

Before the United States Senate  
Committee on Commerce, Science, and Transportation

Testimony of  
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Mr. Chairman and members of the Committee: My name is Earl Comstock and I am the President and CEO of COMPTEL. COMPTEL is a non-profit trade association that was formed by the merger of three trade associations, each of which represented segments of the competitive communications industry. Today COMPTEL has 180 voting member companies and stands as the only trade association representing a broad cross section of the competitive industry. Our members are taking action to advance communications through innovation and open networks, and are responsible for introducing many of the innovative services that consumers and businesses take for granted today.

**Introduction**

It is a pleasure to be here to testify about the concept of “Net neutrality” and its role in any potential rewrite of our Nation’s communications laws. As a former staff member I worked for the Chairman and this committee on the last major rewrite effort, the Telecommunications Act of 1996. Tomorrow marks the 10<sup>th</sup> Anniversary of the

enactment of that Act, and it is instructive to reflect back on that effort as the Committee considers once again an overhaul of our Nation's communications laws.

What the history of the 1996 Act tells us is that this new rewrite should be concerned with what the legal landscape will look like in 2015 or 2025, and not in 2007. It is 10 years since the 1996 Act was enacted, and we are only now seeing the final shape of how the FCC and courts interpret what Congress crafted. As a result, the Committee needs to look well into the future as it drafts any rewrite.

The key to a successful rewrite will be how well Congress articulates what it wants our Nation's communications infrastructure to look like 10 or 20 years hence. Does Congress want an even better Internet, two competing cable systems, or something else? Much of what that vision looks like will be decided by how Congress approaches the issue of Net neutrality. The challenges presented are immense, but there also great opportunity. The convergence of technologies that was much anticipated in 1996 is finally happening, and that gives Congress a real opportunity to consider significant changes in our communications laws.

For example, fiber optic networks have almost unlimited capacity. If consumers are given access to the kind of broadband speeds fiber and coaxial cable allow, Congress could eventually eliminate the cable provisions of the current law almost entirely. Must carry and program access requirements, for example, would no longer be needed if consumers can get 100 megabits per second, as Internet2 now delivers to desktops at universities around the country and consumers in Stockholm and Tokyo can already purchase. With that kind of capacity consumers could go directly to Disney.com and download whatever movie or HDTV program they want. Likewise, consumers who wish

to watch the Olympics could go to NBC.com or could watch in a foreign language by going to the website of a local TV station that is covering the event. Basically, consumers could get content a la carte by going to the website of the content producer.

Computers and high-speed networks can allow America to stay at the cutting edge of the Information Age. Our economy is increasingly service oriented, and new information services based on computer applications are a critical driver of our future growth. If businesses and consumers have access to reasonably priced transmission capacity, then any person can invent the next Google, Amazon, eBay, or Yahoo and hope to succeed. If rural areas can get access to adequate transmission capacity, then rural States and communities can share in that economic opportunity and growth.

Whether or not America will continue to be a world leader in the 21<sup>st</sup> century's Information Age economy will depend in large measure on how Congress rewrites the law. The Federal Communications Commission has recently made significant changes to the structure of our Nation's communications laws through its interpretation of the 1996 Act. As a result, Congress has a basic choice to make. In rewriting the law it can reaffirm the common carrier policies that led to the creation of the Internet and the tremendous explosion of innovation and growth that accompanied the Internet, or it can reaffirm the FCC's recent decision to abandon those policies and trust that the private business interests of a few network operators – namely the Bells and the cable companies – will protect consumers, provide access to competing content and service providers, and enable the next generation Internet to be built. If history and basic business behavior are any guides, the approach taken by the FCC will prove catastrophic.

## **The Internet Depends on a Common Carrier Framework**

The FCC's new approach will prove catastrophic precisely because the Internet depends on basic common carrier rules to ensure the availability of an essential ingredient, namely the transmission capacity over which Internet applications reach businesses and consumers. Those basic rules required all common carriers – incumbents and competitors alike, to provide non-discriminatory service upon reasonable request, to permit attachment of devices to the network, and to interconnect their networks with other operators on a non-discriminatory basis. Without these basic requirements, the Net neutrality principles that the FCC has articulated to protect the Internet fall well short of that goal, and the robust competition in information services that has been the hallmark of the past 25 years will soon diminish to a shadow of its former grandeur.

This rewrite will in many senses determine America's economic future. Communications is increasingly at the heart of America's economy. Companies depend on communications networks to offer content and services to consumers, advertise, manage inventory, and transmit voice and data between locations. Today everyone takes for granted that they will be able to buy transmission services and use those services without interference. That is no longer the case under the FCC's new approach, and will not be the case if the similar approaches taken by S. 1504 or S. 2113 are enacted. Under all three approaches, no longer will AT&T, BellSouth, or other companies that use public resources be required to act as common carriers with an obligation to offer non-discriminatory service upon reasonable request.

Without that obligation, network operators like AT&T will be able to refuse service to, or discriminate against, anyone offering competing content or services, just as

the cable operators do today. The CEOs of the various Bell companies have already been saying publicly how they intend to do just that – namely that the Bell companies will decide who can get content or service delivered via the Bells’ “higher” quality “private” networks.

This will cause a radical change to the Internet and the information services market. Information services – the content and services made possible by computer applications – all depend on transmission networks to reach consumers. The information services market has been robustly competitive – with tremendous innovation as a result – because the FCC in 1980 required all public network operators (incumbents and competitors) to provide their transmission services on non-discriminatory terms and conditions. By regulating the much smaller class of transmission networks – which everyone needed to compete – the FCC did not have to regulate anyone’s provision of information services. By reversing that decision the FCC now makes it possible for the small class of network operators to become gatekeepers on the Internet and dominate the larger information service market.

### **The FCC’s Reliance on Inter-Modal Competition is Not Well Founded**

The FCC’s reversal is predicated on a flawed assumption, namely that the barriers to entry for transmission networks are so low that anyone who wants to compete can build their own network. Nothing is further from the truth. The truth is that all three of the ubiquitous wired networks – telephone, cable, and power – were built in a monopoly environment. The builder was protected from competition by law, and could build their networks with the assurance that they would get every customer. Each of those entities is

now entrenched in their market with ubiquitous facilities and more than 80% of the customers, and therefore a substantial revenue stream. Further, to improve their transmission capability incumbents merely have to upgrade existing infrastructure using ongoing customer revenue. In contrast, in the absence of any rules requiring sharing of existing infrastructure, a new entrant has to build new facilities with no customers and no revenue, and then has to win its customers from the incumbent. That is a very high barrier to entry.

The FCC points to wireless and powerline operators (both of which have significant facilities) as potential competitors. But an examination of the facts regarding broadband over powerline (BPL) and wireless make clear they are not real competitive threats for the foreseeable future. First and foremost, there is the empirical evidence. The US is not the only testing ground for new technology. Nowhere in the world are BPL or wireless being commercially used as the primary means for data or video communications. In the US, the latest FCC report on broadband shows that wireless, BPL, and satellite account for less than 3 percent of the market, and that their share of the market is actually declining. The reality is that there are significant technical difficulties that remain to be resolved with BPL, and you also need significant investment to deploy the needed facilities.

Likewise, a review of the empirical evidence shows that wireless is a complement to wired services, and not a replacement. First and foremost, wireless services are more expensive on per-minute (in the case of voice) or per-byte (in the case of data) basis. People are willing to pay more for wireless because of the mobility, but almost no one uses wireless to replace wired service where wired service is an option. The number of

business users that rely entirely on wireless is limited to those that can only get service by satellite, and in the residential market fewer than 5 percent have chosen wireless only.

The FCC also likes to cite WiMax (a wide area wireless network standard) as a potential wireless competitor providing broadband service. Again, the facts don't support their enthusiasm. WiMax, which like BPL and fixed wireless many of COMPTTEL's members are seeking to use, has numerous barriers to entry that must be crossed. First, a final standard needs to be agreed to. Second, any competitor needs to obtain spectrum rights, which must be acquired at auction. Third, they would need to build out a network. Fourth, any customers they gain must be won over from a Bell company or a cable company. And finally, this must be done in the face of competition from incumbent wireless companies owned by the Bells.

Put simply, the FCC is betting America's future on the good will of the Bell companies and large cable operators. Counting on companies to act in the public good against their own financial interest has been tried before, and it has never worked. The FCC believes that robust competition between these two entrenched incumbents will ensure that unaffiliated content and service providers will continue to get access to consumers. Yet in the 10 years since the passage of the 1996 Act not one large cable company has voluntarily let any competitor offer competing service over its network, and not one Bell has voluntarily negotiated an interconnection agreement with a cable company or competitor. The reason is understandable – no CEO is going to voluntarily help a competitor. It is only laws that can make that happen.

## **Net Neutrality is Fundamental to Preservation of the Internet**

The need for laws is where the concept of Net neutrality comes in. “Net neutrality” is short for network neutrality, and is a concept that is much debated these days in connection with communications law reform. However, it is often not clear exactly what is meant by Net neutrality. Depending upon who is speaking, views of Net neutrality range from the cable and Regional Bell companies view of the concept as “a solution in search of a problem” to the view of many consumer groups, competitors, and content providers (companies like Google, Amazon, and eBay) that Net neutrality is the key to preserving the future of the Internet.

So, precisely what is Net neutrality? Net neutrality is generally discussed in two basic ways. One approach, the one taken by the FCC and S. 1504, focuses on a consumer’s ability to access any lawful content and services. Under this approach, a retail end user is entitled to access any lawful content and services using their own devices, and the debate is generally focused on what steps, if any, need to be taken to ensure that consumers can in fact access whatever content and services they chose. A fundamental limitation of this approach is that it only addresses consumer rights, and not the rights of the content and service providers. As a result, a fundamental assumption built into this approach to Net neutrality is that there are no issues associated with the ability of content or service providers to get on the network to offer their services.

The other approach, the one taken by network engineers and academics since the Internet was first being developed in the 1980s, focuses on the role of the transmission network. The key concept of the neutral network approach is whether or not the network is “neutral” with respect to the content or services being sent over the network; i.e., is the

network simply a “dumb” pipe that carries information controlled by end users or does the network operator play an “active” role in controlling content and services through “intelligence” (equipment) that interacts with the content and services sent over the network. At the heart of this view of Net neutrality is a debate over where innovation will occur with respect to the content and services provided over the network. Does innovation occur at the “edge” of the network through devices attached by both business and residential end users, or does it occur through devices controlled by the network operator in the “core” of the network? A fundamental advantage of this approach is that it looks both the ability of consumers to access content and services and the ability of persons to offer content and services. By doing so, this approach also brings in the fundamental common carrier elements that ensure access to the network for both consumers and providers.

How Congress chooses to address net neutrality will greatly influence the shape of broadband networks and services in America. If Congress looks at the problem narrowly, as the FCC and S. 1504 have done, then they likely will fail to prevent discrimination if that is their goal. The reason is because the consumer approach deals only with prevention of discrimination once a network operator has agreed to provide service to that consumer. If the network operator is under no obligation to provide service (as is the case with the FCC approach and that taken by S. 1504), then the operator can legally discriminate by simply refusing service. Further, this narrow consumer approach fails entirely to deal with the much more likely, and historically more prevalent, forms of discrimination, namely discrimination against competitors or potential competitors.

A network operator that is under no obligation to interconnect their network with other networks or allow attachment of devices on reasonable terms and conditions has every incentive to refuse interconnection or attachment if by such refusal the network operator can thwart a competitor. The network operator can also discriminate in more subtle ways than outright refusal, for example by using bandwidth starvation. Indeed, several different Bell company officials have already suggested in the press that they intend to create a two-tier Internet using bandwidth allocation in which their network will be given priority through the use of Quality of Service management techniques. If Congress allows network operators to take these steps, history will have reversed itself. The common carrier open network requirements that led to the Internet will no longer be in place, and innovation will depend on having the cooperation of the network operator. As a result, the potential to have a world in which consumers can access any content, including HDTV and other high bandwidth services, will disappear.

### **There Are Many Ways Network Operators Can Discriminate**

There are many ways in which a network operator can discriminate. As a result, the concept of Net neutrality must deal with each of them. Some, like bit discrimination and port blocking, are addressed by both the narrow FCC approach and the broader neutral network approach. However, the FCC approach stops there, far short of what is needed. To ensure that the Internet we have today continues to grow and flourish, there are several other discriminatory tactics that need to be addressed. These include:

**Attachment of devices** is a concept that refers to the ability to attach devices to a transmission network. Telephone network users generally have the right to attach any

device to the network without obtaining the network operator's permission so long as the device will not harm the network or other users of the network and conforms to certain minimal specifications. In contrast, cable network operators can control what kind of devices are allowed to attach to their network, and that is the reason there is limited competition in set top boxes and cable modems and why many cable users still rent their devices. The ability to attach devices without approval or interference from the network operator is essential for continued innovation.

**Bit discrimination** is a term used to describe actions by the network operator to either favor its own content and services or to degrade the content or services of other providers by using information conveyed in the individual bits of a message to identify which messages to favor or degrade. Bit discrimination can be accomplished in any one of several ways. A network operator could, for example, instruct its routers (machines which direct the flow of information to its destination) to delay all traffic bound for Google.com by sending it to another network operator rather than carrying it directly to the address. In the alternative, the network operator could use the sender's address to favor its own services by instructing its routers to give priority to all packets that originate from a Verizon.net address.

**Port blocking** is a term used to describe a specific form of discrimination in which the network operator uses information in the message header which tells the receiving computer which software application to use to open the information. The computer knows which software to use by the "port" through which the message enters the computer's communications hardware. If a network operator wishes to block a

particular application, for example a Voice over Internet Protocol (VoIP) telephone call, it can do so by blocking messages destined for the port used by that application.

**Quality of service** is a term that is generally used to describe service offerings in which the transmission component is managed with respect to bandwidth, latency, jitter, priority, or other technical aspects of the transmission in order to ensure the quality of a particular service offering. Quality of service (QoS) is used to differentiate service offerings from the baseline standard for Internet transmissions, which operate on a “best-efforts” basis. In cases where bandwidth constraints or other factors result in congestion in the transmission network, QoS can be used to prioritize the delivery of certain types of services (for example VoIP or video services).

Many network operators are attempting to market QoS as an alternative to the “best efforts” approach of the Internet. Best efforts means that all traffic has the same priority, and the network uses its best efforts to deliver all of the traffic. The problem created by QoS is that it requires additional protocols and network management software in order to provide it, thus increasing the cost and complexity of the network.

Perhaps more importantly, QoS negates one of the key benefits of the Internet, which is the use of a common protocol (IP) to allow unimpeded transmission across multiple networks. When QoS is added, it helps balkanize the Internet because transmissions across multiple networks require cooperation among the network operators to ensure that each is using the same QoS protocols. Six years ago Internet2 (an organization tasked with designing and testing next generation Internet technologies) took a close look at QoS technology, and concluded that the cheaper solution to congestion problems was to add bandwidth and continue to use best efforts.

**Bandwidth starvation** is a term used to describe actions by a network operator to degrade or block applications or services by limiting the bandwidth (capacity) available to provide those services. One way to think of bandwidth starvation is in terms of trying to drink through a straw instead of a garden hose. Bandwidth starvation can be accomplished in a number of ways. At the consumer end, network operators can limit the upstream (sending) capability of user equipment in order to prevent consumers from providing content to other users, or can limit the bandwidth available for downstream content in order to prevent consumers from being able to access competing content. Examples of this would be limiting upstream transmission so that large bandwidth transmissions like digital video content takes much longer to send, thus limiting consumers ability to send movies, or limiting downstream transmission so that video streaming can't compete with the network operator's cable offerings. On the network end, the network operator can create bandwidth starvation by limiting the capacity of its interconnection points, so that content coming from a competing network provider has to squeeze through a narrow choke point, or by creating a two-tier network (as some Bell company officials have proposed) where the bulk of the bandwidth is reserved for the network operator's "private" network and remainder is allocated to the "public" network.

**Interconnection** is a term used to describe the physical linking of two transmission networks. The Internet is a series of interconnected transmission networks that all use a common addressing protocol (the Internet Protocol or IP) to facilitate seamless transmission across the disparate networks. The primary issues with respect to interconnection are the bandwidth (capacity) of the interconnection and where the interconnection will occur. If the connection between the two networks is too small for

the amount of traffic being sent from one network to the other, congestion will occur and transmissions can be degraded or lost. Likewise, if a network operator can only interconnect with another operator at a single location or at distant locations, congestion and/or degradation can occur because of the concentration of traffic across a single point or the additional distance traffic must travel. Historically, if a network operator is under no legal obligation to interconnect its network, voluntary interconnection rarely occurs.

**Caching** is a term that refers to the local storage of information that is frequently requested by an end user. By storing frequently accessed information, in particular large files like pictures or graphics, at a local storage site near the end user, caching allows the content provider to reduce network congestion (to the extent there is any) and reduce the time needed to run an application (for example, web pages appear faster and file downloads take less time). Caching arises as an issue in net neutrality discussions in two ways. First, because caching must be done on devices located closer to the end user, in general these devices are physically located in a facility under the control of the local network operator (for example in a central office or a cable head end). In the alternative, if the caching is done at a physical location not under the network operator's control, then the local storage device needs to be interconnected with the local network. As a result, in the absence of a right for competitors to physically collocate equipment or to interconnect with a local network, a network operator could use local caching to favor their own content and services.

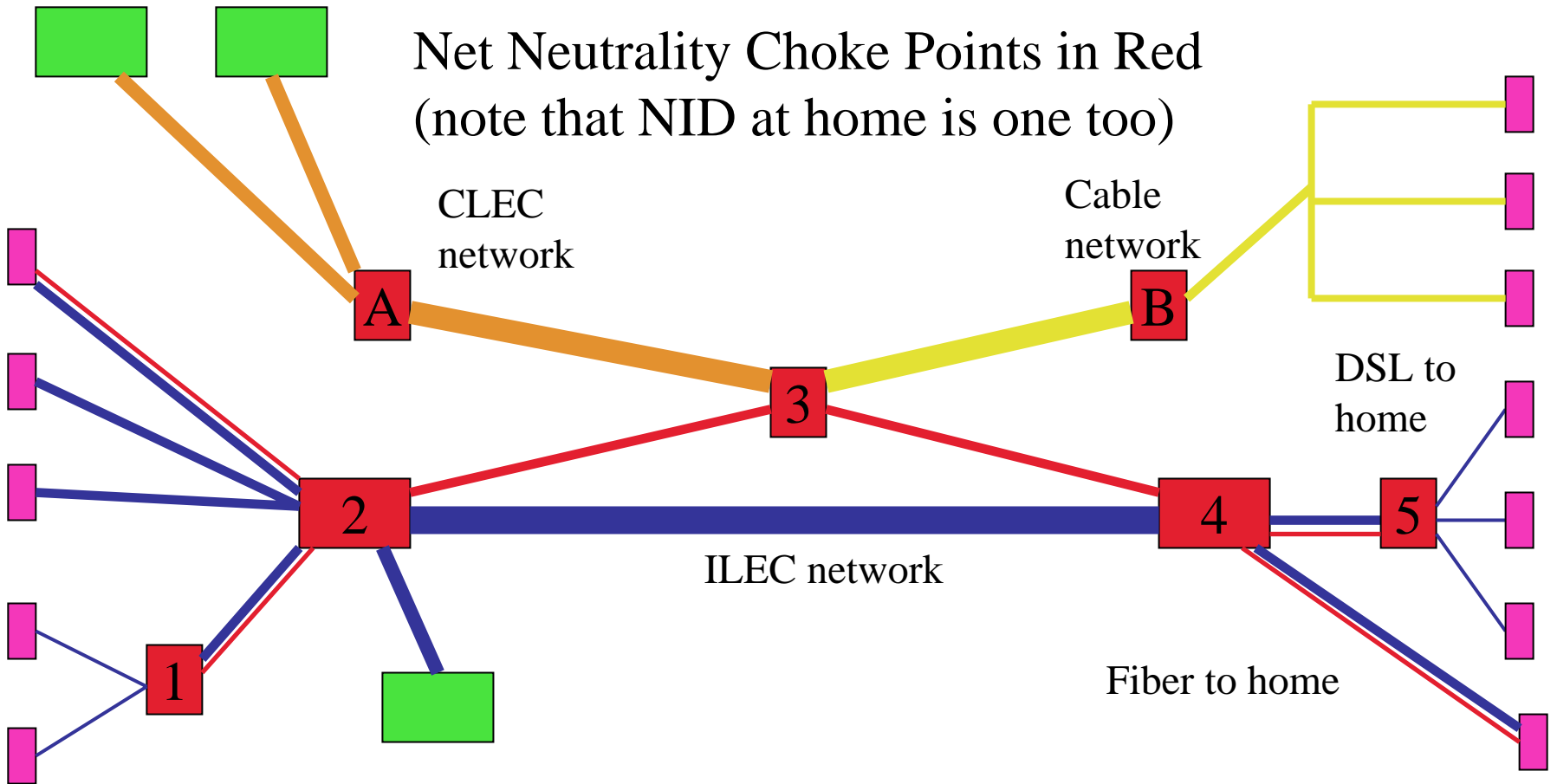
Each of these potential discriminatory actions by themselves would be sufficient to seriously inhibit, if not prevent entirely, competition in the provision of information services. The **attached diagram** illustrates in red the many different potential choke

points that can come into play in the absence of strong Net neutrality requirements. Interconnection issues occur at the incumbent local exchange carrier (ILEC) central offices (numbers 2 and 4) and at the interconnection point with the ILEC network (number 3). Bandwidth starvation is illustrated by the narrow red “ILEC public Internet” lines connecting homes to the central offices and the central offices to the interconnect point. The broader blue pipes of the ILEC illustrate how the ILEC reserves more capacity for itself and its service offerings.

## **Conclusion**

To prevent the discrimination that is at the heart of Net neutrality concerns, Congress should maintain the basic legal framework that made the Internet possible. Under that framework any network operator that built transmission facilities used to provide service to the public was obligated to provide non-discriminatory transmission service upon reasonable request, to allow attachment of devices, to interconnect their network with others on reasonable terms and conditions, and could not interfere with content or services sent over their networks. Congress needs to affirmatively overturn the FCC and require that this framework stay in place. If and when competitive markets in fact develop for transmission services, then there will be no need to remove the requirements because the market will dictate similar behavior. As history has repeatedly demonstrated, it is only those who can discriminate who object to a requirement that they not do so. Net neutrality is no exception. In the interests of preserving America’s leading role in the Information economy, Congress should include Net neutrality requirements that preserve access and prohibit interference in any rewrite.

# Net Neutrality Choke Points in Red (note that NID at home is one too)



1 and 5 are ILEC neighborhood nodes (fiber to DSL)  
 2 and 4 are ILEC central offices (local caching for ILEC only)  
 3 is an interconnection point with the ILEC network  
 A is CLEC switch (local caching); B is cable headend (caching for cable only)

