

**BEFORE THE  
FEDERAL COMMUNICATIONS COMMISSION  
WASHINGTON, D.C. 20554**

In the Matter of	)	
	)	WC Docket No. 17-108
Restoring Internet Freedom	)	

**COMMENTS OF HOME TELEPHONE COMPANY, INC.**

July 17, 2017

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## **EXECUTIVE SUMMARY**

Home Telephone Company, Inc. (Home) is responding to the Notice of Proposed Rulemaking (NPRM), In the Matter of Restoring Internet Freedom adopted May 18, 2017, by the Federal Communications Commission (FCC or Commission). Home is a rural local exchange carrier headquartered in Moncks Corner, South Carolina and has a long history of participating in major FCC proceedings. Home believes this current proceeding could be one of the most important Commission actions in which it has participated. Not only could this proceeding have major impacts on the rural areas in which Home serves, but will likely impact how hundreds of millions of American consumers communicate, connect, and conduct commerce for decades to come. Home recommends the Commission NOT adopt the proposed rulemaking it is considering without substantive changes that will preserve and protect critical aspects of the Internet used by consumers.

Home addresses in its filing the fundamental concept of what constitutes the Internet from a simple, straight-forward consumer viewpoint. We discuss why from a consumer standpoint transport is separable from content. Content is what most consumers view as the Internet. We urge the Commission to avoid the crass politicization that has arisen over the last several years related to telecom policy. The issue at hand is neither a conservative nor a liberal concept. In fact, as we note in our filing both the most conservative and liberal members of the Supreme Court joined in dissent on this issue. It is not a question of pro-business or big government. Business can be found on each side of the debate. Nor is it an issue of free markets or burdensome regulation. Rather what is at question is whether consumers will retain control of the Internet, or if big government will team with big business and allow a few major companies to control how our citizens communicate, what information they can receive and what innovations are allowed to be offered in the marketplace.

Home raises concerns that the Commission is operating from false premises that current rules are discouraging investments and that broadband is being subjected to full Title II regulations. In its filing, Home indicates that as a small broadband provider it has NOT been hindered or discouraged from investing under existing regulations. Rather, the existence of rules of the road

and an impartial referee has provided a degree of confidence that our investments will be allowed to compete fairly in the marketplace and that current regulatory requirements can be viewed more like Title 1.5 rather than Title II regulation.

Home also addresses the ability of the Commission to protect consumers from the largest ISPs blocking traffic or discriminating in the delivery of content. The binary approach of only Title I or only Title II regulation just does not fit. The courts have clearly indicated that absent Title II the Commission has limited ability to confront monopolistic practices of large networks. However, under Title II the Commission can eliminate regulations through forbearance as necessary. The best approach is through the legislative branch where our citizens' elected leaders can pass specific laws to govern the information age of the future. Justice Scalia probably addresses the Commission dilemma best in his dissent on the *Brand X* case when he discussed the attempt to concoct "a whole new regime of regulation" or as he said, non-regulation in this case under the guise of statutory construct. He went on to say "The important fact, however, is that the Commission has chosen to achieve this through an implausible reading of the statute, and has thus exceeded the authority given it by Congress." Home urges the Commission to defer action on this proceeding and submit to the will of Congress through the enactment of specific laws to govern the Internet.

Any action the Commission takes should be focused on ensuring our nation's communication system provides the average consumer the best possible experience. Regardless of all the legal, technical, and economic details, the consumer clearly sees the Internet in three-part harmony: (1) the content or information they desire, (2) the network connection they purchase to transport the information they desire, and (3) the device they use to request and receive the information they desire. Home has used the illustration of an hour glass to provide a simple visualization of this concept.

This illustration helps demonstrate the relationship of the three parts of the Internet. There are literally hundreds of millions of content or applications available to the consumer. The open Internet has allowed content production to flourish and this area is by far the most competitive element of the system, in fact it is what most people consider the Internet. Of course, they know

they must have a device to interface with the Internet. The types and numbers of devices that can be used to connect to the Internet has exploded over the last several decades—everything from watches to large screen television sets from computers to refrigerators. An open Internet has allowed competition to flourish. But consumers also know that they need a transport network to connect their devices to the information they desire. They purchase this transport connection from a limited number of companies. Whether landline or wireless, choices are limited to a handful. Even worse, true high speed connections at 100 Mbps or higher are usually limited to a single provider, if available at all.

It should be clear to even the most casual observer that the transport network is a true bottleneck. Left to their own devices (no pun intended), both history and capitalistic principles indicate that these near-monopoly providers will use their bottleneck position to control the process end to end and maximize their profits. One sees signs today of this effort as large companies utilize proprietary set top boxes and other devices to control customer actions. The large networks are also in a buying frenzy gobbling up content providers at an ever-increasing rate. We have already seen large networks giving preferred treatment to their own content, even with existing regulatory rules in place. It takes little imagination to envision what these large unregulated transport providers will do in the future if unrestrained. The Commission must stay in the game as a representative of the people of our nation and act as an impartial referee in the information age.

Home also addresses the importance of interconnection to the information age. We discuss the history and why rules are necessary, pointing out that for over a hundred years unfettered ability to interconnect networks has been the holy grail of national communication policy. Yet the Commission bluntly says in paragraph 42 of the NPRM, which proposes to eliminate Title II authority, there is no “non-Title II basis to exercise ongoing regulatory oversight over Internet traffic exchange.” The Commission appears to be proposing that it abandon the American public to the whims of the nation’s largest transport providers, leaving the providers free to block or discriminate in the transport of information or connection of devices.

In conclusion, Home trusts that once the Commission takes a detailed look at the public record and views the issues from the common-sense perspective of the American consumer, it will reconsider its preliminary decision. Home believes that absent new legislative power to better regulate our nation's communication system, the current solution of light touch Title II with forbearance, what we call Title 1.5, is the best way to protect the public interest.

## **I. Introduction**

Home Telephone Company, Inc. (Home) responds to the Notice of Proposed Rulemaking (NPRM) adopted May 18, 2017, by the Federal Communications Commission (FCC or Commission).<sup>1</sup> Home is a rural local exchange carrier headquartered in Moncks Corner, South Carolina. Home has a long history of participating in major FCC proceedings that will affect Home, its customers, rural carriers and consumers nationally. Home believes the rule changes proposed in this proceeding will have long-term, substantial negative impact on carriers and consumers in rural areas as well as consumers in general. Home recommends the Commission not adopt the proposed rulemaking without substantive changes that will preserve and protect critical aspects of the Internet used by consumers.

Perhaps no other issue has aroused as much public interest and public concern as the Commission's proceeding regarding the regulatory treatment of the Internet. Millions of comments from ordinary citizens have been filed throughout the various proceedings. Home notes the high level of public interest in its greater service area. For instance, the Charleston Post and Courier published an editorial on July 14, 2017 entitled "FCC should save net neutrality." (See Attachment 1, attached with permission). The editorial concluded that "the FCC should be wary of freeing up Internet companies to once again behave in an anti-competitive fashion."

Such a high level of public interest should be expected given that the monumental issue the Commission must address is what, if any, level of regulation will optimize consumers' experiences in the next stage of the information age. (It is well accepted that the commercialization of the Internet in the 1990s was an important step in the information age that began around 1970.<sup>2</sup>) While it appears from the title and tone of this NPRM that the Commission has already reached its conclusion, Home is confident that given the duty entrusted

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<sup>1</sup> Federal Communications Commission, Notice of Proposed Rulemaking, In the Matter of Restoring Internet Freedom, FCC 17-60, WC Docket 17-108, rel. May 23, 2017 (NPRM).

<sup>2</sup> See American Heritage Dictionary 5<sup>th</sup> Ed. "Information Age."

to the Commission, it will compile a complete public record that will reveal all aspects of this important decision. Home is convinced that a complete review of the full public record will show that an outcome different from that envisioned in the NPRM will best serve the public interest and will preserve and advance the development and investment in infrastructure used to provide Internet-based services to citizens and businesses.

Home approaches this matter from both the historical position of a 113 year-old telecom provider and a cutting-edge fiber to the premise (FTTP) provider. Home was the first company in the state of South Carolina to offer gigabit Internet service to residential customers. As a small, rural provider Home believes it can offer a unique perspective that combines elements both of a network provider and a customer due to our relationships with the large networks.

With its unique perspective, Home is alarmed that an issue of such critical importance to our nation's economic health and our nation's position in the world marketplace has become simply another partisan political issue. We urge the Commission to rise above the temptation to enter the arena of divisive politics that dominates today's national debate and demonstrate the leadership our nation needs to remain the world's leading economy.

## **II. Key Question**

The central question the Commission now confronts is really a very simple one. The NPRM identifies the question early in its discussion: Can the Internet be separated between a telecommunications service "pure transmission capability" and enhanced or information services? The outcome of this proceeding rests on this single question. Indeed, it was this key issue that defined the courts' review of Commission's actions. The Supreme Court did not directly answer the question, rather it deferred to the Commission as the expert agency. However, as we will discuss shortly, when the issue was examined directly, both by the lower court and three dissenting Justices of the Supreme Court, the courts consistently found that Internet transport is a separate offering.



## **A. Be Guided by a Common-Sense Consumer Perspective**

While there are many detailed technical issues, numerous arcane regulatory policy concepts, and countless competing business and economic theories that will be addressed in this proceeding, Home believes the most important consideration is the simple, common sense approach that the average consumer will use to analyze the Commission's action. The key concern the Commission should examine is how the average consumer will be impacted. Will the consumer continue to be able to access the content of her choice over the Internet? Will the consumer be able to use the device of his choice on the network? Will the network provider be able to use the personal information of consumers using its network for corporate gain? Will edge providers have the certainty they need to continue to create and offer to consumers the content, goods, services, and information on the Internet? And most importantly, will the network owner block, slow, or discriminate against edge providers the consumers want to reach?

## **B. Separating Transmission from Internet Service**

Before addressing specific issues raised in the NPRM, Home believes it is important to address a concept that seems to be one of the cornerstones for the FCC's proposed conclusions on this issue: the notion that Internet transport has historically been considered an information service.

A careful reading of the background section contained in this NPRM reveals the fact that "Internet access" began as a Title II regulated service. Indeed, no one has ever seriously questioned the fact that the original Internet access by dial-up modem was a fully regulated Title II service. Telephone companies' "always on" broadband service was regulated as Title II until 2005. Functionally, both dial-up and "always on" dedicated service offer the public the same thing—access to the world of the Internet. Only in 2005, and in response to the 2002 Cable Modem Order<sup>3</sup> which had just received Supreme Court blessing, did the Commission, under the

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<sup>3</sup> See *Inquiry Concerning High-Speed Access to the Internet Over Cable & Other Facilities; Internet Over Cable Declaratory Ruling; Appropriate Regulatory Treatment for Broadband Access to the Internet Over Cable Facilities*, GN Docket No. 00-185, CS Docket No. 02-52, Declaratory Ruling and Notice of Proposed Rulemaking, 17 FCC Rcd 4798 (2002) (Cable Modem Order).

leadership of Chairman Martin, classify Broadband Internet Access Service (BIAS) over telephone wireline facilities as an information service.<sup>4</sup> Importantly, the Commission continued its oversight of Internet access via its Internet Access Policy Statement—recognizing that the Commission needed to continue to ensure that consumers could access an open Internet.

The Wireline Broadband Classification Order ruling was required because, while telephone broadband services were considered to be regulated services, Title II regulation was not applied to cable companies. Thus, when cable companies began offering broadband cable modem service in addition to their cable TV service, the Commission had to determine the appropriate regulatory regime. The Commission issued a Declaratory Ruling in 2002 finding that cable modem service was an inseparable combination of both telecommunication transport and information service. This arguably incorrect conclusion led the Commission to declare cable modem service deregulated. The Ninth Circuit overturned the Commission's order because it found the transmission component to be unambiguously a separable telecommunications service. The Ninth Circuit order was in turn appealed to the nation's highest court.

In the Supreme Court's landmark 2005 *Brand X* ruling, it reversed the Ninth Circuit's decision which had vacated the FCC's 2002 Declaratory Ruling and upheld the Commission's right as the expert agency to make the regulatory determination on the status of BIAS offered by cable providers. The Supreme Court zeroed in on the key question: Was Internet transport or transmission separable from the information services consumers accessed? The Court deferred to the Commission's expertise to make this factual finding, without attempting to actually rule on the key question of severability. It is interesting, however, that in dissent three of the Justices did address the key question and in a long and vigorous dissenting opinion found that it was perfectly clear that a separate offering of telecommunications did exist and for that simple reason set forth in the statute they would have affirmed the Court of Appeals.

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<sup>4</sup> See *Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities et al.*, CC Docket Nos. 02-33, 01-337, 95-20, 98-10, WC Docket Nos. 04-242, 05-271, Report and Order and Notice of Proposed Rulemaking, 20 FCC Rcd 14853 (2005) (Wireline Broadband Classification Order), *aff'd* Time Warner Telecom, Inc. v. FCC, 507 F.3d 205 (3d Cir. 2007).

In their dissent, Justices Scalia, Souter and Ginsburg state “the relevant question is whether the individual components in a package being offered still possess sufficient identity to be described as separate objects of the offer, or whether they have been so changed by their combination with the other components that it is no longer reasonable to describe them in that way.” And they conclude that “the telecommunications component of cable-modem service retains such ample independent identity that it must be regarded as being on offer—especially when seen from the perspective of the consumer or the end user, which the Court purports to find determinative.”<sup>5</sup>

Such consumer-oriented analysis showing that transmission is separable from other applications and functions offered by ISPs is also supported by the technical makeup of networks. In Attachment 2 to these comments, Home provides an engineering analysis entitled “Broadband Access and Content Services Whitepaper” that describes how transport is part of the Open Systems Interconnection (OSI) model. This model separates communication networks into distinct functional layers. Transmission includes the physical, data link, network, and transport layers. Applications and other functions include the session, presentation, and application layers. Using this model for communication networks, the layers clearly demonstrate the distinct feature of transmission that is responsible for the delivery of information without changing such information requested by the end-user customer. Transmission is distinct from applications and other functions.

To summarize the complex legal history, Home finds it ironic that the Commission uses a somewhat circular argument. It deems that transport and content are in effect inseparable and thus they cannot regulate the ISP. This in turns allows the ISP to act as a monopoly and legally refuse to allow others to separately use their BIAS network, enforcing the Commission’s initial finding. However, the public is not so easily fooled by such an obvious sleight of hand as they clearly understand the difference between the network required to transport their information request to the Internet and the multitude of information providers they seek on the Internet.

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<sup>5</sup> National Cable & Telecommunications Ass’n et al. v. Brand X Internet Services, 545 U.S. 967 (2005), (Scalia, J. dissenting) (Brand X Opinion).

### **III. False Premises in the NPRM**

There are two critical false premises in the NPRM that drive the misguided conclusions to return to a policy-free era where consumer protections to access content of their choosing do not exist. The first relates to impacts of regulation on broadband investment and innovation. The second false premise mischaracterizes the 2015 regulations as those of a bygone era.

#### **A. Current Rules are Not Discouraging Investment for Home**

The NPRM points to the Title II Order<sup>6</sup> as a reason for a providers to pull back on plans to deploy new and upgraded infrastructure. It goes on to say “this is particularly true of the smallest Internet service providers that serve consumers in rural, low-income, and other underserved communities.”<sup>7</sup>

As a smaller Internet service provider, Home can say that the Title II Order has had no negative impact on our investment decision. In fact, the Title II Order has helped Home to feel more confident in our ability to remain connected to critical Internet backbone networks. (Home also notes that, as small rural carriers know, it prevents large ISPs from using their market power vis a vis edge providers; and thus, doesn’t tilt the field in favor of large ISPs—making it even further difficult for small companies to compete.) Home is not alone in the belief that the current Title II rules have not hampered investment. A group of 41 small ISPs stated in a June 27, 2017 letter to the Commission that “We have encountered no new additional barriers to investment or deployment as a result of the 2015 decision to reclassify broadband as a telecommunications service and have long supported network neutrality as a core principle for the deployment of networks for the American public to access the Internet.”<sup>8</sup> Home argues that the Commission has misplaced the cause of the lack of rural infrastructure investment. It is clear to Home that the main driver for smaller provider’s investment decisions is the rapidly failing federal universal service support system—a system that attempts to address this significant issue with its artificial

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<sup>6</sup> *In the Matter of Protecting and Promoting the Open Internet*, WC Docket No. 14-28, Report and Order on Remand, Declaratory Ruling, and Order, 30 FCC Rcd 5601 (2015) (Title II Order).

<sup>7</sup> NPRM at 4.

<sup>8</sup> See Letter from Electronic Frontier Foundation to The Honorable Ajit Pai (June 27, 2017).

budget for recovery of investments in sparsely populated areas served by rate-of-return carriers. In fact, after over six years of effort, the Commission has yet to fully support stand-alone rural broadband service at comparable, affordable rates.<sup>9</sup>

To assign blame for lagging investment by small broadband providers on the Title II Order without consideration of the obvious impact of the universal service support issue demonstrates the larger fallacy of blaming overall investment declines on regulations.

The reality is that it is impossible to simply point to the Title II Order as the principle cause of any real, or perceived decline in overall investment. Communication transport infrastructure requires a major, long term capital investment. There is no question the decision to invest is impacted by many factors, technologies and market issues among them. These investments have a natural ebb and flow. While anyone can look at investment data in any given year or years and make a conclusion as to the relative change in investment, determining the underlying reason for the change is more of an art than a science. For instance, wireless carriers recently underwent major new investment expansion to deploy their 4G network that obviously increases investment for those years. Regardless of regulation, it is likely the push to 5G wireless will again prompt tremendous new investment.

## **B. Current Regulatory Treatment is Not Title II, but Instead can be Described as Title 1.5**

The NPRM disparages the Title II Order by claiming the order instituted public-utility era regulation of the Internet. As previously discussed, until 2005 DSL was regulated as a Title II service. In addition, after 2005 and before 2015 when the Commission reinstated Title II regulations, the Commission continually attempted to apply Title II-like regulations on BIAS providers. Further, the claim that current BIAS is currently regulated like a public utility is not supported by looking at the Title II Order regulations. There was a tremendous effort to

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<sup>9</sup> See e.g., Testimony of Shirley Bloomfield CEO NTCA—The Rural Broadband Association, before the United States Senate, Commerce, Science and Transportation Subcommittee on Communications, Technology, and Innovation and the Internet, June 20, 2017 (*While regulatory uncertainty from USF reforms and budgets has seemed like a fact of life for small network operators for more than a decade, the effects of a budget that has been flat for almost a decade are finally coming home to roost. ... Because of these support cuts, rural network operators are already increasing rural broadband rates for consumers and cutting back on future infrastructure investments.*)

narrowly tailor the regulations to meet the obvious need to address certain issues emerging from Internet usage. Blocking and throttling regulations, for example, were imposed to guard against actual and potential actions by certain ISPs. The classification of such providers as carriers also enables said carriers to access rights-of-way under common-sense regulations. Even the claim that the Title II Order imposes price regulation on ISPs is unfounded. Further, because the transmission portion of Internet service is a telecommunications service, the Commission is well supported in providing federal universal service support to broadband services provided by rural rate-of-return and price-cap carriers.

#### 1. Need for Regulation Absent Competition

Indeed, this brings us to an interesting dichotomy. Lack of competition is one of the main public interest reasons for regulation. In a free, fully competitive market, the need for regulations lessen. In a fully competitive market, investment is required to meet competition. Said another way, if, as the Commission suggests, investment in broadband networks declined as a result of the Title II Order, it is a strong indication that the market is not competitive enough for deregulation.<sup>10</sup> Clearly, the telephone broadband network expanded rapidly between 1996 and 2005 while it was regulated as a telecommunications service in order to meet the threat of competition posed by cable modem service. The link between regulation and investment likely does indeed exist but clearly, it is only one of several factors influencing investments.

#### 2. Avoid Political Football

The politicization of this issue is as damaging as it is curious. One of the best and most respected conservative legal minds of the time along with one of the more liberal members of the Court actually teamed up in a lengthy detailed dissent from the Supreme Court's *Brand X* decision.<sup>11</sup> There is nothing either conservative or liberal about the application of Title II regulation to broadband. That proponents or opponents of Title II should line up behind one political party or another demonstrates little other than an effort to use critical national telecom policy in a crass political manner in an attempt to achieve financial gain.

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<sup>10</sup> NPRM at 4.

<sup>11</sup> *Brand X* Opinion.

Our nation’s communication policies are much too important to be left to the political whims of any one political party, subject to change simply based on who is currently in power. This Commission has the opportunity to allow our elected leaders to make a lasting determination on the regulatory status of BIAS. The courts have made it clear that the Commission can decide to regulate or not to regulate. However, the courts have decreed that what the Commission cannot do is deregulate and then attempt to add regulations to what it has deregulated. This seems to be the real message from the D.C. Circuit in both *Comcast* and *Verizon* cases.<sup>12</sup>

The Commission clearly has the power to “forbear” from regulating where it has authority to regulate. This is the current state of affairs. Under current law, it appears highly doubtful the Commission can regulate what it proposes to deregulate. This is important because almost all parties agree that broadband transport should be offered on a non-discriminating, no-blocking basis. Yet the U.S. Court of Appeals, District of Columbia Circuit in 2014 made clear that absent Title II regulation, networks were free to block and discriminate.<sup>13</sup>

There is no apparent urgent need to change regulatory status at this time. The same political party is in control of the Executive and Legislative branches of the Federal government. There is no likelihood the Commission would increase regulatory burdens on broadband providers. Any change made by this Commission alone could clearly be changed by a future Commission with differing viewpoints. Thus, any Commission action would provide no greater certainty to the market than currently exists. This is an important fact—in the long-term capital markets in which broadband investments operate, nothing kills investment faster than uncertainty. This Commission has the unique opportunity to ensure no additional regulatory burdens are placed on broadband providers, while waiting and allowing Congress to properly address laws that will govern the Internet supply and demand.

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<sup>12</sup> *Comcast Corp. v. FCC*, 600 F.3d 642 (D.C. Cir. 2010) (*Comcast*) and *Verizon v. FCC*, 740 F.3d 623, 655–58 (D.C. Cir. 2014) (*Verizon*).

<sup>13</sup> *Verizon* at 63, (“...we vacate both the anti-discrimination and the anti-blocking rules.”).

The very nature of the questions asked by the Commission in the NPRM points to the fact that Congress must establish the basic ground rules of the Internet. The Commission is trying to fit a square peg into a round hole where old definitions do not fit new realities. Everyone appears to agree that a legislative fix is the best solution. Not only is the regulatory treatment of broadband transport an issue, but as a nation we are struggling to get true high-speed broadband connections to as many homes and businesses as possible. In our democratic society, perhaps the best place to start in resolving these issues is through the laws that govern our nation. The existing laws governing our communications mechanisms date back to 1996 when our cellular networks were still young and Internet was in its infancy. Given the fundamental change in communications, it should be clear that a detailed review of the 1996 Act is warranted. Action by this or any FCC using outdated laws to address modern Internet services is a futile exercise that will lead to uncertainty. This will only impair providers' ability to make long-term decisions about how to supply Internet transmission and end-user services to their communities as the next Commission could simply reclassify broadband as a telecommunications service.

## **IV. Discussion of Issues Raised in NPRM**

### **A. Fundamentals: What is the Internet?**

With key issues and false premises addressed above, Home now turns its attention to the real issue in this proceeding: Is Internet transport separable from the information services it connects? While the legal basis for determining the regulatory status of the Internet under current law might rest on this narrow question, it is important to ask a much broader question. What exactly is the Internet?

Perhaps the more important way to examine what the Internet encompasses is to view it from the logical common sense viewpoint of the consumer. The Commission noted that the Supreme Court found that policy should be driven by a degree of common sense.<sup>14</sup> While mere mortals have struggled to understand the complexity of the Internet, even the most technology challenged can clearly see three major components at the consumer level. What most of us call the Internet is really the content or application we seek from the Internet. Of course to initiate our Internet

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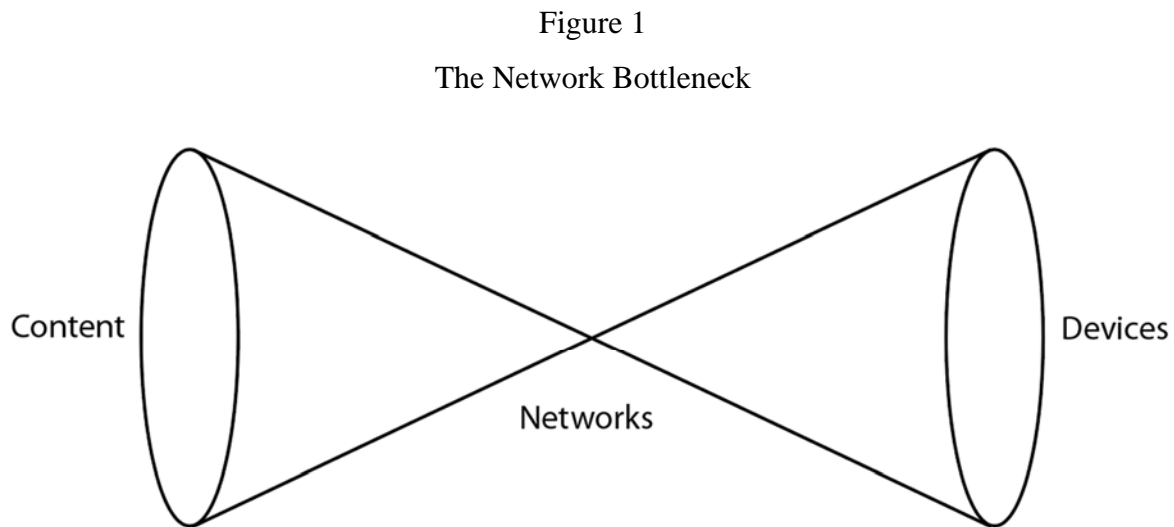
<sup>14</sup> NPRM Footnote 110.



connection, we have to use a device of some sort—a computer, a smart phone, tablet, *etc.*

Finally, we all know that we must have a provider to transport our request to the information provider. We must be connected to a hotspot, cellular network, landline network, or we have no Internet.

These three elements can be visualized as an hour glass. The content/applications/*etc.* are on one end. The other end is the device that we use to request and receive the content. In the middle is the network, the conduit between the information and a device that receives the requested information.



In looking at the three components of the Internet, it is important to understand where competition exists and where it does not. The ends of the hour glass are the creative, vibrant engines of progress. Content available to users has multiplied exponentially. With open access any entrepreneur can develop new forms of content, new ways of assembling information. In the same way, new and exciting devices that can use the content are developed daily. We are on the verge of the Internet of Things when machine-to-machine information flows overtake information flows initiated by humans. Yet the transport element in the middle remains non-competitive, either as a duopoly or a virtual monopoly for rural wireline networks.

Wireless networks generally are limited to 3-4 in any given area, and two giants dominate the mobile wireless market. Landline access, the only real high-speed almost limitless access, is

even more limited with many locations having no high-speed connections, most locations having only one true high speed connection and only a very few select locations having two or more providers. The lack of wireline competitors is not by evil design. The transport network is a capital intensive, long term investment.

However, regulators fail to understand the very basic fact that of all the components that must be in place to create what the public simply calls Internet, the networked transport segment is very different than the applications and services that ride over that network. Not regulating the bottleneck will allow bottleneck providers to constrain the vital creative competition that thrives at the ends.

This simple, common sense visual also provides the answer to the key question. Broadband transport is not the Internet. It is simply the highway over which the Internet operates. It is the conduit whereby users receive the information of their choosing, “without change in the form or content of the information as sent and received.” Indeed, if a user were to request information and this information is changed by the transmission, the user will not be receiving what she requested. While it is likely that any specific ISP can provide a degree of information service along with the transport, it is also true that it is not required. Addressing protocols and even caching are network management operations to facilitate the transmission of information of the user’s choosing. (Home notes that addressing protocols are routinely used with voice telecommunications such as 8YY numbering lookups. Nothing is different with Internet addressing routing—and both voice and BIAS should remain classified as telecommunications services.)

Where the transport provider offers information over their transport pipe, there is clear ability to discriminate against other independent content providers. This hazard needs regulation to ensure the user’s experience is the best available and provides the opportunity for robust competition among content providers. The public inherently knows what Washington does not. A free and open Internet is dependent on open, non-discriminatory access.

## **B. Broader question - How to Deliver the Best Consumer Communications Experience Possible**

The above discussion points to the fact that it is important for the Commission to address a much broader issue than simply if we should regulate broadband. The Commission should ask the question: What do we want our national communications infrastructure to be? Only then should it address the issue of what role, if any, should the government play. Start with a vision: What is the best possible view of the future of communications? The perfect scenario would be one where every citizen has access to an affordable broadband connection that offers unlimited speeds and throughput. It would be a future where any device, manufactured to technical standards, would be able to utilize the ubiquitous network and receive content or applications off the network. Finally, it would be one that allows any content, software, or application to traverse the broadband network (that is fully interconnected) and be received by every device connected to the network. **In other words: any content to every device through all networks.**

This vision is perhaps a utopian dream, but think of the innovative power such a dream would unleash. Think of the social benefits of all citizens being connected in a ubiquitous manner. This dream envisions a future of robust competition as every device manufacturer is free to make the best device possible and not have its product blocked because the network owner will not allow it to be connected to their network. Nor would a content provider be able to block its content from appearing on the device. It would also ensure that any innovative content provider could produce content with knowledge that it will not be blocked by the network or the device manufacturer. Finally, neither content providers nor device manufacturers could discriminate against network providers. Any device would connect to all standard networks and all content would be distributable over all networks. Each segment of the communication chain would be totally free to set prices and innovate as they desire, but they would not be able to discriminate against any other communication segment. Best of all, the consumer could purchase the communication provider of their choice between and among the segments.

However, without retaining the Title II Order regulations, it is both possible and likely that large players will attempt to gain control of content, devices, and networks. Such horizontal integration could allow the owner of must-have content to block new content development of a

competitor by blocking the competitor's access to devices or networks. Likewise, an inferior network could block a competitor's network from entry by not allowing competing networks access to content or devices.

The FCC asks a series of detailed questions within the depths of its complex and lengthy NPRM. In fact, the complexity of the issue easily overwhelms most. Home urges the Commission to step back and take a simpler, yet much broader common-sense approach. However, Home believes that when the Commission reviews the details in a neutral non-partisan basis with a focus on ensuring that the nation's citizens have the best communication experience possible, it will find the answer is the same as when it considers the broader issues Home has raised in this response. The conclusion from a technical and legal perspective is consistent with the common sense public interest perspective—that the current Title II standards should remain until and unless Congress creates more targeted Internet legislations.

Home realizes that in the end “facts” may be utilized to reach any policy decision that the Commission desires. However, Home notes that it is clear the Commission should ensure that any decision it makes meets the higher threshold of protecting the public interest and promoting competition in **all** segments of the market where competition can actually exist. Further, the Commission should ensure that it regulates as telecommunications the **transport** of content selected by the users' choosing, without change in the form or content of the information as sent and received.

### **C. Ability to Regulate Absent Title II with Forbearance**

The NPRM released by the Commission attempts to return the regulation of the Internet to the days where there wasn't regulation. As Home discussed earlier, this attempt is trying to return to a mirage. Prior to 2005, the transport segment of the Internet was regulated as a telecommunications service and generated the highest levels of broadband investment in the past 20 years.<sup>15</sup> After 2005, BIAS was governed by specific Internet policy guidance. This guidance was ignored by the largest of providers and this monopoly power abuse of the transport segment

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<sup>15</sup> NPRM, page 68, Clyburn dissent.

led to reinstitution of Title II status with minimal Title II regulations directed toward Internet providers.

This NPRM is entering uncharted waters and is dangerously exposing all Internet users to the possible impact of the Commission being unable to provide necessary protections specifically tailored to address the needs of consumers and providers in this vibrant marketplace. To prevent this likely scenario, the Commission should retain the simple and necessary regulations adopted in the Title II Order and keep a diligent watch over all segments of the Internet to ensure that all are robust and healthy.

There is a clear and present danger that the Commission may lose its ability to regulate the bottleneck service under limited Section 706 and ancillary authority. This lack of authority has been repeatedly demonstrated through ten years of adverse court ruling consistently limiting the Commission's authority to regulate BIAS under a Title I construct. It would be far better to retain Title II with forbearance as provided in the Title II Order and encourage Congress to address forward-looking legislation that ensures network neutrality principles directly.

#### **D. Specific Questions Raised in the NPRM**

With the above in mind Home desires to address several of the specific issues the Commission raises in its NPRM.

##### **1. How Consumers Access the Internet**

The FCC specifically asks if consumers can access online service using traditional service or special access.<sup>16</sup> This question is important because it shows that transport can and is separated from information services. Hundreds of small telephone service providers currently offer broadband service as a traditional telephone service. Digital Subscriber Line (DSL) service for the nation's rural LECs was never deregulated in 2005. It has been offered on a tariffed common carrier basis even while the FCC classified most other DSL service as an information service. In addition, many businesses use a dedicated special access service to connect to the Internet. In the past, these services took the form of a T-1 or DS-1 or some other "larger pipe" version of

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<sup>16</sup> NPRM at 28.

these services. Today, Ethernet service is often the transport network of choice. In addition, many smaller phone carriers continue to offer “Dial-up” Internet service. The Internet in all cases is the same; the transport used to get there may differ—a clear indication that transport is not the Internet.

## 2. Title II Option

The Commission notes that Title II classification appears to be a poor fit for BIAS.<sup>17</sup> The reality is current law does not properly fit BIAS. While Home agrees with this assertion, the courts have continually found little authority for the Commission to protect BIAS consumer rights outside of Title II. The best solution is for the Commission to leave in place the current classification and rules, and call on Congress to adopt a new law that allows the Commission to protect the public interest related to broadband networks. Then, Congress can determine the level of regulatory oversight, if any, that should apply. Of course, as we describe above, the current state of the market with limited wireline options for consumers, indicates Commission oversight should continue. Usurping Congressional authority with an order that limits public protection is no more defensible than needlessly expanding regulatory oversight.

The Commission states that the 1996 Act was intended to “promote competition and reduce regulation”, but fails to note it was also intended to secure lower prices and higher quality service. In reality, the Act set in place a careful balance between competition, consumer protection, and universal availability. The Commission also recognized its responsibility “to preserve the vibrant and competitive free market that presently exists.”<sup>18</sup> As stated earlier, competition exists at the two ends of the hourglass—specifically, the device market and the content market. There is little-to-no competition for bottleneck transport to and from the consumer especially in the wireline market. Should the Commission free the largest transport providers from any meaningful regulatory oversight, it should be apparent to even the most casual observer that these large bottleneck entities will use their market position to limit competition on the ends, replacing the vibrant competition that currently exists at the content end of the hour glass with services and products they control. If the Commission removes itself from

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<sup>17</sup> NPRM at 33.

<sup>18</sup> NPRM at 1.

the role of referee in the broadband market, it will be unable to ensure a vibrant and competitive free market continues to exist. The end result will be similar to removing the home plate umpire from a baseball game and letting the pitcher call the balls and strikes. Should the Commission abandon its regulatory role it will allow the large transport networks to operate as they please which will certainly not lead to the best possible end user experience for the Internet.

The Commission points to reclassification of BIAS to Title II as creating significant regulatory uncertainty. Home would simply point out that what might be considered regulatory uncertainty by the largest bottleneck providers could be considered clear rules-of-the-road for consumers and smaller providers. As Home has stated previously, it appears impossible that the Commission, acting to eliminate Title II authority, will do little to eliminate regulatory uncertainty. All this Commission will do is create an environment rife with potential legal challenges. It will set up a process where critical national interests have been politicalized and regulation will change depending on the political party in charge. The only way to remove uncertainty is to stand firm with current Title II Order regulations and allow Congress to do its job. Specific legislative action is the only way to clear the air of regulatory uncertainty. Without legislative action, the Commission action will face immediate court action. The sad truth is by the time legal actions have been completed we could see another shift in power at the Commission and the politically based policy merry-go-round will continue.

### 3. Investment Impact of Proposed Actions

The Commission asks for comment on how eliminating utility-style regulation on BIAS will impact investment, competition, and prices. Home urges the Commission to take a non-inside the Washington beltway, common sense approach to the questions it raises.

The elimination of regulation will do nothing to create competition in the BIAS market. In fact, it will likely decrease the number of providers as the largest broadband providers use their now unconstrained market power to eliminate smaller providers and constrain competition from services offered over the top. The harsh truth is some type of “utility-style” regulation is needed in the BIAS market because this service is a utility. After decades of Commission attempts to create a competitive transport market, such a market still does not exist. The vast majority of

Americans have access to two or fewer true high speed broadband providers that can deliver 100 Mbps or higher speeds. In fact, most end users have access to only one—and a large number have none. The concept that eliminating regulatory oversight will magically spur investment and close the digital divide simply has no support from prior history. The Commission argues on the one hand that the Internet has been “deregulated” for almost the last two decades without having achieved either competitive transport markets or ubiquitous coverage, yet if we deregulate it again, we will see an expansion of coverage. The reality is that from 2005 to 2015 BIAS was not regulated for price-cap carriers and providers, yet we have the limited broadband network we see today. In fact, it is the very lack of competition that has led to the limited coverage we have today. In a truly competitive market, even with regulations ensuring the best available consumer experience, providers would have to expand and upgrade their networks to compete.

In the case of Home, and for many other small rural telcos, the protections provided by placing the largest providers under utility regulation has increased our willingness to invest. For most small rural providers, the single biggest impediment to expanding networks is the high cost to do so and the lack of universal service support to offset those high costs of expanding service into areas that do not allow for recovery of those costs directly from consumers. The Commission incorrectly conflates the application of last mile buildout to utility regulations. The only reason one might see any tie between regulation and investment is the fact that the nation’s largest providers might build more network if they could extract unreasonably high prices from end users, or edge providers, or smaller carriers who would need to access their bottleneck networks. Home posits, however, that there has been no demonstration that large broadband providers will expand their networks to unserved areas if they can extract higher prices from these sources.

#### 4. Internet Interconnection

Additionally, Home would like to address the issue of Internet traffic exchange, or interconnection. Why is interconnection important? For over 100 years our communications infrastructure has been governed by one simple rule: All networks should be interconnected. Blocking traffic was considered a cardinal sin and brought the quickest, harshest response from the Commission and state regulators. The history of telecommunication interconnection dates all the way back to the Kingsbury Commitment in 1914. Prior to this date, AT&T had blocked



many smaller providers from connecting to the national AT&T network. This had allowed AT&T to either force smaller providers out of business or to sell to AT&T. This behavior was not unique to telecommunications. In fact, similar behavior on the part of the railroads barons had been observed decades earlier. It had become common practice for many of the nation's railways to sell all available rail transport to large national "farming conglomerates." This left smaller farmers with no way to get their product to market. While not quite the same behavior as AT&T, the impact was the same. Smaller farmers were forced out of business as the large transport companies and the large farms conspired to rule the market. It was this behavior that lead to the enactment of various public utility rules. It is an unfortunate fact of humanity that technology changes much faster than human nature. It takes little in the way of imagination to foresee the day when the largest broadband network providers either buy up any competing entities or conspire with the largest content, application, and device manufacturing entities to restrict or eliminate new competitive entry into the market. Indeed, the Commission's prior open Internet record and its review of large broadband providers' mergers indicate that such behavior already has occurred. Thus, Commission oversight of interconnection is necessary and should continue.

## 5. Necessary Regulations

The Commission seeks comment on what regulations are needed if it were to retain Title II regulations. Here comments on several necessary regulations.

### a. Blocking, Throttling, Paid Prioritization, and Transparency

The Commission's Title II Order regulations are founded on four pillars that should be retained. No blocking, no throttling, no paid-prioritization, and meaningful transparency with existing exemptions for smaller providers should all be retained. Each regulation provides assurances for end users that they will have access to content they request without change or alteration. Transparency regulations also protect consumers of BIAS and ensure that consumers know what services they are purchasing.

The Commission suggests that there was "virtually no quantifiable evidence of consumer harm" before these regulations were adopted. However, that is contrary to the evidence. For example,

note that these regulations were in place in an official capacity in 2010, after Comcast was found to be in violation of the Commission's Internet principles and was throttling services. The evidence is clear there is a need for these regulations, even if they are designed to guard against providers' bad behavior and their incentives to engage in such behavior—which the D.C. Circuit has now agreed with the Commission that these incentives exist in both the *Verizon* and *Title II Order* cases.

It is universally accepted that blocking of lawful content should not be allowed. The blocking rule is critical for small providers such as Home to ensure that upstream transport, *i.e.*, other broadband providers do not block content requested by Home's end-user customers.

b. General Conduct Rule

Elimination of the general conduct rule will prevent the Commission from acting quickly in the future when any unforeseen issue arises. Delay in resolving a new issue or dispute is not good for Home or for other providers. Retaining the General Conduct Rule allows the Commission flexibility to address future unforeseen issues. The Commission has the sole discretion in using this rule and therefore, it appears to Home that retaining the rapid response capability—without having to return to rule making for a new future issue—is a good authority to have. Home does not see that this rule or standard affects in any way infrastructure investment or service-related innovation. Home recommends the rule be retained and defined by the Commission for limited use.

c. Interconnection

As part of the general conduct rule, the Commission can monitor interconnection issues and will be able to respond to these critical interconnection issues in a timely manner. If the Commission were to pare down the general conduct rule, it should retain the ability to resolve interconnection disputes with general BIAS-based authority.

## V. Conclusion

In closing, Home submits that the only way the Commission can ensure a free and open Internet is by remaining in the game as a free and impartial arbiter of the rules of the marketplace. The continuing evolution of the largest networks also becoming the largest content owners demonstrates both the ability and intent to control the information flow. It defies logic and common sense to assume the capital intensive, limited market of Internet access transport will ever be truly competitive. Transport infrastructure is currently, always has been, and likely always will be a utility service—this is dictated by the economics of networks. Given the reality of a bottleneck in the marketplace, the best solution is to ensure that all content and device providers, as well as all end-user customers have access to an open and non-discriminatory broadband transport pipe at a reasonable price. This connection would then allow the operation of a totally competitive content and device market as consumers could use their connections to receive the content they desire using the devices of their choice. Home urges the Commission to support consumers, support small businesses, support rural America, and support vibrant competition among edge providers and device manufacturers to truly keep the Internet free and open.

Respectfully submitted,

July 17, 2017

**Home Telephone Company, Inc.**

/s/ H. Keith Oliver

H. Keith Oliver

Senior Vice President, Corporate Operations

Home Telephone Company, Inc.

579 Stoney Landing Road

Moncks Corner, South Carolina 29461

## Opinion

## ATTACHMENT 1

[http://www.postandcourier.com/opinion/editorials/fcc-should-save-net-neutrality/article\\_75924284-673b-11e7-b403-27be99bbff32.html](http://www.postandcourier.com/opinion/editorials/fcc-should-save-net-neutrality/article_75924284-673b-11e7-b403-27be99bbff32.html)

### FCC should save net neutrality

Jul 14, 2017

File

On Wednesday, some of the internet looked a little different than normal, as major websites joined a protest against a Federal Communications Commission (FCC) effort to undo a regulatory approach that protects net neutrality.

Net neutrality is vital to the free functioning of the internet, but it's less clear how best to go about preserving that crucial and fundamental principle.

Essentially, net neutrality means that internet providers have to treat all data equally. They can't punish companies who don't pay an extra fee for faster service or throttle sites like Netflix or Hulu that might compete with their own entertainment services.

Up until 2015, the federal government mostly stayed out of regulating internet service providers. But a few high profile incidents of companies undermining their competitors to customers' detriment led the FCC to reclassify internet service providers under an old framework used to regulate phone companies.

That approach makes sense to a certain extent, as internet service providers enjoy monopoly power not unlike early phone companies.

Just over half of all Americans — including many in the Charleston area — only have one choice of provider for broadband internet, according to the most recent FCC data. Just 11 percent have access to more than two choices.

Residents of rural areas in South Carolina might not have any choices at all.

Of course there's no way to guarantee that stricter government control of broadband providers would improve that situation. In fact, more rules might actually prevent competitors from entering the industry.

But a hands-off approach has so far mostly led to increasing consolidation, less choice and poorer service. Internet service giants Comcast and AT&T are routinely ranked among the most-maligned companies in the country, for example.

Coincidentally, AT&T customers across the Charleston region were left without cell and internet service for four hours on Wednesday afternoon after a crucial fiber cable was cut.

It would be ideal for Congress to pass a law simply mandating that internet service providers treat all content equally, thereby protecting customer choices without the burden of a decades-old regulatory framework.

But barring that legislative approach, the FCC should be wary of freeing up internet companies to once again behave in an anti-competitive fashion. Excessive regulations may hamper innovation, but so would unchecked internet monopolies.

The commission is accepting public comments on the issue through Monday.

The current approach may not be the best one in the long term, but protecting net neutrality should be a top priority for the FCC — and every American who uses the internet.

[http://www.postandcourier.com/opinion/editorials/fcc-should-save-net-neutrality/article\\_75924284-673b-11e7-b403-27be99bbff32.html](http://www.postandcourier.com/opinion/editorials/fcc-should-save-net-neutrality/article_75924284-673b-11e7-b403-27be99bbff32.html)

# Broadband Access and Content Services Whitepaper

July 17, 2017

Larry Thompson, PE  
CEO  
605-995-1740  
[larry.thompson@vantagepnt.com](mailto:larry.thompson@vantagepnt.com)

Brian Enga, PE  
Senior Technology Leader  
605-995-1745  
[brian.enga@vantagepnt.com](mailto:brian.enga@vantagepnt.com)

# 1 Executive Summary

The local loop that is used for delivering broadband services to an end user customer is sometimes referred to as the “broadband access network” or the “broadband pipe.” From the consumer’s point of view, it is the “transport” system for the broadband content services they want. These broadband services may include things such as voice, video, health monitoring, email, and web pages which may be delivered from a local source (such as their Internet Service Provider) or remote source (somewhere on the global Internet). As we will see later, the broadband loop is like the train track and the broadband services, or content, are like the cars of the train. The train track (similar to a transport network) is required for the train to reach its destination, but the train track and the train cars are separate and distinct from each other. A train track could be constructed to connect two grain elevators or may be connected to a larger network of train tracks which would allow the trains to access locations nationally or even internationally. Similarly, the broadband loop may provide transport to specific locations or may give access to the global internet.

The internationally standardized Open Systems Interconnection (OSI) model separates communication networks into distinct functional layers. Broadband loop and the broadband services (or “broadband content”) operate on separate and distinct layers of the OSI model. Since they operate on separate and distinct layers of the OSI model, they are not integrated services and can be separated. To understand this, we must have a better understanding of broadband content and the broadband access network.

Consumers often equate content services with the Internet. However, broadband content can be from three sources:

1. **Internet based content** – this comprises the majority of the content carried across broadband access networks from content providers such as Netflix, Amazon, Google, and Facebook.
2. **Local broadband access provider content** – the broadband access provider may offer services such as email and video services to end users.
3. **Direct end user content** – the end user may have content applications that communicate directly between their sites (such as between bank branch sites).

Like our train analogy, the broadband access network can also be implemented in two different scenarios:

1. **Direct connection** – the end user can construct their own facilities. These facilities could either be directly between multiple end user sites or to an Internet exchange point.
2. **Third-party connection** – in most cases, end users subscribe to broadband access through a local third-party provider. These third-party providers would include telephone companies, cable companies, and wireless (satellite and terrestrial) providers.

Because the content and the access network are distinct from each other, an end user can make their decision on selecting a broadband “transport” provider separate from the content providers that they want to utilize.

## 2 Network Layer Definitions

Broadband service as ordered by an end user customer can be broken down into distinct functional layers. To conceptually understand the process behind a broadband network, the Open Systems Interconnection Model (OSI)<sup>1</sup> can be used to describe the layers of the network and the relation of one to another. The OSI model consists of seven layers in which the lower layers deal with broadband access (broadband loop), such as, electrical signals, binary data, and physical cable connections. The higher layers deal with the broadband content, such as, representation of data, and user interfaces. In this model, a layer serves the layer above it and is served by the layer below it. An overview of the OSI model is described in Figure 2-1.

OSI Layer	Layer Name	Layer Description
7	<b>Application Layer</b>	Message format, Human-Machine Interfaces
6	<b>Presentation Layer</b>	Coding into 1s and 0s, encryption, compression
5	<b>Session Layer</b>	Authentication, permissions, session restoration
4	<b>Transport Layer</b>	End-to-end error control
3	<b>Network Layer</b>	Network addressing, routing or switching
2	<b>Data Link Layer</b>	Error detection, flow control on physical link
1	<b>Physical Layer</b>	Bit stream: Physical medium, method of representing bits

**Figure 2-1: Overview of OSI Model**

The first layer is called the Physical layer and its task is to transmit digital bits of data. In other words, digital data bits are sent from a source device through network communications media to the receiving destination device. Typical devices used in this level are cables, hubs, and repeaters.<sup>2</sup>

Next, the Data Link layer is served by the physical layer. In this layer, Data Link detects errors that could have occurred in the physical layer. It then puts these data bits into network frames where it defines a protocol to establish and terminate a connection between two physically connected devices. Since this is the most complex layer in the OSI model it is typically broken into two sections, "Media Access Control" and "Logical Link Control".

The third layer is called the Network layer, it adds the task of routing to the Data Link layer. Here, data arrives, and the addresses packed into each frame of bits are examined to determine if the data has reached its destination node, or if it needs to be sent elsewhere. Once at its destination, it puts this data into packets and sends it to the transport layer.

<sup>1</sup> International Organization for Standardization (ISO) standard ISO/IEC 7498-1

<sup>2</sup> Mitchell, Bradley. "The OSI Model Explained in Easy Steps." *Lifewire*. N.p., n.d. Web. 07 July 2017. (<https://www.lifewire.com/layers-of-the-osi-model-illustrated-818017>)

Once these packets are at the Transport layer, they are sent out and delivered to their destination. In most cases the Transmission Control Protocol (TCP) is used to deliver the data packets while checking for errors in the packets once they arrive at their destination.

The fifth layer is called the Session layer, where dialogue between computers is controlled. It manages and terminates connections between local and remote applications along with using TCP to easily close down sessions.

Following the Session layer is the Presentation layer, which is layer 6. The Presentation layer is typically part of the operating system (OS) where it converts incoming and outgoing data from one presentation format to another. Along with data conversion, encryption and decryption of data are done in order to support the final layer.

The last layer, Layer 7, is known as the Application layer, or the layer that the user directly interacts with. Here, interaction is done between the software application that implements a communications component and the end-user. These functions typically include identifying communications partners, determining resource availability, and synchronizing communications.<sup>3</sup>

We will see in the following sections how these OSI layers relate to an end user's broadband connection.

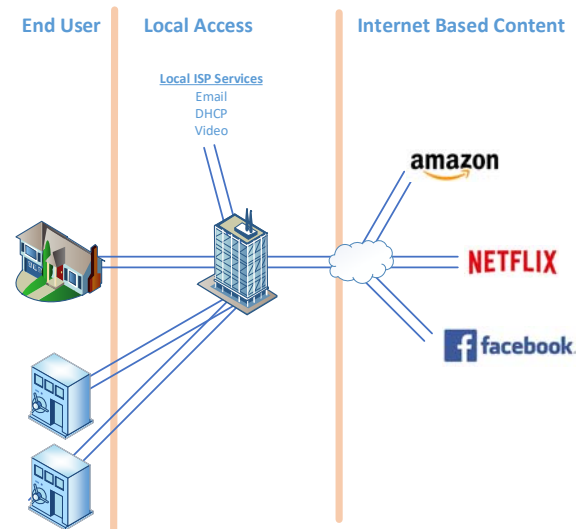
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<sup>3</sup> What is OSI reference model (Open Systems Interconnection)? - Definition from WhatIs.com." SearchNetworking. N.p., n.d. Web. 07 July 2017. (<http://searchnetworking.techtarget.com/definition/OSI>)



### 3 Content Services

The majority of content services that subscribers access today are provided by Internet-based entities outside of the local broadband access provider as shown in Figure 3-1.



**Figure 3-1: Broadband Connections and Content Services**

These Internet based content services connect people and machines throughout the world and have changed the way we communicate, educate, provide healthcare, and buy and sell goods. In recent years, there has been rampant growth of e-commerce sites like Amazon, sites that are used for both news and social purposes like Facebook and Twitter, video communications services like Skype, and video streaming services such as Netflix and YouTube, as well as Instagram, Snapchat, and hundreds of other sites and applications we take for granted today. Netflix alone accounts for more than one-third of all Internet traffic in North America.<sup>4</sup> The Internet of Things (IoT), smart grid and smart city applications, and distance learning and telemedicine functions are also only in nascent stages of anticipated exponential growth.

Additionally, residential and business end users are increasingly utilizing cloud storage and computing services. Microsoft cloud products are predicted to be 30% of their revenue by 2018 and other platforms such as Amazon Web Services (AWS) are experiencing large revenue growth.<sup>5</sup>

In addition to these Internet based services, a local service provider (their Internet Service Provider or ISP) may also offer some services to the end user, such as email and video services.

<sup>4</sup> More than a Third of North American Internet Traffic is on Netflix, Speed Matters, June 27, 2016 (<http://www.speedmatters.org/news/more-third-of-north-american-internet-traffic-on-netflix>)

<sup>5</sup> Roundup of Cloud Computing Forecasts and Market Estimates 2016, Forbes, Louis Columbus, March 13, 2016 (<http://www.forbes.com/sites/louiscolombus/2016/03/13/roundup-of-cloud-computing-forecasts-and-market-estimates-2016/#4472fbb074b0>)



These applications communicate directly between the end user and their local ISP over the broadband connection, without traversing the Internet.

These content services communicate over OSI layers 5-7 as described in section 2 (above the broadband access layers). While these content services require a broadband connection to the end user, they are not tied to specific broadband access provider or technology. A subscriber can select any broadband provider which serves their area without making sure that it is compatible with the content services. From their stand-point, content service providers rely on being able to deliver their applications across any broadband provider network. This provides them the opportunity to innovate compelling content for a large potential customer base.

## 4 Broadband Access

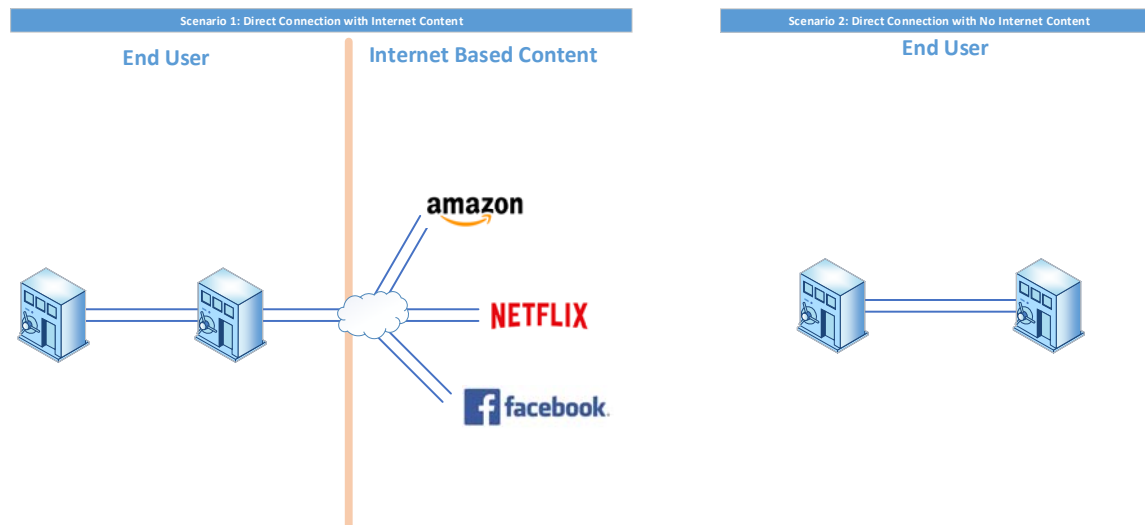
As discussed, the broadband access provides the transport to the Internet that the content services travel across. To obtain this connection, the end user must either obtain their own facilities or subscribe to a third party broadband access service. The broadband access occurs across the lower OSI layers 1-4. Fiber (FTTP), copper (DSL), coaxial (DOCSIS), or wireless (terrestrial or satellite) technologies can be utilized.

While the majority of traffic over the broadband access network is Internet based content, the same concepts apply if the end user is connecting directly to points other than the Internet. For example, a bank can establish a broadband connection between two branch sites to enable applications to securely exchange information between the two banks. In this scenario, the broadband pipe between the sites could be subscribed through a third-party access provider or through direct connections.

Additionally, while Internet connectivity is typically provided by the broadband access provider, it is not required. It is like purchasing ice cream from an ice cream shop. The ice cream (broadband connection) typically comes in a cone (Internet content), but the ice cream can be purchased by itself without the cone.

### 4.1 Direct

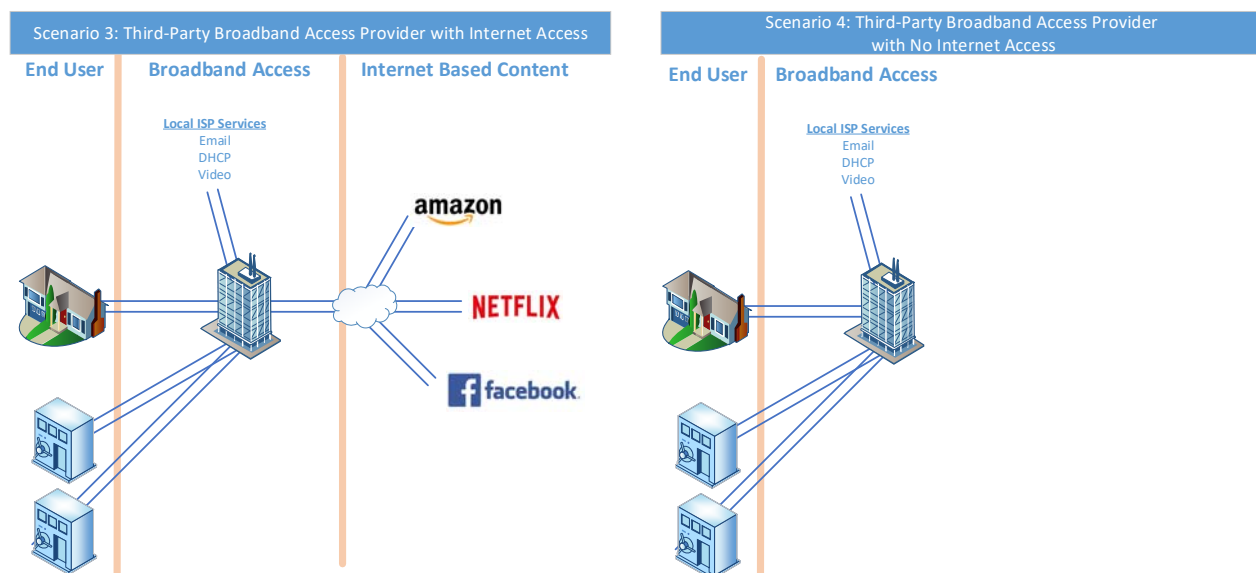
In some cases, such as a large business, the end user may construct facilities or purchase/lease facilities to make a direct broadband connection either between two end users (Scenario 1) or between the end user and the Internet (Scenario 2) as shown in Figure 4-1. In terms of the train comparison, it is like constructing train tracks between two grain elevators. Direct connections are rarely used by residential customers, but are not uncommon for larger businesses. These direct connections bypass the local ISP. By doing this, they have to take care of some of the services are normally handled by an ISP such as the assignment of IP addresses, email servers, and DNS services. With a direct connection, the business could either construct the cable facilities that make these connections or lease them from others.



**Figure 4-1: Direct Broadband Access Connection Scenarios**

## 4.2 Via Third-Party

In most cases, end users purchase their broadband connections through third-party broadband access providers. In the train comparison, this is like putting the train cars onto a train system with transportation hubs that connect into regional and national rail networks. These third-party providers would include cable companies, telephone companies, and wireless providers (terrestrial and satellite). Similar to the direct connection scenario, the third-party broadband access provider can provide connections with or without Internet access. As with the direct connections, the connection is separate and distinct from the Internet content and services.



**Figure 4-2: Third Party Broadband Access Connection Scenarios**

## 5 Summary

In summary, from a technical standpoint and international standards, the broadband access network (transport) and the content services are distinct from each other. The content services (the train cars) rely on broadband access networks (the train tracks) for transport. However, these transport networks can include a variety of different wireline and wireless technologies that may or may not interface with the Internet. Likewise, the content services may be from a variety of sources, including end user content, local service provider content, and Internet based content.



### **About the Authors**

Larry Thompson is a licensed Professional Engineer and CEO of Vantage Point Solutions. Larry has a Physics degree from William Jewell College and a Bachelor's and Master's degree in Electrical Engineering from the University of Kansas. He has been working in the telecommunications industry for more than 25 years. Larry has helped hundreds of rural telecommunication companies be successful in this rapidly changing technical and regulatory environment. He has designed and implemented many broadband wireless and wireline transport networks as he has assisted his clients in their transition from legacy TDM networks to broadband IP networks.

Brian Enga is a licensed Professional Engineer and part of the Senior Engineering team at Vantage Point Solutions. Brian has Bachelor's of Science degrees in Electrical Engineering and Engineering Physics from South Dakota State University. He has been working in the telecommunications industry for nearly 20 years. Brian has engineered and deployed a variety broadband transport networks and has worked with content providers to deliver services, such as IPTV services.