Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Applications of Comcast Corporation,	)	MB Docket No 14-57
Time Warner Cable Inc., Charter	)	
Communications, Inc., and Spinco	)	
To Assign and Transfer Control of	)	
FCC Licenses and Other Authorizations	)	
	)	

REPLY COMMENTS of ADTRAN, INC.

ADTRAN, Inc. ("ADTRAN") finds it necessary to respond briefly to one of the claims made in the Netflix Petition to Deny the proposed Comcast-Time Warner transaction.[1] As part of its Petition to Deny, Netflix disparages the capabilities of Digital Subscriber Line (DSL) services. ADTRAN wants to set the record straight so that the Commission is not left with any misimpression regarding the robust ability of present DSL technologies to provide all manner of high-quality streamed video services.

ADTRAN, founded in 1986 and headquartered in Huntsville, Alabama, is a leading global manufacturer of networking and communications equipment, with an innovative portfolio including solutions for use in the last-mile of today's telecommunications networks. ADTRAN's last-mile equipment is deployed by some of the world's largest service providers, as well as distributed enterprises and small and medium businesses and schools. ADTRAN is thus very aware of the robust DSL capabilities.

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[1] *Commission Seeks Comment on Applications of Comcast Corporation, Time Warner Cable Inc., Charter Communications, Inc., and SpinCo to Assign and Transfer Control of FCC Licenses and Other Authorizations***,** 29 FCC Rcd 8272 (2014); Petition to Deny of Netflix, Inc., filed August 27, 2014, available at http://apps.fcc.gov/ecfs/document/view?id=7521825167.

Netflix in its Petition to Deny suggests that DSL is not "high-speed" broadband,[2] and more specifically asserts:

> But DSL, mobile wireless, and satellite broadband Internet access are not viable alternatives to high-speed cable broadband for edge providers seeking to deliver high quality video to consumers. In addition, while Netflix has engineered its service to work on DSL systems in standard definition, DSL does not provide enough bandwidth to deliver higher quality video content or work when multiple devices in a household are connected. Nor is DSL likely to be able to provide that functionality in the near future, if ever.[3]

Along the same lines, Netflix also claims that:

> For these reasons, to properly assess whether the Transaction is in the public interest, the Commission must consider its effect on competition in the market for true high-speed, high-capacity Internet connections capable of supporting multiple streams of rich media and interactive content. In the near term, that market is likely defined as connections capable of sustaining at least 10 Mbps for individuals and at least 25 Mbps for households. Traditional DSL, mobile wireless, or satellite broadband are incapable of those speeds at present[52] and are unlikely to keep pace with consumer demand for even greater speeds in the foreseeable future.
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> n. 52: Applications for Consent to the Assignment and/or Transfer of Control of Licenses Adelphia Commc'ns Corp., to Time Warner Cable Inc., to Comcast Corp., Comcast Corp. to Time Warner Inc., Time Warner Inc. to Comcast Corp., *Memorandum Opinion and Order*, 21 FCC Rcd. 8203, 8234 ¶ 59 (2006) ("*Adelphia Order")* ("[Competition depends on having choices among products that are close substitutes for one another.").

Netflix provides no support for its allegation that DSL is incapable of speeds of 25Mbps or more. Its citation to a 2006 Commission decision discussing competitive substitutes as a general proposition says absolutely nothing about the current capabilities of DSL technologies.

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[2] Netflix Petition at p. 12 ("Applicants offer an overbroad definition of high-speed broadband, which includes DSL.").

[3] *Ibid.*

As ADTRAN has explained in several different Commission proceedings,[4] DSL technologies have continued to evolve, and currently are able to support robust high-speed services, including HD video streaming. Significant enhancements have been made in improving the capacity/throughput of DSL by advances such as pair-bonding and vectoring.[5] These advances allow carriers to take full advantage of the extensive base of copper loops that currently comprise much of the telecommunications plant in service. One means of increasing the capacity of DSL service is to utilize fully the multiple copper loops that have already typically been deployed to most homes by "bonding" those loops. Using VDSL2 technology and two-pair bonded loops, broadband download speeds of 80 Mbps can be provided on loop lengths up to 2500 feet. Alternatively, using ADSL2+ technology and two-pair bonded loops, the subscriber can get download speeds of 25 Mbps on loop lengths of up to 10,000 feet. And where there are additional loops (which may be the case for most residences, or for broadband service to businesses or to remote terminals), multi-pair bonding can be used to provide hundreds of Mbps download speeds.

One of the challenges limiting DSL performance is crosstalk between the loops within the same binder group in the network. A solution to mitigate crosstalk is vectoring, which uses

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4 *E.g.*, ADTRAN Comments in GN Docket No. 12-353, filed March 5, 2013; ADTRAN Reply Comments in WC Docket No. 10-90, filed February 13, 2013; ADTRAN Ex parte Submission in WC Docket No. 10-90, filed October 27, 2010.

5 *See also*, Remarks of Tom Wheeler, Chairman, Federal Communications Commission, Mid-Atlantic Venture Association, November 4, 2014, available at http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db1104/DOC-330315A1.pdf at p. 4: "New breakthroughs, however, mean that the old copper infrastructure has a new future. … Yes, the future is fiber. But while copper is old, it is not obsolete."

advanced signal processing techniques to alleviate crosstalk. By performing the signal processing jointly among a group of lines at the DSL Access Multiplexer (DSLAM), rather than performing the signal processing on a line-by-line basis, the crosstalk can be significantly reduced or eliminated, thereby increasing capacity. Using vectoring, DSL download speeds of 100 Mbps can be provided on loops of up to 1800 feet over a single copper loop pair, or that same speed can be provided at up to 3400 feet with two-pair bonding. Vectoring thus provides significant enhancements on relatively short copper loops, and combined with bonding, it allows service on loops of up to 3400 feet at the 100 Mbps download speeds adopted as the longer term goal under the Commission's National Broadband Plan.[6] In addition, companies continue to refine these DSL technologies.[7] Moreover, advances in Outside Plant DSLAMs (OSP DSLAMs) are making it more economical to limit the length of the DSL copper loops to the customer premises, so that these download speeds can be provided on a cost effective basis to many more subscribers. Indeed, because of its cost and capabilities, DSL is the last-mile technology of choice for high-speed broadband services in Europe.[8]

ADTRAN itself is engaged in significant research and development to enhance the capabilities of copper-based broadband technologies. ADTRAN has developed a new product that uses a breakthrough technology called "ActivReach," which allows service providers to

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[6] National Broadband Plan, Chapter 2, Goals for a High Performance America (available at http://www.broadband.gov/plan/2-goals-for-a-high-performance-america/).

[7] *E.g.*, one company, Ikanos, uses NodeScale vectoring to achieve speeds of 100 mbps currently, and anticipates speeds over DSL of 800 Mbps. *See,* http://gigaom.com/2010/10/25/100-mbps-dsl/.

[8] *See, e.g.*, http://fastnetnews.com/dslprime/42-d/4845-dsl-tsunami-rolling-over-europe-first-look.

deliver 100 Mbps of Ethernet services at three times the distance over legacy voice grade wiring in older and historic buildings.[9] ADTRAN also continues to innovate with DSL technologies, having recently introduced a variation of DSL technology that will enable VDSL2 and G.fast to coexist.[10] This will allow DSL carriers to deploy G.fast on a node by node basis, rather than having to upgrade entire markets from VDSL2 to G.fast, thus supporting even more economical broadband upgrades.

Netflix, from its particular perspective of a video services provider, offers "standards" for defining high-speed broadband: "Netflix recommends at least 5Mbps per streaming device for 720p video, 7 Mbps for 1080p, and 25 Mbps per streaming device for Ultra 4K HD video."[11] As shown above, the evolution of DSL technologies allows service providers to significantly exceed those speeds. Thus, DSL, along with cable broadband service and fiber access technologies (*i.e.*, GPON, EPON, etc.), all are capable of serving as suitable alternatives that meet the Netflix

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[9] *See generally*, http://activreach.adtran.com/.

[10] *See, CED Magazine*, August 14, 2014, "Adtran paves VDSL2-to-G.fast trail," available at http://www.cedmagazine.com/news/2014/08/adtran-paves-vdsl2-to-gfast-trail. G.fast allows download speeds of 700 Mbps or more over copper loops between a fiber-fed cabinet and the home. *E.g., Recombu*, "BT's G.fast gigabit broadband over copper trials achieve 700Mbps download speeds," September 25, 2014, available at http://recombu.com/digital/news/bt-gfast-gigabit-broadband-trials-achieve-700mbps-downloads.

[11] Netflix Petition at p. 15. ADTRAN finds it somewhat ironic that Netflix posits these standards for minimum movie delivery speeds, since it still offers to send movies to customers via "snail mail." https://dvd.Netflix.com/.

recommendations for streaming video services. The Commission should therefore disregard Netflix's contrary assertion in its Petition to Deny.

Respectfully submitted,
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