**Before the**
**FEDERAL COMMUNICATIONS COMMISSION**
**Washington, DC**

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|---|---|---|
| **In the Matter of** | ) | |
| | ) | |
| **Inquiry Concerning the Deployment of Advanced** | ) | |
| **Telecommunications Capability to All Americans** | ) | **GN Docket No. 07-45** |
| **in a Reasonable and Timely Fashion, and Possible** | ) | |
| **Steps to Accelerate Such Deployment Pursuant** | ) | |
| **to Section 706 of the Telecommunications Act** | ) | |
| **of 1996** | ) | |

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# COMMENTS OF THE FIBER-TO-THE-HOME COUNCIL IN THE NOTICE OF INQUIRY

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May 16, 2007

## TABLE OF CONTENTS

**Page**

## SUMMARY

The Fiber-to-the-Home ("FTTH") Council's comments herein are directed toward the threshold issue raised in the *Section 706 NOI*: should the Commission alter its definition of "advanced telecommunications capability," and, if so, what should be the new definition? The FTTH Council believes the current definition of at least 200 kilobits per second ("kbps") – adopted in 1999 – both downstream and upstream has served its purpose and is no longer relevant either in terms of the technology or the marketplace. Instead, the Commission should adopt a definition that both reflects current market realities and will evolve as circumstances change. Such a definition should be based upon tiers of advanced services and distinguish between wireline and wireless networks. The FTTH Council suggests the following definition for wireline advanced services capability:

- Current Generation – 1.5 Mbps downstream; 256 kbps upstream
- Next Generation – 10 Mbps downstream; 1 Mbps upstream
- Future Generation – 100 Mbps downstream; 10 Mbps upstream

This forward-looking definition is well-supported by the substantial amount of information that exists about delivery technologies and actual service offerings today and improved prediction about future requirements.

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## COMMENTS OF THE FIBER-TO-THE-HOME COUNCIL IN THE NOTICE OF INQUIRY

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The Fiber-to-the-Home Council ("FTTH Council"), through its undersigned counsel, hereby respectfully submits its comments to the Federal Communications Commission ("Commission") in response to the Notice of Inquiry ("*Section 706 NOI*") issued in the above-captioned proceeding.[1]

The FTTH Council is a non-profit organization established in 2001. Its mission is to educate the public and government officials about fiber-to-the-home ("FTTH") and to promote and accelerate FTTH deployment and the resulting quality of life enhancements FTTH networks make possible. The FTTH Council's members represent all areas of the broadband access

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[1] *In the Matter of Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to . . .Continued*

industry, including telecommunications, computing, networking, system integration, engineering, and content-provider companies, as well as traditional service providers, utilities, and municipalities. As of today, the FTTH Council has more than 135 entities as members.[2]

## I. Introduction

The FTTH Council's comments herein are directed toward the threshold issue raised in the *Section 706 NOI*: should the Commission alter its definition of "advanced telecommunications capability," and, if so, what should be the new definition? In brief, the FTTH Council believes the current definition of at least 200 kilobits per second ("kbps") both downstream and upstream – adopted in 1999[3] – is no longer relevant either in terms of the technology or the marketplace. Instead, the Commission should adopt a definition that both reflects current market realities and will evolve as circumstances change. Such a definition should be based upon tiers of advanced services and distinguish between wireline and wireless networks. The FTTH Council suggests the following definition for *wireline* advanced services capability:

- Current Generation – 1.5 Mbps downstream; 256 kbps upstream
- Next Generation – 10 Mbps downstream; 1 Mbps upstream
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*Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996,* Notice of Inquiry, GN Docket No. 07-45, Rel. April 16, 2007.

2 A complete list of FTTH Council members can be found on the organization's website, http://www.ftthcouncil.org.

3 *See Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, Report*, 14 FCC Rcd 2398, (1999), where the Commission defined "advanced telecommunications capability" as upstream and downstream communications paths capable of supporting a speed in excess of 200 kbps.

This forward-looking definition is well-supported by the substantial amount of information that exists about delivery technologies and actual service offerings today and predictions about future user demands and requirements.

## II. For Wireline Networks, Broadband Penetration and Data Rates Continue to Increase Significantly

As noted in the *Section 706 NOI*, the Commission has used the 200 kbps definition of advanced telecommunications capability (or advanced services) for almost a decade.[4] When it first was adopted, the predominant mode of accessing the Internet was utilizing dial-up service, with advanced services having a *de minimis* share of the market. In a very real sense, the Commission adopted the 200 kbps definition as a keystone to encouraging the deployment, under the aegis of Section 706, of advanced services. While the adoption of this definition was important at the time given the circumstances then prevailing, the 200 kbps no longer serves as a meaningful threshold standard.

Dial-up use peaked in 2002 and has decreased since.[5] By 2005, subscribers to wireline "broadband services"[6] (either cable modem service or telephony DSL service) surpassed the number of dial-up subscribers. In the intervening years, broadband growth has continued unabated, with subscribers to cable modem service increasing by 15% in 2006 and DSL subscribers by over 29% in the same period. At the end of 2006, almost 45% of households in

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4 *Section 706 NOI* at ¶12.

5 The statistics in this paragraph can be found in the *HSD/VoIP Outlook & 4Q06 Review: Cable vs Telco Competition Heats Up*, UBS Investment Research, April 4, 2007, Table 1, p. 5. ("*UBS Report*")

6 For purposes of the discussion in these comments, broadband services and advanced services are synonymous.

the United States subscribed to broadband service and this penetration level is expected to increase to over 70% by year end 2010.

| | 2002 | 2004 | 2006 | 2008E | 2010E |
|---|---|---|---|---|---|
| **Internet Subs** | | | | | |
| Dial-Up | 49M | 41M | 31M | 21M | 15M |
| Cable | 11M | 18M | 27M | 35M | 42M |
| DSL | 6M | 14M | 24M | 34M | 42M |
| **Penetration** | | | | | |
| Dial-Up | 46% | 38% | 27% | 19% | 13% |
| Cable | 10% | 17% | 24% | 30% | 35% |
| DSL | 6% | 12% | 22% | 30% | 35%[7] |

Not only is broadband access growing, so too are broadband transmission speeds. According to Technology Futures, Inc., most broadband subscribers have access speeds of 1.5 Mbps downstream. But, increasingly, customers are demanding and being offered data speeds of between 5-10 Mbps.[8] This is confirmed in the Table in *UBS Report* found below.[9] The lowest tier offering from major cable providers is 1.5 Mbps downstream and 256 kbps upstream. For Comcast and Cablevision, the data rates on the low tier are appreciably greater – 6 Mbps/384 kbps and 15 Mbps/2 Mbps, respectively. For the DSL offerings of the major telephone companies, the data rates generally are in the range of 1.5-5 Mbps downstream and 384 kbps upstream. Indeed, Verizon, over its FTTH ("FiOS") network, offers much greater speeds, up to 30 Mbps/5 Mbps in many areas and even 50 Mbps/10 Mbps in select locations.

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7 *Id.*

8 *Broadband Equipment Lives for Local Exchange Carriers*, Lawrence K. Vanston, Ph.D., Technology Futures, Inc., 2007, at 9. ("*Technology Futures Report*")

9 *UBS Report*, Table 2, at 10.

UBS Report 4 April 2007 **Table 2: Comparing DSL versus Cable Modem Offers**

| | Monthly Price | Downstream | Upstream |
|---|---|---|---|
| **DSL PROVIDERS** | | | |
| **AT&T** Oct 3, 2006 | New plans do not require any annual commitment | | |
| | $14.99 | Up to 768 Kbps | Up to 384 Kbps |
| | $19.99 | Up to 1.5 Mbps | Up to 384 Kbps |
| | $24.99 | Up to 3 Mbps | Up to 512 Kbps |
| | $34.99 | Up to 6 Mbps | Up to 768 Kbps |
| **Verizon** | $14.95 | 768 Kbps | 128 Kbps |
| | $19.95 for 3 mos. | 1.5 Mbps | 128 Kbps |
| | $24.95 after (~$23.70) | | |
| **Verizon FiOS** | $34.95-39.95 | 5 Mbps | 2 Mbps |
| | $44.95-49.95 | 15 Mbps | 2 Mbps |
| | $179.95-199.95 | 30 Mbps | 5 Mbps |
| **BellSouth** | $24.95 | 256 Kbps | 128 Kbps |
| | $32.95 | 1.5 Mbps | 128 Kbps |
| | $37.95 | 3 Mbps | 384 Kbps |
| | $46.95 | 6 Mbps | 512 Kbps |
| **Qwest** | $26.99 | 256 Kbps | 256 Kbps |
| | $21.99 | 1.5 Mbps | 896 Kbps |
| | $26.99 | 3 - 5 Mbps | 896 Kbps |
| **Cable MSOs** | | | |
| **Comcast** | $29.99 for 3 mos. $42.95 after. $57.95 (w/o video) | | |
| | | 6 Mbps | 384 Kbps |
| | $42.95 for 3 mos. $52.95 after | | |
| | | 8 Mbps | 768 Kbps |
| **Cox** | $26.95 | 1.5 Mbps | 256 Kbps |
| | $19.99 for 3 mos. $41.95 after. $49.95 (w/o video) | | |
| | | 7 Mbps | 512 Kbps |
| | $56.95 | 12 Mbps | 1 Mbps |
| **Cablevision** | $29.95 for 12 mos. $44.95 after | | |
| | | 15 Mbps | 2 Mbps |
| | $44.95 for 12 mos. $59.90 after | | |
| | | 30 Mbps | 2 Mbps |
| **Charter** | $19.99 for 3 mos. $42.99 after | | |
| | | 3 Mbps | 256 Kbps |
| | $49.99 for 3 mos. $59.99 after | | |
| | | 5 Mbps | 512 Kbps |
| | $69.99 for 3 mos. $79.99 after | | |
| | | 10 Mbps | 1 Mbps |
| **Time Warner** | $29.95 | 1.5 Mbps | 384 Kbps |
| | $44.95 | 7 Mbps | 512 Kbps |
| | $54.95 | 10 Mbps | 1 Mbps |

All of these data transmission speeds are expected to increase substantially in the next decade. Technology Futures contends the "average data rate increases by 42% per year" reflecting Moore's Law (computer performance doubles every 18 months to two years).[10] It believes that subscribers have already "begun the shift to much higher data rates in the neighborhood of 24 Mb/s."[11]

The increased rates of subscribership to higher speed broadband services have been propelled in part by the fact that prices have remained reasonable even as speeds have increased. Cable and telephone providers generally charge below $30/month for their 1.5 Mbps downstream services. Services offering ten times that speed, like Verizon's 15Mbps/5Mbps FiOS service or Cablevision's 15Mbps/2Mbps service, cost less than $50/month[12]

In sum, the provision of broadband services is following a trend akin to that in the computer industry, where performance ratchets up continuously (and geometrically) while price per unit of performance drops dramatically. Yet, while so much has evolved in the intervening years, the Commission's dial-up era definition of advanced services has remained fixed. Accordingly, the definition has lost any real meaning as a tool to impel the industry to deploy higher-speed offerings.

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10 *Technology Futures Report* at 9.

11 *Id.*

12 *UBS Report*, Table 2 at 10.

## III. Internet Provided Content and Applications File Sizes are Growing Dramatically and Require Increasingly Greater Bandwidth to Satisfy End-User Demands

The threshold definition for advanced telecommunications capability has been a surrogate for the end-user having a satisfactory Internet experience accessing and transmitting a wide variety of data with increasingly large file sizes or other requirements. The user needs to be able to receive and send information within a sufficiently short time – a time dependent on the user's expectation and the type of information being received or sent. These expectations have changed over time, putting a premium on accelerated response times that would have been almost unthinkable when the current standard was adopted. For instance, on-line gamers expect to interact with other users when playing fast-moving, multi-player games over Internet connections at speeds simply unavailable to homes in the late 1990's. As for business, entertainment or instructional video, users will be more demanding for a real-time transmission than a program to be stored and played at another time. Thus, the Commission in establishing the definition of advanced telecommunications capability should ensure a satisfactory Internet experience for all these users in an era where different types of content and applications are entering the market and where video and audio file sizes are continuing to grow dramatically.

In 2004, end-users began shifting their Internet demand from audio to video content. For that year, audio transmissions via Peer-to-Peer networks (which comprised 60% of total Internet traffic) were approximately 6% of Internet traffic worldwide, and video transmissions were approximately 37% of that amount.[13] Since then, the amount of video traffic has continued to

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[13] P2P in 2005, Presentation by Andrew Parker, Co-founder and CTO, CacheLogic. http://www.cachelogic.com/home/pages/studies/resource/p2p2005/slide01.jpg

explode, and, because the file sizes of video are vastly larger than audio, network service providers are increasing the data rates offered to end users to ensure timely access.

According to comScore Networks's Executive Vice President, Jack Flanagan, "Consumers clearly view video as one of the most accessible, interesting and entertaining sources of content on the web. The trends we're witnessing indicate that online video is emerging from its infancy and entering the mainstream."[14] comScore determined that in January, 2007, approximately 70% of U.S. Internet users downloaded videos, and that more than 7 billion videos were downloaded. It also is important to note that most users accessed these videos during the week in "Primetime," placing a particular stress on broadband networks and further highlighting the need for greater data rates. The leading site for streaming in January were the Google sites (including YouTube), which streamed 1.167 billion videos. On average, an Internet user accessed 59 streams during the month and viewed 151 minutes of video (or 2.6 minutes per video).[15]

The efficient and timely delivery of these video services, with their larger file sizes[16], requires high-speed broadband connections, not only for downloads but also for uploads as home-produced video becomes more common. The importance of access to higher-speed connections can be seen by examining the transmission speeds of a short video versus that of a

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14 comScore Networks Press Release, Online Video Officially Goes Mainstream as YouTube.com Breaks Into the comScore Media Metrix Top 50, August 15, 2006. http://www.comscore.com/press/release.asp?press=982.

15 The data in this paragraph can be found in the comScore Networks Press Release, *'Primetime' U.S. Video Streaming Activity Occurs on Weekdays Between 5-8 P.M.*, March 21, 2007. http://www.comscore.com/press/release.asp?press=1264.

16 For Peer-to-Peer networks, in 2005, the average size of traded files exceeded 100 MB, and many files exceeded 600 MB. *See P2P Fuels Global Bandwidth Binge*, Joanna Glasser, WIRED, April 14, 2005. http://www.wired.com/print/techbiz/media/news/2005/04/67202.

feature-length movie. To deliver a relatively short video (50 MB file size) over a 10 Mbps connection takes approximately 5 seconds and over a 3 Mbps connection almost 13 seconds. To access a DVD movie (7400 MB file size) requires little additional time – 86 seconds – if it is transmitted over a 100 Mbps (for instance, fiber-to-the-home) connection. In contrast, if one were to use a typical 6 Mbps (cable modem or DSL) connection offered today, such a download would take about 15 minutes, changing the user's experience significantly.[17]

The demand for greater bandwidth will increase even further because the federal government is mandating a shift from analog to digital broadcasting. This in turn is propelling a major and imminent change throughout all video media as producers and consumers move from analog video – which requires 6 Mbps for timely delivery in either a MPEG2 or MPEG4 compression format – to digital, high definition video – which, in a 1080i format, requires 20 Mbps (MPEG2) or 8 Mbps (MPEG4), and in a future Super HDTV format requires 60 Mbps and 32 Mbps, respectively.[18] Consumers are procuring DTV sets in record numbers to view broadcast television directly, via cable, satellite, or telephone, or via an Internet connection. In 2005, 12 million DTV sets were shipped, and, in 2006, DTV sets outsold analog sets by a large margin.[19] It is clear that, despite its high price, HDTV is gaining traction: more HDTV programming will be produced, more HDTV sets will be shipped, and the price of these sets will

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17 For a complete demonstration of connection speeds for various types of information delivery, *see*, http://www.utopianet.org/why/meter.html.

18 *The New Economics of Fiber*, p. 11.

19 "2006 IS THE YEAR OF DTV, FORECASTS CEA," press release, January 4, 2006. http://www.cesweb.org/print/press/news/rd_release_detail.asp?id=10913. "CEA: Consumer HDTV Demand Steady," TVWeek.com, October 19, 2006. http://www.tvweek.com/page.cms?pageId=342.

continue to decline – all of which indicate that higher speed access connections will be in great demand.

Of course, there are a great many other Internet applications in use today requiring greater bandwidth. Telementoring by health care professionals over the Internet requires transmission speeds of 10 Mbps to ensure good quality images.[20] E-Learning video applications tend to be more interactive and thus can have even greater data rate requirements.[21]

Given these new, bandwidth-intensive services and the increasing demands for access to high definition and other video programming, an average consumer in just a few years will require a network capable of transmitting information at almost 100 Mbps (3 HD video streams, Internet access at 50 Mbps symmetrical, and other applications).[22] According to a senior Vice President from Cisco, "By 2010, the typical home will have standard-definition and high-definition TVs, voice, data, and time-delayed TV. The bandwidth needs of just 20 homes will be equal to that of the entire Internet in 1995."[23]

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20 *Technology Insight: telementoring and telesurgery in urology*, Ben Challacome et al, Nature Clinical Practice, November, 2006, Vol. 3 No. 11, at 613.

21 *See* http://www.ecampus.com.au/blog/education-bandwidth.

22 *The New Economics of Fiber*, John George, Director FTTx Solutions, OFS, delivered at the Digital City Expo, 2006, p. 14.

23 *Bandwidth Demand has brought life to OFC*, Martin Rowe, Test & Measurement World, March 28, 2007. http://www.tmworld.com/index.asp?layout=articlePrint&articleID=CA6428697.

## IV. The Commission Should Define Advanced Telecommunications Capability Based on Current Generation, Next-Generation, and Future Generation Demands by Consumers and Requirements of Content/Applications Providers

As demonstrated herein, advanced services technology and the market have changed greatly since the Commission first adopted its 200 kbps definition. Further, all trends clearly indicate that this evolution will continue. Consequently, the Commission should seek to craft a "living" definition that reflects (1) end-users' current perception of advanced services and (2) the shared goals of meeting consumer's anticipated needs, encouraging network investment and deployment, and providing global economic leadership. To that end, the FTTH Council proposes that advanced services for the wireline sector be defined as:

- Current Generation – 1.5 Mbps downstream; 256 kbps upstream
- Next Generation – 10 Mbps downstream; 1 Mbps upstream
- Future Generation – 100 Mbps downstream; 10 Mbps upstream

As can be seen from the information submitted in these comments, the current generation data rates are commonly found on the lowest tier of cable modem and telephone DSL offerings. The next generation data rates reflect the upper bounds of today's services. So, the technology is available, and end-users are just beginning to make the jump to these services. As for the speeds for future generation advanced services, they are about to be offered for FTTH networks and are possible over cable networks with DOCSIS 3.0. These networks are beginning to be deployed more widely, yet the Commission has a significant role in encouraging their deployment.[24]

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[24] The FTTH Council notes that in the United States Senate, Senator Rockefeller has introduced Senate Resolution 191 calling for a "100 Megabit Nation" by 2015. This resolution provides that "the Senate-- (1) establishes a national next-generation

. . .*Continued*

Finally, the Commission should revisit this definition in several years with the aim of refining them again to fit the new "current" status of technology and the market, as well as future trends.

## V. Conclusion

The Commission is to be commended for its efforts to encourage the deployment of advanced services capabilities, and the current definition has served its purpose. The Commission should now adopt a new definition – one that drives the United States forward to be the global leader in state-of-the-art advanced services deployment.

Respectfully submitted,

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May 16, 2007

broadband network goal to bring, by 2015, universal and affordable access to networks with the capability of transmitting data at 100 megabits per second, bidirectionally, so that households, businesses, and government offices in the United States can access the Internet and, via direct connections, access other households, businesses, and government offices; and (2) directs the relevant congressional committees to work with the President- - (A) to develop a strategy to achieve the national next-generation broadband network goal; and (B) to begin, by the end of 2007, to enact specific legislation and adopt policies to implement this strategy." The text of Senator Rockefeller's statement introducing this resolution is found in the May 8, 2007 *Congressional Record* at S5751.