech's investment in Bell Canada)
- Chile (through VTR)
- Denmark (through Ameritech's investment in Tele Danmark)
- France (through Cegetel)
- Israel (primarily through AUREC Group)
- Mexico and Puerto Rico (through Telmex)
- Switzerland (through diAx)
- Taiwan (through TransAsia Telecommunications, Inc.)

SBC also has investments in China-US and Japan-US Cable Networks for undersea cables. (SBC 1999a, 1999b; Ameritech 1999)<sup>23</sup> SBC's international affiliates had 15,019,000 wireline access lines, 6,976,000 wireless subscribers, and 811,000 video subscribers as of September 30, 1998. (SBC 1999b)

#### *AT&T*

AT&T is the US's largest telecommunications company, with 90 million customers. Its primary offerings include long distance, wireless telephone, Internet access (through AT&T WorldNet), and local and international phone services for businesses. AT&T has bought the US's second largest cable operator TCI, which AT&T now calls AT&T Broadband & Internet Services. As of the time of this writing, AT&T has reached a merger agreement with MediaOne. This would make AT&T the largest cable television operator in the US, ahead of Time Warner. AT&T intends to use the cable television networks to offer local telephone and long distance service, as well as Internet services. AT&T also is forming a global telecommunications venture with BT. (Hoovers, Inc. 1999)

AT&T Broadband & Internet Services has nearly 12 million customers. It owns 33% of Cablevision Systems, which provides cable television to 3.4 million customers, primarily in and around New York City, Boston, and Cleveland. In total, AT&T Broadband & Internet Services owns cable franchises in 23 of the 55 largest metropolitan statistical areas in the US and, through its joint venture with Time Warner, will have access to at least 13 more. Cablevision's Rainbow Media unit holds cable networks, including American Movie Classics and Bravo. AT&T Broadband & Internet Services also owns 26% (58% voting interest) of Excite@Home. Excite@Home uses cable TV systems to provide high-speed

<sup>23</sup> Except in the case of undersea cables, investments of less than 20% ownership are omitted. An exception is made for undersea cables because large consortiums often share them.

Internet access to residences and businesses, and operates the Excite Internet portal. Excite@Home also teams with cable operators to market its services to 500,000 customers in the US and Canada. The Excite portal features search services, online shopping, and content on topics such as careers and travel. Excite Voicemail provides free voice mail, e-mail, and fax messages. (AT&T 1999; Federal Communications Commission 1999; Hoovers, Inc. 1999)

AT&T Broadband & Internet Services also owns cable programmer Liberty Media. Liberty has ownership in about 100 cable channels, including BET, Discovery Channel, E!, Encore, QVC, and USA Networks. It also has 49% ownership of TV Guide and 86% ownership of TCI Music, which holds music and online properties. Liberty owns 90% of Liberty Media International, which operates multichannel video and telecommunications distribution networks primarily in the UK, Japan, and Argentina, but also in other parts of Europe, Asia, Latin America, the Caribbean, and Australia. (Hoovers, Inc. 1999)

AT&T Wireless Services is the largest US wireless operator. The only other US operator with a national footprint is Sprint PCS. Services include voice and data, air-to-ground, and messaging. The company's pricing plan that offers nationwide calling for a single price attracted 1 million customers its first year. (Hoovers, Inc. 1999)

AT&T also owns 22% of AT&T Canada, which is Canada's largest CLEC. AT&T Canada formerly concentrated on long-distance service, but its services now include local and long-distance telephone, data networking, and Internet access nationwide. AT&T Canada will focus on business communications, having agreed to sell most of its residential business to another carrier. (Hoovers, Inc. 1999)

Concert, the AT&T alliance with BT, provides telecommunications network services for more than 4,700 customers (largely multinational businesses) in more than 800 cities throughout 50 countries. (Hoovers, Inc. 1999)

### *Deutsche Telekom*

Deutsche Telekom is the incumbent telecommunications carrier in Germany. Prior to liberalization of the German market, Deutsche Telekom was the only carrier in Germany. The company is the largest telecommunications provider in Europe and is third worldwide, behind NTT and AT&T. It has more than 45 million telephone lines and 6.2 million mobile phone subscribers. It is also Germany's largest cable television provider, with 17 million households, but is taking steps to sell this line of business. Deutsche Telekom has aggressively entered Internet telephony. Deutsche Telekom is in the Global One joint venture with Sprint and France Telecom. The German government owns 72% of Deutsche Telekom. (Hoovers, Inc. 1999)

Recently, Deutsche Telekom agreed to purchase One 2 One, a UK mobile phone provider, from MediaOne Group, Inc. and Cable and Wireless plc.<sup>24</sup>

Deutsche Telekom operates in most major economic centers. Through its regional units in Europe, the US, and Asia-Pacific Region, its international joint ventures, and Global One, Deutsche Telekom serves customers in more than 65 countries. Deutsche Telekom has regional units in Bonn, Brussels, Kiev, London, Moscow, and Paris.. Other regional operations include Deutsche Telekom Asia Pte Ltd. (Singapore and Hong Kong), Deutsche Telekom Repr. China, Deutsche Telekom K.K. (Japan), and Deutsche Telekom Canada Inc. (Deutsche Telekom 1999) Through Global One, Deutsche Telekom offers virtual private network in 11 countries, managed bandwidth in 21 countries, packet switching in 52 countries, Internet in 27 countries, and prepaid cards in 93 countries. (Global One 1999) The virtual private network product uses software to provide large customers with what appears to be a private network, when they are actually using the public network. Managed bandwidth allows customers to easily adjust their telecommunications transmission and switching capacity.

#### *MLR with SBC, AT&T, and Deutsche Telekom*

SBC, AT&T, and Deutsche Telekom illustrate MLR. They compete in many markets, but each competes in markets that the others do not. Deutsche Telekom competes in all German markets for wireline telecommunication and mobile telecommunications. AT&T competes only for multinational customers in Germany. Deutsche Telekom faces other competitors in Germany -- for example, MobilCom and VIAG. AT&T and SBC do not compete against these companies. (Hoovers, Inc. 1999)

AT&T and Deutsche Telekom compete in numerous markets for multinational customers, but the products and footprints have differences. Also, their costs and abilities differ because their modes of entering the international markets differ. AT&T has historically provided international service by collaborating with the incumbent companies. Now AT&T has placed its own operations in a number of countries and is expanding its global offerings through Concert. Deutsche Telekom operates through Global One and through Atlas, its alliance with France Telecom, in most major markets. However, Deutsche Telekom has in some instances competed against its own alliances, as is indicated by the number of Deutsche Telekom enterprises in countries where Global One operates. SBC is not in these markets because of its interLATA long distance restrictions. Once these restrictions are lifted, SBC will probably enter selected markets for multinational customers.

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<sup>24</sup> "MediaOne Group and Cable & Wireless Agree Sale of One 2 One To Deutsche Telekom for Total 8.4 Billion British Pounds," *PRNewswire*, 6 August 1999.

SBC's international operations have competed with Deutsche Telekom's in some instances, but rarely with AT&T's. SBC and Deutsche Telekom both bid for domestic licenses, something AT&T tends not to do. Through its investment in Telmex, SBC competes with AT&T in Mexico.

SBC and AT&T compete in numerous US markets, but not all. AT&T competes in all domestic and international long distance markets in the US. SBC competes only in intraLATA long distance because of the company's interLATA restrictions. Even once these restrictions are lifted, it is unlikely that SBC will compete in all US long distance markets because its greatest success is likely to be in areas where it has a historically strong local footprint. Also, SBC is in numerous local markets, such as markets for local data services, where AT&T is not. AT&T is in all of SBC's wireless markets because AT&T is the only company with a nationwide wireless footprint. AT&T is in several cable television markets where SBC is not a cable television provider, including Atlanta, Boston, Chicago, Dallas, Los Angeles, Miami, Pittsburgh, and Seattle. (Federal Communications Commission 1999) Furthermore, AT&T will compete in local networks markets that SBC is likely to leave alone. AT&T will do this for two reasons. First, AT&T already has long distance customers in these markets. Second, AT&T's broadband operations (formerly TCI) and its joint venture with Time Warner have market presence in residential telecommunications markets outside of SBC's traditional territories, markets where SBC is likely to have little interest.

## **THE NEW ELECTRICITY INDUSTRY**

The electricity sector – which is composed of electricity generation, transmission, and distribution -- is undergoing restructuring. Historically, this industry, which annually produces \$200 billion in revenues in the US, was a vertically integrated monopoly in which all three components were under common ownership. In the US, these were generally privately-owned companies. Outside the US, these were generally state-owned enterprises. (Department of Energy 1999)

This section describes how governments are restructuring energy markets and how electricity utilities are transforming themselves to adapt to the new environment. This new industry change, while less dramatic than the complete revolution that is occurring in telecommunications, nonetheless is characterized by MLR in many instances. The US Department of Energy (1999) describes the impact of electricity competition in the US this way, clearly envisioning markets characterized by MLR.

“What does deregulation mean? Taking a tip from the oil companies, which have strong brand names at the gas pumps, the utilities are trying to put some sparkle into their electricity. UtiliCorp United was the first to try branding electricity. Utilities are also looking into completely new business areas: soon the utility man may be selling you a home security system or a cellular phone. The Telecommunications Act of 1996 freed the giant

electric utility holding companies to enter telecommunications areas, and Southern Company and American Electric Power are just two of many that are taking the plunge. Some electric utilities, forced to sell off power plants under deregulation initiatives, are focusing on telecom opportunities: BEC Energy, the holding company for Boston Edison, is one. But others, such as UtiliCorp, found that consumers were not prepared to buy new services from their old utility.” (Department of Energy 1999)

Hoover’s, Inc. (1999) describes the changing energy markets this way.

“Preparing for competition, the big utilities have been positioning themselves to get bigger; for example, the proposed merger of AEP, based in the Midwest, and Central and South West of Texas would create the largest US utility. The deregulation of electricity and natural gas has also encouraged the convergence of the two industries. Thus we see giant electric company TXU acquire the owner of Lone Star Gas, ENSERCH (locking up Texas territory?), while Enron walked electric company Portland General down the aisle.

“By 2020, world energy demand may double, according to the World Energy Council. To meet the forecast world demand for electricity alone in the next quarter-century, it is estimated that one major power station (1,500 megawatts) will have to be built every week. The growth comes not from the rich countries, as might be expected, but from the developing countries of Latin America and Asia. Asian contagion may temporarily derail new power projects and cripple consumer demand for cars and appliances. But eventually the US will lose its disproportionate share of world energy consumption to the developing countries, which will use as much as 60%. This is good news for your average Colombian or Chinese guy, coming home from a long day's work. He likes his beer cold, too.” (Hoover’s, Inc. 1999)

Hoover’s, Inc. sees instances of MLR in which companies compete in multiple energy markets.

Hoover’s, Inc. also identifies tendencies towards industry consolidation -- a “locking up” of markets. Harry Trebing (1998) concurs in this observation and recommends a structural separation between competitive and noncompetitive components. Consolidation raises issues of natural monopoly and regulating market power, which this book addresses.

**Efforts Toward Reform**

Recently, countries such as Chile, Argentina, the UK, and Norway have shown that the generation segment of power supply in today's environment can be more efficient in a competitive market. In contrast, countries generally assume that transmission and distribution are natural monopolies, meaning that customers are better off being served by a monopoly than by multiple firms.<sup>25</sup>

In the US, the evolution to the new electricity industry began in 1978, when the Public Utility Regulatory Policies Act (PURPA) allowed non-utility generators to enter the wholesale power market. There are two basic markets for power. The retail market sells power to the final consumer. The wholesale market sells power to marketers, who are often electricity distribution companies. PURPA opened the wholesale market to non-utilities, but left the retail market closed to competition. (Department of Energy 1999)

The 1992 National Energy Policy Act (EPAct) further changed the US electricity sector. EPAct requires electric utilities to transmit competitors' power to large customers, such as large industrial businesses.

Several US states have begun allowing retail competition in electricity. California was the first, prompted in part because California-based PG&E and Edison International had some of the highest electricity prices in the country. As of the time of this writing, at least 13 other states have addressed retail competition in electricity and the US Congress is considering the issue.

Chile was one of the first countries to undertake significant reform. It first allowed large customers to purchase power from any generator or distribution company. It also linked the regulated price to the market price so that small customers could benefit from the competition for large customers. Chile also developed two central dispatch systems to facilitate the competitive flow of electricity. (Lalor and Garcia 1996, p. 41)

Argentina began its reforms about ten years after Chile did. Like Chile, Argentina adopted open access for wholesale capacity and an energy pool for generation. It also adopted centralized dispatch. Argentina went further than Chile by separating transmission from generation and distribution, and by establishing an independent dispatch agency. It also adopted limits on market share in generation. (Lalor and Garcia 1996, p. 42)

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<sup>25</sup> Jamison (1999b) contains a more complete discussion of the effects of MLR on the concept of natural monopoly.

### **Market Models for Electricity Competition**

Sally Hunt and Graham Shuttleworth (1996, p. 22) describe the market models that have emerged for electricity competition. There are four basic models: the monopoly model, the purchasing agency model, the wholesale competition model, and the retail competition model. We explain each below.

The monopoly model retains the traditional monopoly structure. There is no competition in generation and the utility is vertically integrated. Utilities can, and often do, use pooling arrangements to coordinate electricity dispatch, the act of sending electricity through electricity lines. Trading is generally reciprocal, so prices are generally based on volume sensitive costs. There is no competition for building generating capacity. (Hunt and Shuttleworth 1996, pp. 31-32)

Figure 6 illustrates the monopoly model.<sup>26</sup> The rectangles represent components of the system. The arrows between the rectangles in the top row represent the flow of energy. Energy flows from the generator, to the transmission system, to the distribution system, to the customer. The arrows between the rectangles in the bottom row represent the flow of sales, illustrating how the transactions would flow if the utility were not vertically integrated. The sales would flow from the generator to the transmitter, from the transmitter to the distribution company, and from the distribution company to the customer. The vertical arrows between the rectangles marked "wholesaler/transmission" represent sales between utilities.

The purchasing agency model allows for a single buyer of electricity, who chooses among competing generators. The single buyer has a monopoly on transmission and distribution. The single buyer is able to purchase energy from its own generating plant (if vertical ownership is allowed), divested generators (if vertical separation has occurred), other utilities, and independent power producers or IPPs. The US has been using this model under PURPA. In the US PURPA model, the utility has been the single buyer and is vertically integrated. As a result, the IPPs have competed against the single buyer's own generating plants. (Hunt and Shuttleworth 1996, pp. 43-45)

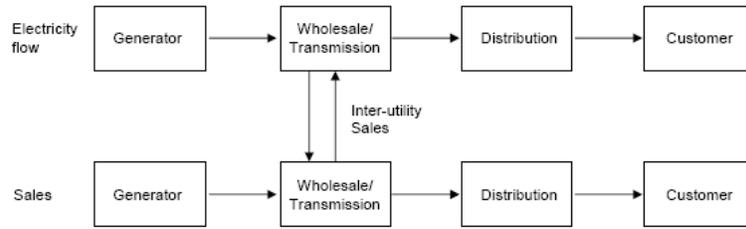
The wholesale competition model allows distribution companies to buy directly from generators. There is open access to transmission wires for delivering the electricity to the distribution companies. The distribution companies remain monopolies for sales to final customers. (Hunt and Shuttleworth 1996, p. 22) Transmission can be a monopoly, too, and is often vertically separated from distribution and generation.

Figure 7 illustrates the wholesale competition model. The flows at the top of the figure represent the flow of electricity. The generators put electricity into the transmission lines. These lines are interconnected and are called a transmission

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<sup>26</sup> Adapted from Hunt and Shuttleworth (1996, p. 32).

grid. A system operator manages this dispatch function to keep the system stable. (Hunt and Shuttleworth 1996, p. 54) The electricity flows out of the transmission grid and to the distribution companies. The distribution companies provide the electricity to customers.



**Figure 6. Monopoly Model of Electricity Markets**

The flows at the bottom of Figure 7 show the flow of sales. Generators sell electricity directly to distribution companies or to aggregators. (Hunt and Shuttleworth 1996, p. 22) Aggregators make sales to distribution companies. This is called the wholesale market. In the retail market, which is a monopoly, distribution companies sell electricity to customers.

Notice that the flow of sales and the flow of electricity in the wholesale market do not need to match. The only matches that are required are the matches between the amount of electricity that a generator or aggregator sells and receives payment for, and between the amount of electricity that an aggregator or a distribution company buys and makes payments for. In the retail market, the flow of electricity and the flow of sales match.

The retail competition model allows all customers to choose their electricity supplier. There is open access to both the transmission wires and the distribution wires for delivery of the electricity; i.e., both the transmission wires and the distribution wires perform common carriage. The retail competition model creates a merchant function that does not exist in the other models.

Hunt and Shuttleworth (1996, pp. 65-68) explain the role of monopoly provision of transmission in the retail competition model.

"(The retail competition model) is of necessity a single transporter model, moving power to facilitate bilateral trading. The trading arrangements we discuss for (this model) involve a method for the physical delivery of power. Inevitably this means that all trading has to be done over an integrated network of wires. The operator of the wires has to measure and account for the trades." (Hunt and Shuttleworth 1996, p. 65)

They further explain that there is little need for separating generation from retailing as the retailer adds little value in their view. However, given the incentive of a combination retail-distribution company to favor its own retail customers, there is a reason to separate these functions.

Figure 8 illustrates the retail competition model. The flows at the top of the figure represent the flow of electricity. These are the same as for the wholesale competition model that Figure 7 illustrates. The flows at the bottom of Figure 8 show the flow of sales. Generators sell electricity directly to customers, retailers, or aggregators. Aggregators make sales to retailers. Retailers make sales to final customers. (Hunt and Shuttleworth 1996, p. 24)

The next section describes the natural gas industry. A description of MLR in energy follows the gas section.

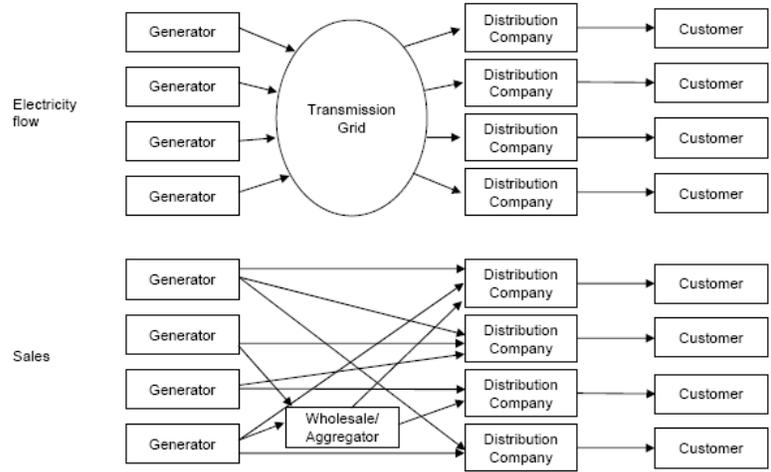


Figure 7. Wholesale Competition Model of Electricity Markets

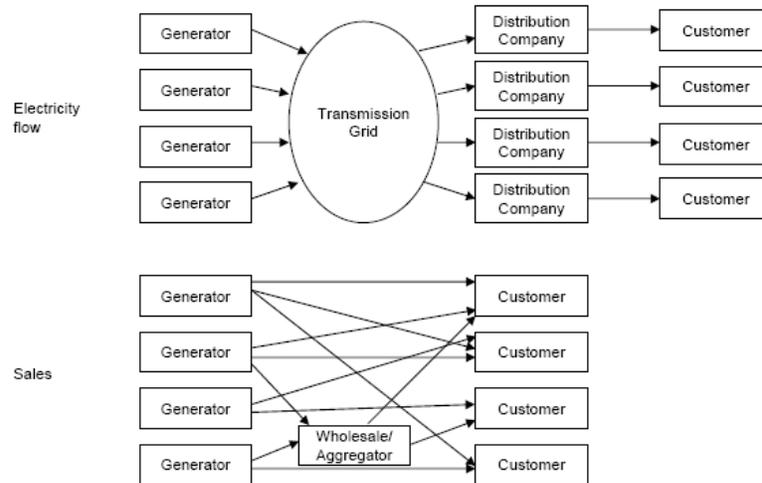


Figure 8. Retail Competition Model for Electricity Markets

## **THE NEW NATURAL GAS INDUSTRY**

This section describes the new rivalry in natural gas. It first provides an overview of gas market history and reforms. It then describes models for reform.

### **Overview of Gas Market Reform**

Natural gas is used to fuel factories and electric utilities and to heat homes and businesses. It is produced at the wellhead, transported by pipeline companies, and distributed by local distribution companies (LDCs). These comprise the industry's three basic components. (Hoovers, Inc. 1999)

Natural gas production includes exploration, drilling, and production. Collectively, these deliver gas to what is called the wellhead. The gathering function collects gas from wellheads and delivers it to a terminal, where the gas goes into a pipeline. According to Andrej Juris (1999, p. 5), production involves economies of joint production, but the economies exhaust at a point well below the entire market demand. As a result, multiple firms survive in the market and the market tends to remain competitive.

Juris (1999, p. 5) further explains that natural gas transportation carries the natural gas from the terminals to consumer markets via high-pressure pipelines. He believes that transmission is a natural monopoly because of economies of joint production and high sunk costs. Economies of joint production exist because a single pipeline can serve multiple markets. Costs are sunk because there are few alternative uses of the pipeline other than to transport natural gas.

Natural gas distribution delivers gas from high-pressure pipelines to customers via low-pressure pipes. It also includes metering and construction of customer sites. Juris (1999, p. 6) argues that distribution is also a natural monopoly because of economies of scale in the distribution pipeline and economies of joint production among the other functions.

Before the Natural Gas Policy Act of 1978, producers in the US sold natural gas to pipeline companies. These then sold the gas to LDCs, who were the local gas utilities. The Natural Gas Policy Act of 1978 deregulated wholesale gas prices, the prices paid by pipelines and LDCs. The US Federal Energy Regulatory Commission (FERC) deregulated and unbundled pipelines in 1986 and 1992, making the pipeline market competitive. (Hoovers, Inc. 1999)

Other countries have taken similar steps, and some have moved towards opening retail gas markets to competition. The UK partially opened its natural gas market to competition in 1986 and completed the development of retail gas competition in 1998. In 1992, Argentina separated natural gas production from transportation and distribution. LDCs and large customers can purchase gas directly from producers.

Mexico opened its natural gas market to competition in 1993. (Hoovers, Inc. 1999; Juris 1999, p. 4)

US industry restructuring, called retail unbundling, is occurring at the state level, which means that the state governments are developing and implementing the policies. As in the case of electricity, unbundling means that customers can purchase components separately. Large commercial and industrial customers have had this option for some time. Only recently has the competition begun to extend into the small customer and residential markets. (Department of Energy 1998)

Increasing numbers of US states are allowing residential natural gas users to select their gas suppliers. However, there are variations. According to the US Department of Energy (1999), New Mexico, New York, and West Virginia allow all residential consumers to choose their own natural gas suppliers. Eight states have begun to implement statewide retail unbundling. Nine states and the District of Columbia have pilot or partial unbundling programs. An additional 11 states are considering the issue.

According to the US Department of Energy (1999), US experiences to date have had mixed success.

"In some states, such as Nebraska, 97 percent of the eligible residential and commercial customers are electing to choose their own suppliers. In other states, such as Indiana and New York, participation is 2 percent or less of those eligible. Large commercial and industrial consumers have had the option of purchasing the natural gas commodity separately from transportation and other services for many years. State regulators and lawmakers, who are responsible for designing and implementing retail restructuring programs, have moved more slowly in implementing choice programs for residential and small-volume commercial customers, traditionally known as 'core' consumers, until they could ensure reliable service. In several cases, a local distribution company has initiated the development of a choice program for its customers."

### **Market Models for Gas Market Reform**

Juris (1999, pp. 7-11) describes four models for reforming gas markets: the monopoly model, the competition in natural gas production model, the open access and wholesale competition model, and the unbundling and retail competition model. These models parallel Hunt and Shuttleworth's (1996) models for electricity reform described above. Choices between market models involve decisions based on the efficiency of monopoly relative to competition.

The monopoly model, which Juris calls the vertical integration model, is the traditional industry structure. A single monopoly performs production, transportation, and distribution. Figure 9 illustrates this model. The rectangles represent components of the system. The arrows between the rectangles in the top row represent the flow of natural gas. Gas flows from the producer, to the transmission system, to the distribution system, to the customer. The arrows between the rectangles in the bottom row represent the flow of sales, illustrating how the transactions would flow if the gas utility were not vertically integrated. The sales would flow from the producer to the pipeline, from the pipeline to the LDC, and from the LDC to the customer.

Juris's second model, called competition in natural gas production, is comparable to Hunt and Shuttleworth's (1996) purchasing agency model. His model allows for a single buyer of gas, who chooses among competing producers. The single buyer has a monopoly on transport and distribution. Figure 10 illustrates this model.<sup>27</sup> The rectangles represent components of the system. The arrows between the rectangles in the top row represent the flow of natural gas. Gas flows from multiple producers, to the pipeline, to the distribution system, to the customer. The arrows between the rectangles in the bottom row represent the flow of sales, illustrating how the transactions would flow if the pipeline and LDC were not vertically integrated. The sales would flow from the producers to the pipeline, from the pipeline to the LDC, and from the LDC to the customer. Often in this model, the pipeline and LDC are vertically integrated, which removes the pipeline-LDC transaction. This was the case with British Gas in the UK prior to 1986. (Juris 1999, p. 8)

The third model, open access and wholesale competition, incorporates open access to pipeline transmission for third-party transport. Certain large customers are allowed to purchase gas in the wholesale market. In one scenario, the gas utility is required to provide these customers with transport for their natural gas. In an alternative scenario, the pipeline is vertically separated from the LDCs. The LDCs remain monopolies for most sales to final customers. Pipelines can be monopolies, too. The US operated under this model from 1985 to 1992, as did the UK prior to 1996. (Juris 1999, pp. 8-9)

Figure 11<sup>28</sup> illustrates the open access and wholesale competition model. The flows at the top of the figure represent the flow of gas. The producers inject gas into the pipelines. The gas flows out of the pipelines and into the LDCs' pipes, or to certain large customers who have the right to purchase gas in the wholesale market. The LDCs provide gas to most retail customers.

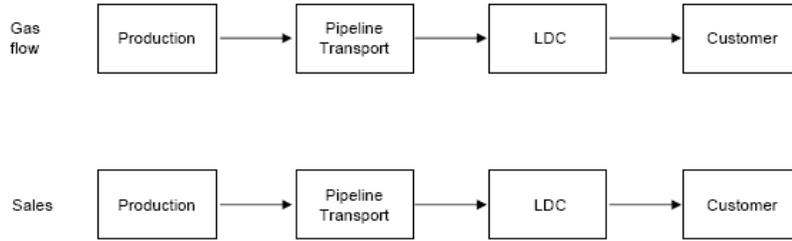
The flows at the bottom of Figure 11 show the flow of sales. Producers sell natural gas directly to LDCs, to traders and suppliers, and to certain large customers.

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<sup>27</sup> Adapted from Juris (1999, Figure 2).

<sup>28</sup> Adapted from Juris (1999, Figure 3).

Traders and suppliers make sales to LDCs and to the large customers. This is called the wholesale market. In the retail market, which is a monopoly, LDCs sell gas to the remaining retail customers. Juris (1999, p. 9) explains that the important regulatory tasks are protecting captive retail customers from the monopoly power of



**Figure 9. Monopoly Model for Natural Gas Markets**

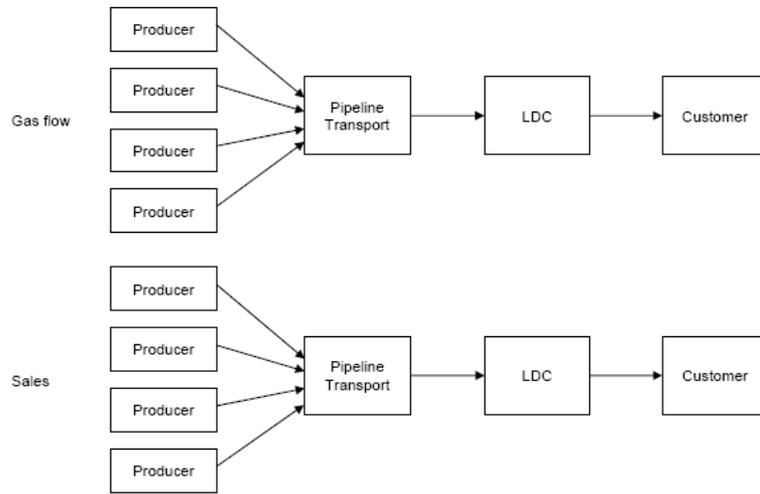


Figure 10. Model for Competition in Natural Gas Production

the LDCs, protecting the users of the pipelines from the monopoly power of the pipelines, and ensuring that the wholesale market is efficient and competitive. Because there is rivalry between LDCs and producers/traders/suppliers for large customers, and because there can be rivalry among pipelines for some markets, regulatory pricing involves issues of cross-subsidy, sustainability, and access to essential facilities.<sup>29</sup>

The fourth model, unbundling and retail competition, separates gas supply from pipeline transportation and distribution. Pipelines and LDCs provide open access for competitors. This model also involves full deregulation of the markets for the commodity. LDCs are often allowed to remain in the competitive retail market for gas, raising issues of cross-subsidy and competitor access to essential facilities. This model also introduces new trading arrangements to ensure efficient supply of gas and transport. (Juris 1999, p. 10)

Figure 12 illustrates this model. The flows at the top of the figure represent the flow of natural gas. These are the same as for the open access and wholesale competition model that Figure 11 illustrates. The flows at the bottom of Figure 12 show the flow of sales. Producers sell gas directly to customers, traders, suppliers, or LDCs. Traders, suppliers, and LDCs make sales to retail customers. (Juris 1999, p. 10 and Figure 4)

## **CASE STUDIES IN ENERGY MLR**

MLR in energy results from traditional energy companies and new entrants crossing traditional market boundaries in different ways. In some instances, energy companies are combining electricity and gas products. Combinations of electricity and gas companies have occurred before (Mayo 1984), but today's deregulation permits combinations for components and market features that did not exist in the past. In other instances, firms are specializing in components and crossing traditional geographic boundaries. Also, firms providing components in one area, and which are prohibited from owning other components in that area, are entering other areas to provide other components. In yet other instances, firms are diversifying outside of their traditional energy markets, choosing, for example, to enter some areas of telecommunications.

Table 4 provides examples of energy firms extending into diverse markets. These are examples that occurred in late 1998 and early 1999.

Duke Energy and Enron Corp. provide an illustration of MLR in energy. Duke Energy is an electricity company that is moving into natural gas markets. Enron is a gas company that is moving into electricity markets. Table 5 shows selected US

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<sup>29</sup> Jamison (1999b) describes the effects of MLR on issues of cross-subsidy, sustainability, and access to essential facilities.

markets for the two companies. The rows represent markets without contact between the companies and markets with contact between the companies. The

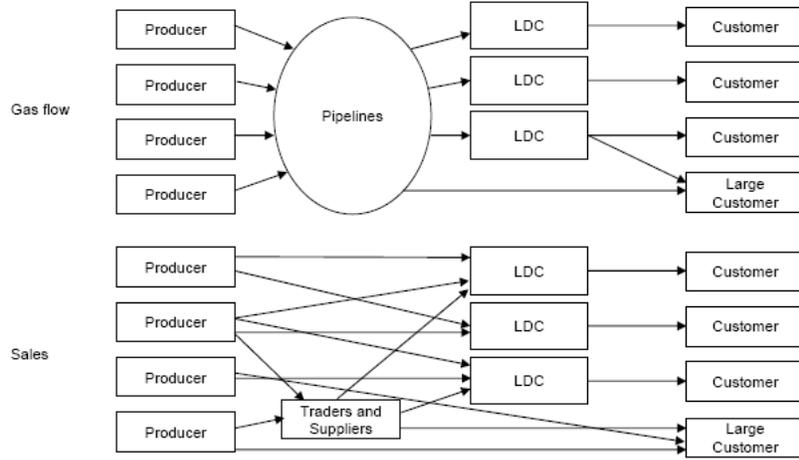


Figure 11. Open Access and Wholesale Competition Model for Natural Gas Markets

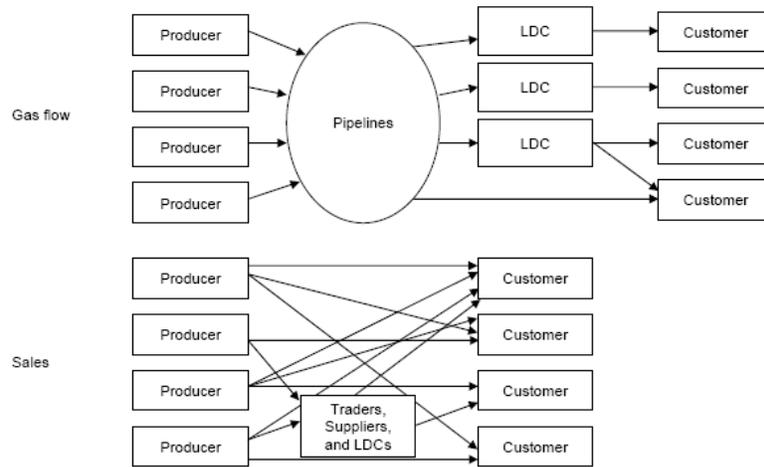


Figure 12. Unbundling and Retail Competition Model for Natural Gas Markets

**Table 4. Examples of Energy Firms Extending into Diverse Markets<sup>30</sup>**

<b>Firm</b>	<b>Market Entry</b>
AES Corp.	Expands its European electricity generation operations by purchasing National Power PLC's Drax power station.
Boston Edison Co.	Uses corporate network for telecommunications products in Boston.
CalEnergy Co.	Enters energy market in Indonesia. Expands into Midwest US energy markets.
Carolina Power & Light	Purchases North Carolina Natural Gas Co. Enters Florida generation, transmission, and distribution markets through purchase of Florida Power.
Dominion Resources <sup>31</sup>	Enters Pennsylvania natural gas market by purchasing Consolidated Natural Gas Co.
Duke Energy	Invests in power generation in Latin America by purchasing assets from Dominion Resources Inc. and controlling interest in power plants in El Salvador. Enters Australian energy market. Enters natural gas processing business.
El Paso Energy Corp.	Announces plans to spend \$1.5 billion to purchase natural-gas-fired power-generation plants to complement its gas pipeline business.
Enron Corp.	Enters video and Internet markets for large businesses in US.

<sup>30</sup> "AES to Buy British Plant for \$3 Billion," *The Wall Street Journal*, 19 August 1999, Eastern Edition; "Cablevision Files Suit Alleging Violations by BEC Energy Unit," *The Wall Street Journal*, 15 December 1998, Eastern Edition; "How U.S. Companies and Suharto's Circle Electrified Indonesia," *The Wall Street Journal*, 23 December 1998, Eastern Edition; "AES is Planning to Buy Cilcorp for \$885 Million," *The Wall Street Journal*, 23 November 1998, Eastern Edition; "Electricity and Natural-Gas Companies are Again Looking for Merger Partners," *The Wall Street Journal*, 23 February 1999, Eastern Edition; "Carolina Power & Light to Buy Florida Progress for \$5.3 Billion," *The Wall Street Journal*, 23 August 1999, Eastern Edition; "Electricity and Natural-Gas Companies are Again Looking for Merger Partners," *The Wall Street Journal*, 23 February 1999, Eastern Edition; "Duke Energy, in Latin America Push, Is Buying Dominion Resources Assets," *The Wall Street Journal*, 3 August 1999, Eastern Edition; "Duke Energy to Buy A Controlling Stake in Salvadoran Plants," *The Wall Street Journal*, 2 August 1999, Eastern Edition; "Duke Energy Agrees to Buy BHP Power in a \$315 Million Deal," *The Wall Street Journal*, 18 December 1998, Eastern Edition; "Duke Energy Agrees to Pay \$1.35 Billion for Gas Unit of Union Pacific Resources," *The Wall Street Journal*, 23 November 1998, Eastern Edition; "El Paso Energy Corp. Has Big Power Plans in the Pipeline," *The Wall Street Journal*, 26 July 1999, Eastern Edition; "Enron to Unveil Pact Involving RealNetworks," *The Wall Street Journal*, 21 January 1999, Eastern Edition; "Water Business is Hot as more Cities Decide to Tap Private Sector," *The Wall Street Journal*, 9 November 1998, Eastern Edition; "KeySpan Seeks to Make Telecommunications a Core Business," *The Wall Street Journal*, 29 July 1999, Eastern Edition; "Groups Sign 'Minor' Phone Deals in Brazil," *Financial Times*, 19 January 1999; "National Power to Build 2 U.S. Plants," *The Wall Street Journal*, 6 July 1999, Eastern Edition; "Electricity and Natural-Gas Companies are Again Looking for Merger Partners," *The Wall Street Journal*, 23 February 1999, Eastern Edition; "Scottish Power Deal could Mark Start of Utility Invasion," *The Wall Street Journal*, 8 December 1998, Eastern Edition.

<sup>31</sup> Dominion Resources is a US electricity company.

	Enters water markets.
KeySpan Corp. <sup>32</sup>	Purchases 300-mile fiber-optic network in Long Island, New York, and Manhattan in New York City.
National Grid <sup>33</sup>	Enters telecommunications market in Brazil.
National Power <sup>34</sup>	Expands in US electricity market by building plants in Massachusetts and Texas.
Scana Corp.	Purchases Public Service Co. of North Carolina.
Scottish Power Co.	Enters US energy markets with purchase of PacifiCorp.

columns represent markets. In some markets the companies clearly compete: electricity generation in New York, natural gas pipelines, and energy outsourcing in numerous states. These are examples of competition in the market. The companies also have clear differences. Duke is heavily involved in telecommunications, primarily providing antenna sites and backbone fiber optics, but also providing PCS (Georgia, North Carolina, and South Carolina) and local network fiber optics (North Carolina). Enron apparently provides only limited telecommunications. (Duke Energy 1999; Enron 1999)

Other rivalry between the companies is not readily apparent in Table 5. This includes rivalry for the market. As the next section explains, companies often compete for the opportunity to be in a market rather than compete in a market. Duke, Enron, and other energy firms frequently compete for opportunities to be in markets. These include many non-US markets.

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<sup>32</sup> KeySpan is a US generator of electricity and distributor of natural gas.

<sup>33</sup> National Grid is an UK electricity distribution company.

<sup>34</sup> National Power is an UK electricity generator.

**Table 5. Example of Diverse Market Contacts, Duke Energy and Enron, 1999**

Markets		Examples of States and Markets					
		Electricity		Gas		Telecom	Energy Outsourcing
		Genera-tion	Trans./Distr.	Produc-tion	Pipeline		
Without contact	Duke	CA CT MA NC SC VA	NC			AL AR CO CT DE IL IN KS KY LA MD MA MI MS MO NJ NY NC OH OK PA RI SC TN TX WV	AZ IN OK SC WA
	Enron	MS TN		CA NM TX			CO CT KY MA MD MA MN MO NH NJ NM NC OH OR
With contact		NY			Into most regions of the US		CA GA IL NV NY PA RI TX

The distributed generation model also introduces MLR into energy markets. In the distributed generation model, customers use small, inexpensive generators, such as microturbines, to generate electricity during service interruptions and during times of peak demand.<sup>35</sup> These generators serve as substitutes for traditional generators, transmission lines, and distribution lines. As the costs of these small generators continue to fall, the rivalry between the alternative technologies will increase. The operators of these small generators are largely customers, whose cost structures are different from traditional utilities. (Leggio 1999)

### HOW COMPANIES JOIN AND REMAIN IN THESE MARKETS

This section explains how firms join utility markets. Because entry is not uniformly open across products and areas, firms often compete in ways that are not readily apparent in charts such as Table 5.

Michael Klein and Philip Gray (1997, p. 5) and Klein (1999) explain the changes that are occurring in how companies come to participate in these markets. Governments that are allowing private participation in infrastructure must decide which private company(ies) should serve the market. There are several ways that countries use competition to address this problem. In general, the methods fall into three categories -- competition for the market, competition between markets, and

<sup>35</sup> "Microturbine + fuel cell = CC-level efficiency," *Power*, March/April 1999.

competition in the market. Issues of natural monopoly often drive the choice of method.

### **Competition for the Market**

Competition for the market occurs when companies compete for licenses, franchises, or concessions. (Klein and Gray 1997, p. 5) These generally involve some form of auction.<sup>36</sup> Sometimes the right to serve the market goes to the highest bidder(s). Most privatizations fall into this category. Other times it goes to the company(ies) that offer the lowest prices to customers. Israel's auction of mobile telephone licenses was conducted this way. Chile and Peru used a variation of the lowest price auction to extend telephone service into rural areas. They offered subsidies to companies that would serve rural areas, but auctioned off the subsidies, with the subsidy going to the company that bid the lowest. The Chilean auction illustrated the effects of MLR in that companies varied in their incremental costs of extending service into certain rural areas and these differing economies affected their bids.

Pierre Guislain and Michael Kerf (1997) explain that there is a continuum of options for concessions -- arrangements in which the private sector assumes some risk in the provision of the utility products. Supply and service contracts, which are only loosely a form of concession because they involve little if any risk related to the utility market, involve the private sector in specific tasks, such as providing inputs or performing construction. Options include management contracts, subcontracting, technical assistance, and supply and civil works contracts. In some concessions, the private operators do not own the infrastructure assets. Examples are the Build-Operate-Transfer arrangement, in which the operator constructs and operates the assets, but does not take ownership, and the leasing arrangement, in which the operator leases the assets from the government. In other concessions, the private operators take ownership of the assets. These include Build-Own-Operate and divestiture arrangements .

### **Competition Between and Within Markets**

Competition between markets occurs when utility regulators benchmark a monopoly's performance against other companies' performance. (Klein 1999) The comparison may be made on the basis of price, cost of service, quality, or some combination. Regulators may adjust regulated prices in accordance with these benchmarks, simply publish the benchmarks and let public pressure affect how companies perform, or both. (Foster 1999) The Norwegian electricity regulator and

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<sup>36</sup> In cases of political corruption, the auction may take on uneconomic characteristics, but it nonetheless constitutes a competition among economic interests for the right to serve the market.

the UK water regulator both make extensive use of this so-called benchmark or yardstick regulation.

Competition within markets is the form of competition traditionally seen in Western non-utility markets. Here, multiple companies are in the same market and compete customer by customer. Electricity commodity markets operate this way in several countries as do telecommunications markets, especially mobile and long distance telecommunications.

### **Combinations**

Governments may use more than one of these methods. The FCC auctioned multiple licenses for Personal Communications Service or PCS, which is effectively digital cellular service. Companies that won the licenses had to pay for them and now compete against each other. The telecommunications regulator in the UK has used cost information from US companies to benchmark BT's performance, even though there were active competitors in the UK telecommunications markets. Telecommunications regulators in the US and Europe use computer models to establish prices that telecommunications companies pay to each other for exchanging traffic even though there is growing competition in the markets. The European Union establishes benchmarks for these charges by comparing prices across countries.

### **SOURCES OF MLR**

Governments' choices regarding private participation in infrastructure contribute to the MLR that is described earlier. The timing of issuing licenses, restrictions on who may compete for licenses, requirements for domestic ownership and/or management, and continued partial government ownership are all important. A firm that might otherwise be a viable candidate for a license might be precluded if the firm is occupied with other matters, such as competing for licenses elsewhere, when the government opens competition for this license. Governments have different bidding requirements, such as the minimum size of firm, the roles of investors versus operators, and the number of years of experience of the bidders. These variations in requirements create varying patterns of entry opportunity. Domestic ownership, domestic management, and government ownership all affect the economies of joint production that firms might be able to obtain.

Another source of MLR is differences in economies of joint production. Dan M. Berry and Franklin G. Mixon, Jr. (1999) demonstrate that electric utilities' costs vary depending upon the markets they serve. Telecommunications' companies costs vary with their customer and product mixes, location of facilities, and technologies. Firms' economies of joint production can vary even if they use the same technologies. These variations in economies of joint production create diversity in

patterns of market entry and, as described in Jamison (1999b), affect notions of natural monopoly and efficiency in pricing.

## **CONCLUSION**

This paper describes MLR in telecommunications and energy markets. The MLR results from firms following different paths in extending outside their traditional markets and from new entrants crossing traditional market boundaries in ways that the incumbent firms do not. Diversity of market contacts characterizes MLR.

One effect of MLR is that firms have diverse sets of multimarket contacts. This diversity in market contacts is an integral part of the new globalization and convergence that is moving telecommunications networks towards value-based strategies. Customer access, provider access, and network functionality determine this value. In telecommunications, we see a trend toward bundling long distance and local services. As stated earlier, this is an initial step in the evolution of combination products. The ability to allow increased customer choice through alliances with other firms and entering into new markets is rapidly becoming necessary for a firm's success.

As a result of MLR, firms not only need to combine products, but also their modes of service. In energy, we see firms combining to provide electricity and natural gas. While not as dramatic as telecommunication changes which seem to branch into other markets, the electricity and natural gas markets are dramatically changing by offering customers the opportunity to choose how and from whom they purchase their energy requirements. Firms are finding new ways to combine generation, transmission, and distribution so as to provide customers with more diverse products/packages to meet more specific needs.

