The Broadband Impact: Asymmetric Regulations Restrict Growth

Brent P. Thurn

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The Broadband Impact: Asymmetric regulations restrict growth.
The Broadband Impact: Asymmetric regulations restrict growth
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Abstract

Though the growth of broadband has increased dramatically in the last decade, asymmetric government regulations are impeding its continued growth. The Federal Communication Commission (FCC) has placed additional regulations on advanced telecommunications capability services (broadband). This report will show that asymmetric government regulations have limited the future growth of broadband by local exchange carriers (LECs1).

Broadband technology has had a significant impact on today’s Internet culture because it has changed the way that we work and use the Internet as a means for communicating. Most of the broadband regulations only apply to the telephone incumbents as compared to cable, satellite, and wireless. The contrasting (asymmetric) regulatory treatment of these services harms consumers, contributing to higher prices, and in many cases denying them a choice of provider.

It is the intention of this thesis to show how asymmetric regulation has slowed further broadband growth with regards to incumbent local exchange carriers (ILECs) “last mile”2 connectivity to consumers. There are changes needed to current policies that would encourage growth. These guidelines will stimulate competition, promote capital spending on new broadband technologies, and allow for additional capital expenditure by the ILECs within broadband. Congress and the FCC should equalize the regulation of broadband service providers so consumers can obtain the benefits of free and open competition.

1 LOCAL EXCHANGE CARRIER- the term ‘local exchange carrier’ means any person that is engaged in the provision of telephone exchange service or exchange access. Such term does not include a person insofar as such person is engaged in the provision of a commercial mobile service under section 332(c), except to the extent that the Commission finds that such service should be included in the definition of such term. TA96 Text – Section 3 Definitions #44. http://www.fcc.gov/Reports/com1996.pdf
2 “Last mile” or “first mile” refers to broadband local access connectivity.
1.0 Introduction

During the past decade there has been a tremendous shift in the way Americans use the Internet. One of the main technologies that has impacted this is broadband. Broadband is defined as technologies, which, encompass all evolving high-speed digital technologies that provide consumers integrated access to voice, high-speed data, video-on-demand, and interactive delivery services.¹ Deployment of broadband services holds the promise of increasing consumer benefits and productivity, as well as developing bandwidth-intensive applications and content. Although broadband services are being deployed, many experts agree that these investments are not taking place as fast as they should be and that incentives are needed to spur that investment. ²

In the U.S., asymmetric regulation over broadband providers prevails. A cable television system operator is not regulated in its sale of cable modem service. In contrast, an ILEC that offers digital subscriber line (DSL) service faces price regulation as well as the obligation to offer competitors the use of its broadband network. They must offer their network on a wholesale or “unbundled” basis so in turn they may offer DSL services in the retail market that compete with the ILEC’s own retail offering to consumers.

Such regulation leads not to deregulation, but to an enduring “managed competition” far more complex to administer than traditional regulation of a monopoly service provider ever was. The alternative to asymmetric regulation is either symmetric regulation or symmetric freedom from regulation, which would create a level playing field for all providers.
Broadband has evolved from its early beginnings in the 1980s. It started with a "fast" speed of 64 Kps and now has speeds up to 8+ Mbps. A brief introduction to the evolution of broadband will be discussed in section two. In section three, the discussion focuses on what drives this broadband demand. There are numerous drivers that are outlined.

As the Internet becomes more and more popular, using it for e-commerce, downloading music, videos, etc., the need for a faster medium is increasing. The demand for speed is increasing in both the consumer and business realm. With large amounts of data being transmitted, there is also a strong need to have the bandwidth available to perform this function. In section four, the two main types of broadband technologies are discussed, digital subscriber line (DSL) and cable modems.

The use of broadband has had a tremendous impact on the Internet users way of life. They tend to spend more time online, do more things, and do them more often versus dialup users. Broadband users are more likely to conduct transactions online, download more files, and produce information for the web. The end result is that broadband contributes to economic growth in different arenas. Broadband has the potential to add billions of dollars each year to the economy within the next ten years. This translates to the need for more bandwidth. Section five covers the impact that broadband has had on Internet users and, the economy.
Section six covers the two main service providers of broadband that will be discussed, which are cable and telephony (DSL). While there are other providers, namely wireless, satellite, and electric, they will only be briefly addressed in this section. Since telephony regulations are discussed in detail in later sections, section six will be on the history of cable regulations and how their regulations compare to telephony (DSL).

In today's market, asymmetric regulation has intervened and slowed the growth process of this broadband technology. Broadband enables many different patterns of use that have the potential for dramatic lifestyle changes on both the consumer and business world. The topics discussed in section seven will include: Telecommunications Act of 1996, TELRIC (total element long run incremental cost), collocation, and UNE-P (unbundled network element plan). Steps that should be taken to abolish asymmetric regulation of ILEC provision of broadband Internet access will also be discussed.

Symmetric regulation will be addressed in section eight. This section will highlight the positives of having a symmetric regulation across the board to all players involved. The idea of creating a level playing field will prove beneficial to both consumers and service providers.

2.0 Evolution of Broadband

What is broadband and how/why did this technology evolve to what it is today? Broadband, as seen through the eyes of the FCC, is defined as speeds in excess of 200 Kbps (Figure 1), upstream and downstream, over a medium (whether is be cable, wire, satellite, etc). Broadband technologies, such as fiber optics, have been around for decades, dating back to the 1950's.
However, fiber optic technology was mainly limited to one-way direction in regards to the cable industry and was more of a backbone structure within the telecommunications industry. Fiber was going to be the main component of the broadband infrastructure, implemented by companies such as MCI and Sprint.

Integrated Services Digital Network (ISDN) was the first technology that offered the potential for higher speeds. This was developed in the 1980’s by Bell labs and offered the “fast” speed of 64 kilobits per second (Kps). However, the cost to the consumer was high and the technology never really took off.

The advent of the Worldwide Web (WWW) in 1991 fueled the need for more speed and, therefore, more bandwidth (the number of binary bits of information that can be transmitted per second through a given channel, whether that is copper wire, radio spectrum, coaxial cable, or optical fiber).^5^20030626

3.0 Broadband Demand Market Drivers

3.1 Internet and Internet Users

With the popularity of the Internet in the decade of the 1990’s, the demand for faster speeds rose exponentially with the Internet. Former FCC Commissioner William Kennard had stated, “The most important issue on our agenda today is
broadband...Broadband is going to change America...We want four things for the consumers in the broadband world. We want fast deployment. We want ubiquitous deployment. We want competitive deployment. And we want open deployment."

The Internet has developed faster than any other technology in the last five years and shows no signs of slowing down (except for asymmetric regulations). According to the Department of Commerce (DOC), the Internet ramped up faster than any other medium in history. It took the television industry 13 years to reach 50 million users; cable to 10 years and radio took 38 years. The Internet reached 50 million in only 4 years. So how can we say that growth has been hindered? Broadband has grown, however, recent growth has been slowed due to regulations and the fact that incumbents aren't willing to spend big money on new technologies. (This will be addressed in section seven).

As the Internet grows, it is also shaping the new economy by allowing companies, both bricks-n-mortar and virtual, to conduct business no matter “where” they may be located. Electronic commerce (e-commerce) enables consumers and businesses to conduct transactions on the Internet. However, in order to accommodate the high number of users, there is a great demand for more Internet “space” (bandwidth).

The Internet is a widely used medium that has increased in numbers on a yearly basis since the 1990’s. According to a 2000 DOC census, 51% of U.S. households (roughly 144 million people) had access to the Internet-which was up from 26% in 1998. More than 80% of the households with computers also have Internet access (Figure 2). The estimate worldwide was that a total of 304 million people had access to the WWW.
3.2 Personal Computers (PCs)

The PC ownership within the U.S. is now at 61% according to a study from the research firm Odyssey. This is up from 56% in 2000 and from 36.6% in 1997. Why is this? Well, for one, the price of PCs continues to drop and it now has become more affordable to buy not only one PC, but also two for the same home. Also, laptops have become even more popular and a lot of universities now require them for new incoming freshman.

With the increase in PC consumption, there is a bigger demand for faster speeds, hence the need for more broadband services. According to Odyssey, the reason that the penetration rate isn’t higher is that many people believe that at this time they simply don’t need a PC. A reason for this may be that high-speed access isn’t available to them, which would lead to the discussion of whether the concept of universal service is actually working.

Another reason why PC owners demand broadband service is that over 30% of U.S. households that own more than one computer. The number of multiple-PC homes
is growing faster than the number of single-PC homes. This is a major driver in the need for broadband. Broadband allows a single home to share the same broadband connection without compromising the speed.

This is where the demand for broadband and its benefits to users weighs in. In a 2001 broadband study by Arbitron:

- People with broadband Internet access are bigger consumers of electronic media and entertainment. Compared to the average household, Americans with broadband access spend 22% more total time with electronic media.
- Nearly half (46%) of people in broadband homes say they are buying things online more since they got the service.
- Broadband catapults the Internet to a media time spent position on par with television and radio. The average American spends 33% of his or her electronic media time each day with television, versus 28% with radio and 11% with the Internet. In broadband homes, the Internet’s share of media time surges to 21%, equivalent to television and radio at 24% and 21%, respectively.\(^{10}\)

4.0 Broadband Access

As Internet becomes more and more popular, using it for e-commerce, downloading music, videos, etc., the need for a faster medium is increasing. The demand for speed is increasing in both the consumer and business realm. With large amounts of data being transmitted, there is also a strong need to have the bandwidth available to perform this function. What needs to be addressed here is how regulation(s) have played an integral part in the deployment of broadband services.
4.1 Types of Broadband Service

It is important to understand the two main types of broadband service that are affected by regulation in the United States. Digital Subscriber Line (DSL) and cable modems are the two most popular (Figure 3). In the U.S., DSL is offered in most areas by Incumbent local exchange carriers (ILECs) over their networks; and by broadband competitive local exchange carriers (CLECs) who typically rent network elements from ILECs at prices set by regulation at below their economic costs.11

![Figure 3 - High-Speed Internet Access, (2000) % distribution](image)


Competitive local exchange carriers (CLECs) are able to rent unbundled network elements (UNE) on the ILEC networks. The prices for these unbundled elements are set by regulation; this is done by the FCC via the Telecommunications Act of 1996-at wholesale prices, which are below costs. Broadband Internet access is also offered over cable Hybrid Fiber Coax (HFC) networks. The cable operators are unregulated and do not share their network with competing firms. A brief description of each follows.

4.1.1 Digital Subscriber Line (DSL)

Digital Subscriber Line (DSL) technology utilizes unused frequencies on copper telephone lines to carry traffic at multi-megabit speeds. DSL is an “always on” technology that carries voice and data over the same line, which connects the user and
the central office of a local telephone company. Like any technology, DSL presents its own advantages and disadvantages.

DSL is advantageous in that the user can leave an Internet connection on and still use the phone line for voice calls. DSL operates at a speed faster than a regular modem connection-up to 8+Mbps versus 56Kbps. DSL does not command new wiring-it uses existing telephone lines. DSL, however, offers better quality when the user is closer to the central office of the provider. DSL also receives data quicker than it sends it and the service is not available everywhere.

DSL delivers applications that are bandwidth-intensive, such as streaming video, online games, application programs, and video conferencing. Another main advantage of DSL over cable is that it is a more secure connection. This is because the line from the CO to the customer’s house is dedicated and not a shared medium. As we discussed with cable, cable is a shared medium, which is easily subjected to breaches in security.

Digital subscriber line technology is a copper-loop transmission technology that solves the bottleneck problem often associated with the last mile between network service providers and the users of those network services. DSL technology achieves broadband speeds over the most universal network medium in the world: ordinary phone wire.
While DSL technology offers dramatic speed improvements (up to 8+ Mbps) compared to other network access methods, the real strength of DSL-based services lies in the opportunities driven by:

- Multimedia applications required by today's network users
- Performance and reliability
- Economics

The disadvantages of DSL are that it is limited in distance to 18,000 cable feet from the central office (CO) to the consumers home. DSL does not work (or work well) if the copper segment exceeds approximately 3-3.5 miles, which encompasses about 25-35% of ILEC customers. Also, DSL cannot be provided where digital loop carrier technology (fiber optic cable) has been employed. (Recent technologies are opening up this area).

There also needs to be a “clean” line from the central office to the customers' premises. This means that there can’t be anything added to the line that would interfere with the high frequency signal. This may encompass items such as a load coil (an amplifier that is used to boost the signal of the telephone signal). A bridge tap essentially splits the telephone line to provide an extra (second line) at a customer’s house.

4.1.2 Cable Modems

The first industry that offered interactive service was cable-multiple system operators (MSOs). Since this industry was deregulated (and today still is) cable companies found it essential to invest in this new technology as a way to stay ahead of the telecommunication companies and emerging industry, satellite.
Cable modems share a similarity with DSL in that they also provide high speed and an always-on condition. Cable modems operate on digital cable networks supplying cable television services. Cable providers are also capable of very high data exchange rates.

Like DSL, a frequency division-multiplexing scheme is also used for high-speed cable modem data access. Cable modems send data in a 6 MHz channel allotment whose center frequency sits in a band that extends from 5 MHz to 42 MHz. The data travels upstream in a reverse path through coaxial cables, amplifiers, and coax/fiber interfaces called nodes, and optical fiber to the operator's headend, with the headend of a cable modem connection equivalent to a telephone company CO.

In large systems, data from various areas may be collected at hubs before being passed along to a regional headend--similar to a telephone company's central office. While at the headend, data is routed into and out of the local network and Internet through a cable modem termination system, or CMTS. This same CMTS returns data to the modem through the same path but at a channel allotment situated at a higher frequency (normally above 50 MHz.) with the data then heads downstream in a forward path, which the cable modem receives at the higher frequency.13

At the end of 1999, there were about 1.5 million cable-modem subscribers, and cable companies were adding more than 2,500 subscribers per day. In late 1999, America Online and Time Warner agreed to merge, validating and at the same time intensifying the push for interactive cable services.14 This number is expected to be around 20 million by the end of 2003, according to a report by the Strategis Group.15
4.1.3 Other Broadband Providers

4.1.3.1 Wireless

There are different systems that take advantage of the wireless form of communication to make broadband available. The most common that are used now are fixed wireless and satellite. However, with new technologies of third-generation (3G) cellular service, mobile wireless will figure to become a popular broadband medium in the years to come.

*Fixed wireless* services provide connectivity from a base station to a fixed stationary point, such as a home or office building. Connectivity may be either to a single gateway within the home (which in turn is connected through a home network to computers within the home) or directly to individual computers within the home.\(^{16}\)

The spectrums that are allocated for fixed wireless are called local multipoint distribution services (LMDS), which has a spectrum located above 20 GHz. Multichannel distribution services (MMDS) has a spectrum in between 2.1- and 2.5- to 2.7 GHz bands. LMDS is generally allocated for point-to-point voice, data, or video transmissions. MMDS was used to provide wireless cable video services that would include educational and instructional programming.

However, in 1998 the FCC issued a rule change that allowed two-way data service delivery over the MMDS frequencies.\(^{17}\) This allowed MMDS operators to offer wireless return transmission of voice, video and data. As a result, MMDS operators have the ability to provide bi-directional high-speed Internet access and other data services as well as telephony services. The operators still need a license by the FCC to provide these services.
Satellite technology allows for the use of a technology that has been around for many years. It is possible with the use of geo-synchronous Earth orbit (GEO) satellites. With the use of digital broadcast satellite (DBS), satellites’ one-way broadband technology has evolved during the 1990s.

There are technologies that are being worked on to improve bi-directional broadband service. This two-way service is now available, however, it is much more costly than the current DSL and cable modem technologies. An example of this would be a company called Blastsurf.com that provides two-way satellite service for $99/month. If you choose to pay for the hardware and installation upfront, then the charge is $579.98 upfront, $59.99/month. The monthly cost for DSL and cable service range in the $40-$60/month and modems can be bought for under $100.

4.1.3.2 Electric Lines

Broadband over Power Line (BPL) is this latest technology that is set forth to deliver high-speed services over wire. In April of 2003, the FCC voted unanimously to conduct a technical review of this technology. “As part of its ongoing effort to promote spectrum flexibility and access to broadband services for all Americans, and to encourage multiple platforms for broadband, especially new facilities-based platforms, the FCC today issued a Notice of Inquiry seeking public comment on using existing electrical power lines to provide Internet and broadband services to homes and offices.”

Commission Chair Michael Powell cheered the arrival of BPL as a "monumental breakthrough in technology," and predicted several other broadband options, such as fiber to the home, are on the way. "Broadband over power lines can offer consumers
freedom to access broadband services from any room in their home without need to pay for additional wiring, by simply plugging an adaptor into an existing electrical outlet," Powell said.20

The review would look into whether power line broadband could interfere with existing radio frequency spectrum devices. The inquiry will also look for appropriate measurement procedures for testing emissions, which is what the FCC calls interference, and whether changes are needed in existing FCC technical rules to foster the development of BPL.

Since new digital power line designs use a large frequency range, unlike most radio frequency devices, the FCC inquiry will look into whether BPL services could interfere with everything from garage door openers to police radios. The inquiry, according to the FCC, addresses the two types of BPL: Access and In-House. Access BPL uses medium voltage (1,000 to 40,000 volts) power lines to bring Internet and other broadband applications to homes and offices. In-House BPL uses existing electric utility wiring to network computers and printers, as well as smart appliances, within a building.

Some of the benefits that have been mentioned by the FCC:

- BPL would help drive down prices of broadband by adding a third choice for broadband-DSL and cable being the other two;
- Because of the near ubiquity of power lines, BPL could also bring broadband services to rural areas that may not have other broadband options;
- Offer speeds up to 20 Mbps-similar to DSL and cable;
- Enable access to communication services in rural areas of country;
While it's still early to decide what impact BPL will have on the broadband market, consumers will stand to benefit by being able to choose another broadband provider.

5.0 Broadband Impact

The use of broadband has had a tremendous impact on the Internet users’ way of life. They tend to spend more time online, do more things, and do them more often versus dialup users. Broadband users are more likely to conduct transactions online, download more files, and produce information for the web. The end result is that broadband contributes to economic growth in different arenas. This translates to the need for more bandwidth.

There are about 13.1 million high-speed users today (second quarter 2002).21 As the users demand more and more bandwidth, the need for new technologies arises. The new technologies involve capital spending by the providers, mainly the incumbent local exchange carriers (ILECs) and cable companies.

What will be discussed in this section are how broadband impacts the users of the Internet, on-line behavior of users, and the overall benefits to the economy as a whole. This will show how broadband has become such an effective and needed technology and why broadband regulations need to be changed in order to sustain broadband growth.

5.1 Broadband Users

Broadband allows the user almost unlimited capabilities in relation to what can be done via the Internet. The broadband user will tend to spend a lot more time online and
the demand for higher and faster bandwidth is growing. Broadband Internet users tend to behave differently as to dial-up (narrowband) users.

In a recent study by Pew Internet in July 2002, roughly 24 million Americans (21% of all Internet users) have high-speed connections at home.\textsuperscript{22} The Pew Internet & American Life Project’s survey of broadband Internet users shows that broadband users spend more time online, do more things, and do them more often than dial-up Internet users. According to the study, there are three major ways in which broadband users distinguish themselves from their dial-up counterparts. For high-speed home users, broadband lets them use the Internet to:

- Become creators and managers of online content;
- Satisfy a wide range of queries for information, and;
- Engage in multiple Internet activities on a daily basis.

Broadband users also tend to stay on line four times as long as narrowband users and use more services (Figure 4). This figure is a good illustration as to how broadband has changed the habits of Internet users.
5.2 Effects On The Economy

According to a Brookings Institute report issued in July 2001, “...the universal adoption of broadband Internet connections by U.S. households could eventually provide consumers with benefits in the range of $200 billion to $400 billion per year. Moreover, producers of networking equipment, household computers, ancillary equipment, and software, and producers and distributors of entertainment products could also benefit by as much as $100 billion per year. The report also estimates that widespread, high-speed broadband access will increase our GDP $500 billion annually by 2006.

With this statement it is easy to see why there is a concern that regulations will have a negative effect on the growth of the economy. Information Technology is a large sector that stands to reap the most benefits from broadband. This would also have a
trickle-down effect on the rest of the economy in the form of jobs, capital spending, and the like.

In a 2002 review of broadband demand, the U.S. Department of Commerce listed factors that need to be obtained in order for the U.S. to remain a global technology leader. Among the factors listed was, “…our ability to maintain a world-class information infrastructure…there may be no element more critical today than ubiquitous and affordable high-speed Internet – broadband. The deployment and usage of broadband networks will significantly impact the global competitiveness of nations and businesses in the 21st Century.”

In another study by the New Millennium Group, they predict that building and using a robust, nationwide network will expand U.S. employment by an estimated 1.2 million new and permanent jobs. These jobs include direct labor associated with deploying and maintaining broadband investment, direct labor associated with manufacturing the infrastructure components and consumer premises equipment, and indirect labor associated with creating services and applications that would ride on advanced networks.

Also, it was found that a failure to improve the performance of broadband could reduce U.S. productivity growth by 1% per year or more. This takes capital expenditure on the part of the incumbents and asymmetric regulations take away from this—as ILECs hold back on building out for fear of having to share their network.

The Information Technology (IT) sector stands to gain the most from the continued deployment of broadband services. Information technology was the driving force behind the boom of the second half of the 1990s, accounting for as much as 70
percent of total U.S. productivity (Figure 5) growth and, by increasing GDP without sparking inflation, enabling the length and breadth of the last expansion. About 30 percent of total annual U.S. economic growth was attributable to information technology, increasing the growth rate in 1998, for example, from 3.1 percent to an extremely robust 4.4 percent.27

There are numerous benefits to the IT professionals in the U.S., the top five benefits from a 2002 survey were listed as:

- Improved productivity (78%)
- Faster desktop access (76%)
- Ability to handle data-intensive applications (57%)
- Ability to handle more users (53%)
- Ability to handle multimedia (51%)28

The High Tech Broadband Coalition (HTBC) issued comments on the FCC’s rules on unbundling. Within this document were comments on how broadband will have positive effects on the economy. Besides the spending aspect of growing broadband out, there also is the fact the broadband also has the capability of saving money within the business sector. One report predicts that companies in 26 industry segments can “save an estimated $223 billion using [collaborative] commerce solutions through 2005.”29
6.0 Broadband Regulations: Cable v. Telephony

The two main service providers of broadband that will be discussed here are cable and telephony (DSL). While there are other providers, namely wireless, satellite, and electric, they will not be addressed in this section. Since telephony regulations are discussed in detail in later sections, the focus will be on the history of cable regulations and how their regulations compare to telephony (DSL).

6.1 History of Cable Regulations

The Federal government, since 1965, has regulated the cable TV (CATV) industry, however, the regulations differ from the telecommunications industry. The premise of this section will be to examine the differences in regulation between these two entities and provide a brief history of cable regulation in the U.S. A brief timeline of regulations within the CATV is listed below:

- 1965 - FCC asserts jurisdiction over cable; imposes must carry. FCC First Report and Order.
- 1968 - *US v. Southwestern Cable Co.* Supreme Court upholds FCC's jurisdiction over cable as "reasonably ancillary" to Communications Act responsibilities.
- 1972 - Major policy statement: 1972 Cable Television Report and Order: codifies previous rules and imposes regulations concerning (1) signal carriage, (2) access and non-broadcast activities, (3) technical standards and (4) federal/state/local arrangements. Third Report and Order.
- 1984 - Amendment to the Communications Act of 1934, the Cable Communications Policy Act, deregulates rates, eases franchise renewal process, mandates leased access, and caps franchise fees at 5%.
1989-90 - Attempts to reregulate cable television results in several bills introduced into Congress. None pass.

1991 Some reregulation (rates and effective competition) approved by FCC. Video dial tone authorized.


1996 - The Telecommunications Act of 1996 passes Congress and is signed into law by President Clinton. This bill restructures the entire telecommunications industry.30

The Cable Television Report and Order of 1972 issued new rules that were set in place to soften some of the restrictions placed on cable for expanding into new markets. Cable companies were able to deliver more than just local broadcast signals via microwave. With deregulation coming to the forefront in the 1970's and early 1980's, there was a huge growth in the number of cable systems. The 3,506 systems, serving nearly 10 million subscribers in 1975, leaped to 6,600 systems serving nearly 40 million subscribers just ten years later.31

The Cable Communications Policy Act of 1984 actually had provisions that deregulated rate regulation. The companies were able to charge whatever they wanted for their different tiers of service-they had to show that there were "effective competition" for this type of service.32

The Telecommunications Act of 1996 changed the face of the telecommunications industry and also had an effect on the cable industry. Rate regulation for cable services would be eliminated in 1999, except those of the basic tier (mostly local television signals). This act opened up competition and allowed for the telecom and cable industry to compete in each other's backyard.
6.2 Cable v. Telephony

The regulations that govern cable and telecommunications are entirely different.

(Figure 6)

The local and state municipalities administer most of the regulations on cable. One of the main differences is that cable does not have to offer their transmission service to the public on a nondiscriminatory basis. This differs from how telecommunications industry is regulated. The cable systems are able to maintain considerable control over the content that is transmitted over their systems.

The courts have upheld the cable industry’s First Amendment right to the content (programs) that they carry (this is what’s viewed by the consumer). This has caused a huge debate from the telecommunications side in that the Telcom industry has very little freedom in the content that they provide over their network. This is commonly referred to “open access.”

The FCC has opted not to regulate the cable industry (since their signal is mainly one-way—two-way wasn’t originally considered) on open access, however, the telecom providers (LECs) must “unbundle” their network (also called local loop) to competition. Cable broadband providers oppose government mandates for access, pointing out that

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**Figure - 6**

*Regulations for cable operators vs. local exchange carriers*

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</tbody>
</table>

Source: This is a portion of a chart prepared by Roy Neel in his testimony before the House Telecommunications Subcommittee, May 25, 2000.
the market will provide choice and highlighting some efforts by cable providers such as AT&T and Time Warner to offer access to multiple ISPs, at least on a trial basis. The FCC classified cable broadband as an "information service" not as a "cable service" or telecommunications service." This means that federal "open access" rules that apply to phone companies do not apply to cable providers.

A policy implication of "open access" came to light in the mid-1990s when the cable authority in Portland, Oregon, tried to assert its right to compel a provider of broadband to the home—in this case a cable system acquired by AT&T—to allow any Internet service provider (ISP) to offer services over its network. Just as telephone companies, as common carriers, are required to allow any ISP to offer service, cable providers of Internet services, it was argued, should also have to provide the same "open access" to other ISPs. Fears about monopoly control were part of the debate.

Specifically, some were worried the provider of the broadband connection to the home could leverage that connection to gain control over the types of information and services that were provided through that operator’s wires. Others were worried that a lack of open access (via broadband) might not permit users to access to all content on the Worldwide Web.

Even though cable via the Internet has two-way potential (actually, this is in use today as cable is able to provide telephony service), the FCC has left regulations to state and local governments. As discussed above, the cable industry is not regulated in the same manner as the telecommunications industry (Table 1). Without an open

3 INFORMATION SERVICE- The term 'information service' means the offering of a capability for generating, acquiring, storing, transforming, processing, retrieving, utilizing, or making available information via telecommunications, and includes electronic publishing, but does not include any use of any such capability for the management, control, or operation of a telecommunications system or the management of a telecommunications service. TA96 text, section 3 – Definitions #41.
access policy in place, it would be extremely costly for any competitor to build their own cable infrastructure to compete with the incumbent(s) in their area. Telecom companies, on the other hand, are forced to unbundle their networks and allow the competition to use the very same network.

<table>
<thead>
<tr>
<th>Table 1.</th>
<th>DSL v. Cable Broadband Regulations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mandate</strong></td>
<td><strong>DSL</strong></td>
</tr>
<tr>
<td>Have to “unbundle” the wireline spectrum that they use for broadband . . . and make it available to all comers at regulated prices.</td>
<td>Yes</td>
</tr>
<tr>
<td>Must permit their competitors to “collocate” equipment in company premises to make it easier to use that “unbundled” spectrum.</td>
<td>Yes</td>
</tr>
<tr>
<td>Must offer their retail broadband transmission services to competitors at a federally mandated discount.</td>
<td>Yes</td>
</tr>
<tr>
<td>Must pay-in to universal service when they provide broadband access.</td>
<td>Yes</td>
</tr>
<tr>
<td>Forced to carve-out their broadband transmission services into a separate affiliate as a condition to gaining regulatory approval of recent mergers.</td>
<td>Yes</td>
</tr>
</tbody>
</table>


7.0 Asymmetric Regulations Hinder Growth

In today’s market, asymmetric regulation has intervened and slowed the growth process of this technology. Broadband enables many different patterns of use that have the potential for dramatic lifestyle changes on both the consumer and business world. What actual steps would be taken to abolish asymmetric regulation of ILEC provision of broadband Internet access?
The regulation of broadband providers is not the same for all providers-hence asymmetric (Table 2). Telephone companies are heavily regulated while cable and wireless providers are not regulated. The unevenness of regulation has hindered further LEC growth of broadband and has tied the hands of incumbents as it relates to capital infrastructure spending.

Federal regulations of broadband services are based on the identity of the service provider. The facilities used to provide DSL services offered by the telephone companies are subject to the extensive "unbundling" requirements that were designed to let competitors share a phone company’s existing voice network. (This is known as unbundled network element platform-UNE-P).

As Matthew D. Bennett, Policy Director of the Alliance for Public Technology, notes, "UNE’s are a temporary fix. In the short term, unbundling has encouraged a rise in competition statistics, but it has done immeasurable damage to the long-term prospects for deploying advanced services. It has discouraged network upgrades in urban and suburban areas and led to practically non-existent investment in rural and underserved communities."
In harsh contrast, facilities used by cable companies to provide cable modem service aren't subject to regulations or unbundling obligations - or no open access

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Table 2 - U.S. Requirements for support of service-level

<table>
<thead>
<tr>
<th>Type of Service</th>
<th>Voice</th>
<th>Data</th>
<th>Video</th>
</tr>
</thead>
</table>
| **ILEC** | Voice: UNEs, collocation and resale (TA'96, 251c) | • UNEs, collocation and resale (TA'96 §251c)  
• Line sharing, DSL UNEs (FCC Report & Orders 3 & 4)  
• Separate subsidiary: not (merger conditions invalidated by courts; but, watch PA) | 3 choices under TA'96 §302  
• None (“cable”): just usual broadcast and programming rules  
• Hybrid: “open video”  
• VDT: “common carriage video” |
| **Incumbent Cable Operator** | Allow access to rights of way, don't prohibit resale, etc. (“CLEC” rules: TA'96 §251b) | • Statutory: none  
• Court rulings: none  
(1) ATT v. Portland: locality can't require, but FCC can  
(2) MediaOne v. Broward County: open access violates 1st Amendment  
• Merger conditions  
(1) AOL/TW: FTC consent decree (5 years)  
(2) ATT/TCI/MediaOne: none | None (1984, 92 cable acts; ineffective “leased access”) |
| **Rural telco** | None (TA’96 §251f exemptions pre-empt §251c) | None (TA’96 §251f exemptions pre-empt §251c) | None |
| **Alternative facility provider** | Allow access to rights of way, don't prohibit resale, etc. (“CLEC” rules: TA'96 §251b) | None | None |
| **Municipality (typically through electric utility)** | Unclear whether even allowed (differing state laws, pending court cases) | None (although may be locally required, de jureor de facto) | None (although may be locally required, de jureor de facto) |


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5 Cable-telephone cross-ownership restrictions are also lifted for rural telephone companies. It is speculated that companies that are already allowed to provide both video and voice services might be more likely to offer integrated services over a future FTTH network.
requirements (this refers to opening up the cable network to competitors). Satellite and wireless operators offering high-speed Internet access can also do so, free of regulation.

As stated in the abstract, current regulations harm consumers. Two of the major areas (highlighted here-discussed in detail in later sections) in which LEC regulations have an unconstructive effect:

- **Limit competition** - Since DSL signals get weaker over distance, telephone companies can't deploy the service farther than three miles from their Central Offices without making expensive investments in new technologies and network upgrades. But the old rules governing voice services are being applied to these new facilities, which creates a huge disincentive to deployment. (As the result of recent FCC (2003) rulings, UNE does not apply to new investments made by the LECs. “The uneven playing field created by UNE-P has motivated the incumbent telephone carriers to scale back almost all network expansion,” states John Malone, president and CEO of Eastern Management Group. However, this is still being sorted out in the courts with changes not likely until 2004). The result: beyond the three-mile radius, cable operators have a virtual monopoly on broadband services. Consumers get none of the benefits that competition would otherwise yield.

- **Limit the introduction of new technologies** – With LECs not spending monies on new technologies due to forced sharing (UNE-P) of networks, capital expenditure

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6 John Malone is President and CEO of Eastern Management Group, one of the oldest and largest management consulting firms focused exclusively on the communications industry. He provides professional services to leading edge communications companies and governmental institutions worldwide.
on new technologies is lost. Randolph J. May⁷, Senior Fellow and Director of Communications Policy Studies at the Progress and Freedom Foundation writes, “For if the Commission chooses [Static Regulated Competition] embodying an indefinite future of ‘managed competition’, investment in advanced telecommunications facilities and equipment and innovative new services will be impaired.”³⁸

- Streaming video, or the ability to receive video signals the quality of which is comparable to cable television service is destined to become the next major application to broadband. Since streaming video has the potential to make the cable television business obsolete, it is unlikely that cable operators are going to invest in the research, development and deployment of new facilities that will undermine their core business.

- These same disincentives to research, development and deployment - created by federal regulations - keeps telephone companies from doing so as well. In a July 2002 report, Haring and Rohlfs from MIT stated, “the FCC, through its unbundling policies, has expropriated a valuable call option from the ILEC and bestowed it on CLECs. As a result, the CLECs, like holders of call options in general, get much of the upside potential of the ILEC’s investments but do not bear the downside risk. The expected return of the ILEC’s investment is reduced by precisely the value of this call option. In this way, unbundling requirements afford a strong

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³⁸ Randolph J. May is Senior Fellow and Director of Communications Policy Studies at the Progress and Freedom Foundation, a market-oriented think tank that promotes innovative policy solutions for the digital age.
investment disincentive for the ILEC. The result will deprive consumers of access to the new technologies.\textsuperscript{39}

Broadband is shaping the way people work, purchase goods and communicate via the Internet. There has been substantial growth within the last ten years and this needs to be able to continue. That means letting the RBOCs spend their big money on new technology to appease the demand for more bandwidth. Representative Bob Goodlatte stated that the 1996 Act, “gives new entrants the incentive to build their own local facilities-based networks, rather than simply repackaging and reselling the local services of the local telephone company. This is important if the information superhighway is to be truly competitive.”\textsuperscript{40} This statement was made over seven years ago, however, it is the basis for what is needed for broadband to continue to grow.

7.1 Telecommunications Act of 1996 (TA96)

The TA96 was implemented to promote competition within the telecommunications sector. This act enabled competitors of the Regional Bell Operating Companies (RBOCs) to offer local service within the RBOCs areas and, in theory, giving consumers a choice for local telephony service (we have seen AT&T, MCI, Sprint, and others offering local telephone service).

One of the goals of the Telecommunications Act of 1996 Section 706 is to provide broadband in a “reasonable and timely fashion.”\textsuperscript{41} The act directs the FCC to take action when this clause isn’t being fulfilled. Therein lies the question as to whether there is too much or too little regulation as it relates to the pace/growth of broadband in
the ILEC\textsuperscript{8} sector. Regulation is not similarly distributed among the broadband providers—telephone companies are highly regulated, whereas cable is not.

At the time Congress passed the 1996 Act, the Internet was in its infancy and not an established medium for business, government, or personal use; however, since then the Internet has become a prominent feature of the communications landscape. The objective of section 706 is to encourage the deployment of advanced telecommunications capabilities (ATCs) “on a reasonable and timely basis...to all Americans”.\textsuperscript{42} The term “advanced telecommunications capability” is defined, without regard to any transmission media or technology, as high-speed, switched, broadband telecommunications capability that enables the users to originate and receive high-quality voice, data, graphics, and video telecommunications using any technology.\textsuperscript{43}

Since this act was passed in 1996, the FCC has added more than 10,000 pages to the Federal Register. In the telecommunications industry, ILECs are highly regulated by the FCC as compared to the other sectors, i.e. cable, wireless, satellite. The incumbents are required to unbundled their network elements—the copper lines that run from the central office to the subscriber are the most common-to competitors at regulated prices. On the other hand, the cable companies, which also have broadband, are not subject to the same rules. In order to have a fair and level playing field, regulations (rules) that are in effect today need to be modified for growth to continue.

Former FCC Commissioner Kennard once stated, “The most important issue on our agenda today is broadband...Broadband is going to change America...”\textsuperscript{44} However,

\textsuperscript{8} DEFINITION- For purposes of this section, the term `\textit{incumbent local exchange carrier}' (ILEC) means, with respect to an area, the local exchange carrier that-- (A) on the date of enactment of the Telecommunications Act of 1996, provided telephone exchange service in such area; and (B)(i) on such date of enactment, was deemed to be a member of the exchange carrier association pursuant to section 69.601(b) of the Commission's regulations (47 C.F.R. 69.601(b)); or (ii) is a person or entity that, on or after such date of enactment, became a successor or assign of a member described in clause (i). T.A96 text. Section 251, (h)(1)
the FCC has imposed regulations that have hindered the future growth of the LEC's broadband services.

The TA96 was enacted to encourage competition within the telecommunications industry and to "deregulate" the voice infrastructure. However, broadband was just beginning to develop and the wording of the TA96 doesn’t apply to today’s technology that is in place. The aim of the Title II provisions of the Communications Act, as amended by the 1996 Act, is to enhance consumer welfare by promoting competition in voice and other basic communications, historically a monopoly industry. Thus, extending legacy regulation to an ILEC’s new broadband facilities is not required by statute and is inconsistent with sound public policy, given that ILECs are not incumbents in the broadband services market and that Congress did not contemplate such action when passing the 1996 Act.45

The goals that Congress laid out in the preamble of the act: “to promote competition and reduce regulation in order to secure lower prices and higher quality services for American telecommunications consumers and encourage the rapid deployment of new telecommunications technologies.”46 The benefits to consumers were to be: lower prices, higher quality services, and accelerated deployment of advanced services (broadband).

Congress viewed competition as a way to achieve these goals, however, they understood that competition wasn’t the only way. Therefore, the included universal service mandates within the act. Universal service is another way of stating that telecommunication and advanced services be available to every person. The TA96 has
different regulations as they pertain to telecommunications and cable broadband. Some of the main issues are discussed below.

7.2 TELRIC

The FCC sets the wholesale rates via TELRIC (total element long run incremental cost), which are below the actual costs of many or all of the potential entrants. The TELRIC was established prior to the TA96 and is based on historical data. Therefore, the rates that have been established are far below the actual costs for the ILECS to provide these elements. TELRIC regulation attempts to set wholesale prices based on estimates of current costs with state-of-the-art technology, which are typically lower than historical costs.

TELRIC is thus the price of a network built from scratch, on a blank slate in the minds of regulators. The regulators have studied prices and simply know what they ought to be (or so they think). TELRIC assumes its hypothetical networks would use the same wire centers, or central offices, as the existing networks of the ILECs. Figure 7 below shows what the hypothetical TELRIC network looks like as compared to what's in the ILEC real world today.
Excluding the full range of fixed investments from cost recovery thus undermines infrastructure creation incentives both at the ILECs, who subsidize their competitors to the extent they make fixed investments, and among the CLECs, to whom regulators award price discounts so long as they rent rather than own.48

If the ILEC wanted to offer the competitor a contract for the network element that has been purchased, it would set a price of the UNE that would be the total investment cost plus the operating costs each year for the UNE. If demand did not materialize or prices fell, the new entrant would bear the economic risk of this outcome—the contract (or regulation) could allow the new entrant to sell the use of the unbundled element to another firm if it decided to exit the business.49

However, the FCC states that the competitor can only purchase the UNE on a month-to-month basis. This puts all the risk on the ILEC in that if the demand is not there or the prices fall, the ILEC has to accept the risk for the business of the new
competitor. In this regulation, the ILEC has been required to basically give the competitor an option that does not force them to purchase the use of the UNEs.

It is clear that the ILECs take the full brunt of this risk (Figure 8) and allows the competition many advantageous options. It is not hard to see why the ILECs strongly oppose UNE, thus causing them to reduce capital expenditure within the infrastructure. In contracts between unregulated telecommunications companies, e.g. long distance carriers, and their customers; significant discounts are given for multi-year contracts.50

Figure 8 - ILECS Cost Risk

The example (figure 5) is based on a $1000 loop, which had a ten-year life and a 10 per-cent rate of return on investment. Under TELRIC, the lease price during year one will be $110, reflecting $100 of depreciation and a $10 return on investment. If nothing changed for the next ten years, the incumbent could earn $1100 over the life of the loop.
However, there are always changes. The assumption is that costs are falling by 10 percent each year. At the beginning of year two, it would cost an efficient carrier only $900 to build the loop that was, in fact, built the previous year for $1000. Under TELRIC, the lease price in year two is $99, not $110—and the following year the price falls even further, to $89.10. If prices fall by 10 percent each year for the life of the loop, the incumbent will not recoup $1100 or even the $1000 it spent to put the loop in place. On these assumptions, the incumbent will recoup under $720. Even if costs are falling by only 2.5 percent each year, the incumbent will lose money on this loop. This conclusion can be generalized: under TELRIC, the incumbent loses money on every investment it makes in something the Commission has defined as a UNE.\textsuperscript{51}

The issue has been in the courts since 1999, with the ILECs stating that the TELRIC calculations should use the historical costs incurred by the incumbents in constructing and maintaining the networks, which are estimated to be a lot higher. However, in July 2002, the Supreme Court upheld TELRIC’s application formula by a 5-3 decision. The opinion focused on the possible interpretations for the term “costs,” finding that a forward-looking interpretation put forth by the FCC was within the mandate for “just and reasonable rates” under the 1996 act.\textsuperscript{52}

There have been numerous studies that show how TELRIC has hindered the ILECs recovery of their network investments. One study looked at the effects on technical change and found that low TELRIC prices discouraged investment.\textsuperscript{53} Another study calculated that TELRIC costs would need to be marked up 3.3 times in order to recover the ILECs’ sunk costs and risks.\textsuperscript{54} There is also a study showed that UNE prices were so low that ILECs could not survive solely as wholesale companies.\textsuperscript{55}
finding was validated in subsequent studies, which concluded that UNE prices needed to be as much as doubled in order to encourage investment and innovation.56

Another analysis from The Progress and Freedom Foundation compared UNE revenues to retail end-user revenues and concluded that UNEs give the ILECs only 42% of the revenue they would have received from their retail operations.57 Dr. Alfred Kahn of Cornell University found that, in effect, it would take 20 years of productivity-based price reductions to reach the one-time effect of an immediate shift to TELRIC prices.58

7.3 Collocation

This aspect of the TA96 relates to ILECs sharing their physical locations with the competition. This is property that is actually ILEC owned; yet they are required to provide space to the competition at no cost. According to the act9, the reason for providing this space to the competition is, “necessary for interconnection or access to unbundled network elements at the premises of the local exchange carrier.”59

Under the TA96, the ILECs are required to provide space and all the necessary elements needed to support the equipment, i.e. HVAC systems, power, cabling, and even remove asbestos if necessary. Along with these requirements, in 1999 Congress expanded on these and added more. This included providing a “cageless” environment (Figure 9), which enabled competitors not only to intermingle their equipment but also to place that equipment in any available space in an incumbent ’s premises.60

9 COLLOCATION- The duty to provide, on rates, terms, and conditions that are just, reasonable, and nondiscriminatory, for physical collocation of equipment necessary for interconnection or access to unbundled network elements at the premises of the local exchange carrier, except that the carrier may provide for virtual collocation if the local exchange carrier demonstrates to the State commission that physical collocation is not practical for technical reasons or because of space limitations. TA96 text. Section 251, c6.
In March 2000, the D.C. Circuit court has found that the FCC’s collocation regulations have exceeded the planned approach in the TA96. The Court of Appeals held that the FCC’s definition of “necessary,” and in one respect its’ definition of “physical collocation,” were unduly broad.61

As of 1999, the FCC Order required the ILECs to:

1. permit collocation of any equipment that is “used or useful” for either interconnection or access to unbundled network elements, regardless of other functionalities inherent is such equipment;
2. offer competitors both caged and cageless collocation;
3. offer collocation space on both the ILECs’ central offices and in adjacent controlled environmental vaults or similar structures;
4. to the extent technically feasible, provide competitors with the option of collocating the equipment in any unused space within the ILECs’ premises;
5. refrain from imposing unreasonable minimum space requirements on competitors that wish to collocate at the ILECs’ facilities;
6. bear the initial costs of preparing collocation space for their competitors, as opposed to requiring the first competitor to collocate at the facility to bear the entire cost of preparing new collocation space as an up-front charge.\textsuperscript{62}

However, with their ruling in 2000, the Court of Appeals (COA) made some changes as to what regulatory power the FCC has and how it is now defined. The COA eliminated items 1 and 4 as stated above. They also ruled that the ILECs do not have to collocate any equipment that is not “necessary” for either interconnection or access to unbundled network elements. They also rejected the FCC’s directive that the competitor is allowed to choose the physical location within ILECs location to position their equipment.

Collocation regulations hinder the growth of broadband infrastructure. Item number six above states that the ILECs must “bear the initial costs of preparing collocation space for their competitors.” This takes away from the spending that would be done on updating their technologies with modern equipment. The FCC again is forcing money away from the growth and allowing the competition to gain access to key physical locations at very little cost.

7.4 Unbundled Network Element Platform (UNE-P)

This section carries the most weight in the argument against asymmetric regulation. The 1996 Act (section 251) requires incumbent local carriers to allow competitive local exchange carriers (LEC’s) to interconnect their networks to the incumbents.\textsuperscript{63} DSL was classified as a “telecommunications service” by the FCC, hence ILECs were/are obliged to make available their DSL facilities (e.g., DSL Access Multiplexers (DSLAMs) to data local exchange carriers (DLECs), though some exceptions have been allowed.
In other words, this means that the incumbent carriers (i.e. Verizon, SBC) have to share their networks-infrastructure-with the new competition. This means the competition does not have to build their own network since they can use the incumbents at a discounted price. They (ILECs) must “unbundle”\(^{10}\) and lease their network elements\(^ {11}\) at wholesale prices. The regulatory discount for ordinary resale is typically 20-25 percent; the UNE-P typically prices out at a discount of closer to 60-65 percent. (Figure 10).

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**Figure 10 - UNE-P v. Resale**

![Diagram showing UNE Platform and Resale comparison]

Source: Thorne

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\(^{10}\) **UNBUNDLED ACCESS** - The duty to provide, to any requesting telecommunications carrier for the provision of a telecommunications service, nondiscriminatory access to network elements on an unbundled basis at any technically feasible point on rates, terms, and conditions that are just, reasonable, and nondiscriminatory in accordance with the terms and conditions of the agreement and the requirements of this section and section 252. An incumbent local exchange carrier shall provide such unbundled network elements in a manner that allows requesting carriers to combine such elements in order to provide such telecommunications service. TA96 text. Section 251, c3.

\(^{11}\) **NETWORK ELEMENT** - a facility or equipment used in the provision of a telecommunications service. Such term also includes features, functions, and capabilities that are provided by means of such facility or equipment, including subscriber numbers, databases, signaling systems, and information sufficient for billing and collection or used in the transmission, routing, or other provision of a telecommunications service. TA96 text. Section 3 – Definitions #45.
Network elements like local loops and access multiplexers (a device that combines several signals for transmission over a single medium) are provided on an unbundled basis if they are made available individually and in a manner that allows requesting carriers/users to combine such elements in order to provide telecommunications services, that is they have to be adequately supported by the provider.\textsuperscript{64} From the incumbent’s standpoint, they have to open their network to the competition with very little compensation in return. The FCC identified seven network elements that are subjected to the unbundling regulations (figure 11).

\textbf{Figure 11 - Unbundled Network Elements 1996}

![Unbundled Network Elements 1996](image)

\textsuperscript{64} Source: Thorne (2001)

The UNE-P prices have had a negative effect on the incumbents, especially in the telecommunications industry. Rather than make unbundling the direct stepping stone to deregulation, as Congress intended, the FCC has instead transformed it into a mountain of new regulation (roughly 10,000 pages worth to the Federal Registry). It would seem the FCC has taken these steps to benefit the smaller competitors that neither have the capital or infrastructure to compete on their own.
Since TELRIC and UNE-P rates have been established at lower than cost prices, the expectation that such terms will be set by regulation creates a risk premium for new investment—thus hindering growth. This provides an additional investment disincentive, one likely to be highest in a market exhibiting high (and volatile) growth rates, uncertain product demand, and unsettled technology.\(^65\)

7.4.1 **Disincentive to Invest in Broadband**

One of the FCC’s objectives of the deployment of broadband is to “encourage and facilitate an environment that stimulates investment and innovation in broadband technology and services.”\(^66\) However, UNE regulations have kept the monies that broadband providers would spend on deployment of new technologies and kept it in their pockets. In a study done by Strategic Policy Research (SPR), they stated unbundling requirements are poor public policy for risky services:

- Regulators cannot (and should not try to) get into the micro-management of investment decisions of a regulated firm. Consequently, they must rely on the firm to make sound choices with regard to investments. Ideally, the firm will make risky investments that are cost-effective, evaluated *ex ante*; it will reject risky investments that are not cost-effective, evaluated *ex ante*.

- The firm is likely to make sound investment decisions if, but only if, its incentives are structured properly. The incentive structure that leads to sound decisions with regard to risky investments is for the firm to reap the full consequences of its investment decisions—whether positive or negative.

- Unbundling requirements prevent the regulated firm from reaping the full positive consequences of its investment decision if the investment turns out to be profitable. In that case, competitors can purchase unbundled components and erode the regulated firm’s profits from the investment.\(^67\)
This is key in that in order for broadband deployment to grow, positive incentives need to be there for incumbents to build out their networks. The disincentives have a greater effect on the ILECs when it comes to advancements in mass DSL deployment. As Figure 12 indicates, cable modem services are, by far, the dominant provider of high-speed Internet services, accounting for 64% to 75% of the market share for high-speed services to residential consumers.

Figure - 12 U.S. Cable modem market share of high-speed lines

<table>
<thead>
<tr>
<th>Source</th>
<th>Publication Date</th>
<th>Market Share</th>
<th>HHI Index**</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCC ~ Res. &gt;200 kbps*</td>
<td>FCC.gov</td>
<td>2/2002</td>
<td>64%</td>
</tr>
<tr>
<td>FCC ~ Res. &gt;200 kbps*</td>
<td>FCC.gov</td>
<td>2/2002</td>
<td>74%</td>
</tr>
<tr>
<td>Eastern management</td>
<td>John Malone: EMC, ZDNet Commentary</td>
<td>6/2001</td>
<td>75%</td>
</tr>
</tbody>
</table>

* Denotes minimum speed in one and both directions, respectively.
** HHI, denotes residential market.

Reflects the Herfindahl-Hirschman Index (HHI), a standard economic measure of industry concentration, of cable modem providers relative to the total market for high-speed lines. The table shows that, in every case, the HHI index exceeds a level of 1,000, which, according to the Horizontal Merger Guidelines of the Department of Justice and the Federal Trade Commission, represents a highly concentrated industry. Therefore, regulations are inhibiting DSL growth and unreasonably leading to cable dominance. The HHI is calculated by summing the squares of the percent market shares of each firm in the industry and multiplying the result by 10,000. If one hundred firms have a 1% percent market share, the resulting HHI would be one. If one firm has 100% market share (a monopoly), the resulting HHI would be 10,000.


As has been discussed in section four, DSL is limited to a certain amount of households. In order for growth to continue, capital expenditures need to be made by:

- Installing new fiber-optic cables and systems (together with investments in constructing remote terminals);
- Upgrading existing fiber-optic systems so that they can accommodate DSL (under a February 2003 ruling, the FCC Eliminated the requirement for incumbent local-exchange carriers (ILECs) to unbundle loops using fiber facilities. The decision primarily affects consumers, Internet service providers and data LECs; this is still in the courts today), as well as voice-grade lines; and
Upgrading existing copper cables to enable them to carry DSL.

The expenditures that need to be made by ILECs are extensive. UNE forces them to share these expenditures with the CLECs and assume all the risk. Without any significant compensation to the ILECs, the incentive to invest in new infrastructure is not there. The SPR study concluded that unbundling requirements afford severe disincentives for ILEC infrastructure investments to support mass DSL deployment. The most likely result of those requirements is that ILECs will not make those investments and thereby cede a large part of the broadband market to monopoly provision by cable. The amount of deterred ILEC investment will probably be approximately $20 billion or more.68

In a 2002 report, the Computer Science and Telecommunications Board (CSTB) & National Research Council issued their recommendations for continued growth of broadband. They found that many current policies are flawed. In regards to incentives for investment, they recommended:

- **Recommendation 4.3. Relax federal, state, and local rules to ease market entry or to stimulate investment.**69
  - Provide relief from certain forms of regulation, such as mandated access in exchange for specified deployments of new or upgraded facilities.
  - Reduce the business risk associated with facilities construction by providing assurances that compensation would be provided for future regulatory imposition of unbundling requirements.

- **Recommendation 4.4. Provide financial incentives for investment in underserved and high-cost areas.**70
  - Examples of this would include tax credits given for building out infrastructure in underserved areas, or;
  - Incentives-including tax credits and changes in permitting and zoning rules-given to providers that invest in infrastructure upgrades exceeding specified buildout or...
performance targets or that make investments in training and support of developers and users.

- Provide government-guaranteed loans for infrastructure upgrades and build-out in high-cost areas.

In 2001, the Telecommunications Industry Association (TIA)\textsuperscript{12} issued its replies to the \textit{Third Notice of Inquiry}\textsuperscript{13} set for by the FCC. In section IV of TIA's comments, they stated that "the commission must act to remove regulatory barriers that are slowing the deployment of advanced telecommunications capability."\textsuperscript{71}

The TIA believes that current regulations are impeding investment in facilities that would promote broadband infrastructure growth. The specifics of their findings include:

- The Commission take "immediate action" to encourage the deployment of facilities capable of supporting advanced telecommunications capability.

- It is critical for the ILECs to make the investments needed to equip their networks with the capability to meet the increasing demand for broadband connectivity. And an upgraded telecommunications infrastructure is essential to its usability as an important competitive alternative to the high-speed networks of cable operators, the other primary communications "pipe" into most American homes at this point in time.

- ILECs clearly are hesitating to upgrade their networks to enable remote subscribers to have access to DSL services at least in part because of regulatory obligations and uncertainty surrounding unbundling, pricing, and collocation obligations.

- ILECs continue to lay copper in new builds and total plant rehabilitations when bandwidth-rich fiber solutions can be deployed at cost parity. This investment behavior

\textsuperscript{12} \textbf{TIA} is the principal industry voice for communications and information technology manufacturers and suppliers.

\textsuperscript{13} \textit{Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment. Pursuant to Section 706 of the Telecommunications Act of 1996. CC Docket No. 98-146}
also appears to be due at least in part to the unbundling, resale, and pricing rules that reduce the ILECs return on investment and increase their risks, thereby undermining the incentive to innovate.72

The TIA concluded that the FCC should seek to remove any regulatory obstacles that stand in the way of deployment of new broadband technologies. They also stated how UNE encourages disincentives and should exempt any new investment from UNE regulations.

8.0 Symmetric Regulation of Broadband

While asymmetric regulation hinders growth, symmetric regulation would seek to level the playing field and promote growth according to a 2002 conclusion by 43 economist.73 Symmetric here does not mean to apply the same rules to cable system operators (CSO) that are now applied to ILECs. There needs to be standards set that are fair both to the ILECs/CSOs and also to the CLECs.

The FCC has deemed the ILECs as a “telecommunication service” which warrants regulation under the TA96, whereas CSOs are an “information service.” The FCC could remove asymmetric regulation that the agency itself previously imposed. They could assert that broadband Internet access service is not a “telecommunications service,” but rather an “information service,” which is free of such regulations.

When it comes to providing broadband service, cable and telephone companies—as well as wireless and satellite companies—are providing an identical product. They are competing with each other for customers on price, quality, and services. Cable and telephone companies provide broadband service over old wires. These are wires that were inherited from their prior monopoly status, but that require substantial investment and upgrading to handle the demands of broadband.
8.1 Symmetric Regulation Spurs Investment

The FCC’s regulatory disparities inevitably distort prices and undermine incentives to invest-disincentives. The costs are especially high in young markets where technology is evolving fast and customer bases are growing even faster. The FCCs attempt to drive prices to cost at the beginning of a product cycle eliminates incentives for companies to enter the market, thereby eliminating options for consumers.

Symmetric regulations would provide a level playing field that would be spur investment without fear of regulation retribution. As has been discussed in section seven, current regulations actually dissuade the ILECs to investing in new infrastructure technologies. The Commission’s decision to impose contrasting rules on broadband service is not simply a boon to cable companies and CLECS, it constitutes a burden on ILECS. Ultimately, consumers pay the price and are denied the benefits of innovation.

Unbundling restricts investment so, conversely, having the FCC eliminate the UNE platform would induce investment. It has been well documented that cable does not have to comply with the FCC’s UNE-P. Cable seems to have benefited the most from being non-regulated in that there are almost twice as many cable modem subscribers as there are DSL subscribers. (Figure 13) There is a good amount of evidence that supports the fact that current regulations are hurting DSL investment.
Along the same lines, investment in wireless infrastructure has suffered since it’s less expensive for a CLEC to rent the ILECs. This lessens competition and has a negative effect to the consumer in the form of higher broadband prices. Slow growth in wireless has been affected by asymmetric and UNE which, in turn, stagnates prices. In both cases, wireless and DSL, there isn’t any incentive to invest in new technologies and the consequence is a status quo infrastructure.

### 8.2 Facilities-Based Competition

Facilities-based providers-mainly ILECs-have argued that TA96 was intended to promote facilities-based competition, so regulatory policies should favor CLECs that build their own networks. There are zero barriers to entry in any market a facilities-based carrier might otherwise enter, but won’t, and no protection in markets the facilities-based carrier has already gone to the trouble to build-out. New facilities-free carriers can buy UNE-P from the incumbent telephone company at prices the facilities-based carrier cannot match, and take customers.
Broadband competition must be facilities-based. Innovation will be lacking without strong competition among and within the different platforms. Competitors will push each other, developing more advanced and comprehensive services. Facilities-based competition offers more opportunities for consumers to choose a provider that fits their needs.

The idea of reselling services and dismantling ILEC networks neither automatically decreases prices for consumers nor provides more choices. Real competition comes from companies with full service operations that can offer various service packages that address individual needs and desires. Facilities-based competition will spur investment in trying to bring advanced services to more Americans. This is done as competitors seek venues where they can build facilities that will succeed. In turn, capital expenditures are made within the industry promoting growth.

The ILECs have become reluctant to invest in advanced telecommunications capabilities for fear that the FCC will require them to offer the modernized network to competitors at the TELRIC discount-as mentioned above. The Commission’s sole reliance on UNE resale entry is thus impeding the facilities-based competition that is necessary to achieve the ubiquitous advanced telecommunications deployment that Section 706 of the ’96 Act requires.

As FCC Chairman Powell has noted in the FCC’s Triennial Review (2001), facilities-based competition reduces consumers’ dependence on incumbent networks, provides truly differentiated choice and a redundant, more dependable infrastructure.\textsuperscript{75}
Stephen B. Pociask\textsuperscript{14} writes, "The fact is that UNE prices are being set so low they have effectively become a subsidy for CLECs paid by their competitors, the ILECs."\textsuperscript{76}

9.0 Conclusion

The time for symmetrical regulation of broadband has come. Broadband is playing and will play a key role in the technology economics within the United States and the rest of the world. The FCC has placed an undue regulatory burden on the ILECs that has transgressed the future growth of broadband.

Not only has it's (FCC) regulations spurned investment by the ILECs, these same regulations also have disincentive effects on all other broadband providers. It has been shown how important broadband has become with regards to Internet use and the potential uses it brings users. The financial effects that are related to the future growth of broadband run into the billions of dollars.

The Commission needs to allow all providers a level playing in order for competition to take place on an even scale. This would allow for the creation of new and untapped markets. In regulating one entity differently than the others forgoes the ideal of competition stated in the TA96. The TELRIC and UNE concept are antiquated in that regulating one segment of the industry has a trickle down effect to all providers. By not allowing a more facilities-based competition, closes the door to future investment within the broadband structure.

The idea of symmetric regulation of broadband is one the FCC needs to adopt. Allowing the current structure to continue only hinders the future growth of broadband.

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and the positive impacts that will result. It has been shown how symmetric regulations can be achieved and how the outcomes will be fair to all those involved.
References:


9 Sacramento Business Journal. (2002). Retrieved on 11-1-02 from


12 Paradyne.com


17 CSTB. (2002). (140)


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28 DOC (2002)


38 New Millennium Research Council. What’s At Stake At The FCC On UNE’s: Ensuring Sustainable Competition.


47 Grieve, W. and Levin, S.L. ‘Telecom Competition in Canada and the U.S.: The Tortoise and the


67 Haring, John & Rohlfs, Jeffrey H.

68 Haring, John & Rohlfs, Jeffrey H. (15)


70 CSTB (2002).


72 Telecommunications Industry Association (TIA). Reply Comments to the FCC-CC Docket No. 98-146.


Figures, Tables & Chart References


Figure 2. U.S. DOC (2000)


Figure 5. Carriere, et al. (2000)

Figure 6. Cable Datacom News, Kinetic Strategies, March 2002.


Figure 8. Thorne. (2001)

Figure 9. Thorne. (2001)

Figure 10. Thorne. (2001)

Figure 11. Thorne. (2001)

Figure 12. Cable Datacom News, Kinetic Strategies, March 2002.

Figure 13. Cable Datacom News, Kinetic Strategies, March 2002.
