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

In the Matter of	
Technological Transition of the Nation's Communications Infrastructure	WC Docket No. 12-353
Petitions for Rulemaking and Clarification Regarding the Commission's Rules Applicable to Retirement of Copper Loops and Copper Subloops	RM-11358

COMMENTS OF VERIZON AND VERIZON WIRELESS

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COMMENTS OF VERIZON AND VERIZON WIRELESS[1]

Advanced broadband networks have delivered enormous benefits to consumers. The Commission has repeatedly recognized the importance of giving broadband providers the flexibility to determine what technology to deploy and when to make the transition from one generation of technology to the next. At the same time, the Commission has specifically encouraged investment in next-generation networks, such as wireline fiber networks and 4G LTE wireless networks. As TelePacific *et al.* concede, fiber is the "ideal" for wireline networks and offers consumers unparalleled capabilities, reliability, and opportunity. In fact, the Commission has long endeavored to encourage providers to invest in next-generation, fiber-based networks that provide the most future-proof wireline option for consumers as their demand for broadband capacity and performance continues to grow.

At the foundation of these long-settled Commission policies is the acknowledgment that carriers need flexibility in determining the technologies that they will use to serve their

[1] In addition to Verizon Wireless, the Verizon companies participating in this filing are the regulated, wholly owned subsidiaries of Verizon Communications Inc. (collectively, "Verizon").

customers. So far, even as newer networks have been deployed, many customers are still served by copper facilities, thus making actual retirement of copper rare to date. But over time, as customers continue to move to fiber, cable, and wireless networks and the number of customers served by legacy copper facilities continues to drop while the costs of maintaining the copper facilities continue to increase, it ultimately will not make economic sense for a given provider to retain redundant parallel network facilities in some areas. In such areas, carriers should be given the flexibility to determine when it makes sense to retire the copper and rely on their other platforms for serving consumers. The Commission has recognized that if carriers are forced to operate redundant network facilities they are not using and do not need, it will require carriers and consumers to bear unnecessary costs, which will deny carriers the full benefits of their investment and slow future investment in and deployment of advanced broadband networks.

Maintaining this flexibility will further other important policy goals that depend on continued investment in next-generation networks. Policymakers at the federal and state level have been vocal in calling for higher speed, higher quality broadband networks. For example, most recently the Chairman launched a "Gigabit City Challenge." The National Broadband Plan set a goal of 100 million U.S. homes with access to download speeds of at least 100 Mbps by 2020. Broadband companies, state commissioners, vendors, equipment makers, and consumer groups all agree that the collective goal must be to deploy higher speed networks to more consumers quickly. But this goal can be achieved only by ensuring that companies continue to invest in next-generation networks such as fiber: the wireline gold standard for delivering 100 Mbps to Gigabit speeds to a community. The Commission's policies therefore must be geared to promoting increased investment in deployment and upgrades of such networks.

If, as the petitioners urge, the Commission were to move backward on its copper retirement policies and eliminate carriers' flexibility to control their technology choices, the Commission would also competitively disadvantage one set of broadband providers – ILECs – over all others. This would distort the market both by giving greater flexibility to other, often larger, broadband competitors (cable companies) and by favoring business models of companies focused not on deploying facilities but on making do with legacy network facilities at artificially low, regulated prices. To promote fiber deployment and meet the Commission's broadband goals, the Commission should stick with its current policies, which have successfully encouraged tens of billions of dollars of investment in fiber, and which in turn has led to increased investment in other wireline and wireless broadband technologies.

Thus, the Commission should reject the petition by TelePacific *et al.* that is designed to require carriers to maintain older copper facilities even as they invest in advanced technologies and no longer need those copper facilities to serve their own end-user customers.[2] TelePacific *et al.*'s petition provides no reasons for the Commission to reverse its longstanding and successful approach. Instead, the Commission should maintain its focus on fulfilling its existing broadband goals, and should encourage TelePacific and companies with similar business models to engage constructively with wireline carriers to develop feasible wholesale solutions for fiber and other next-generation platforms and/or to take this opportunity to invest in their own network facilities. Such an approach will best serve the evolving demands of consumers.

[2] *See* Letter from Eric J. Branfman *et al.*, Bingham McCutchen LLP, to Marlene H. Dortch, FCC, WC Docket Nos. 10-188, 12-353; GN Docket Nos. 09-51, 13-5; RM-11358 (filed Jan. 25, 2013) ("TelePacific *et al.* Letter").

I. Advanced Broadband Networks Deliver Enormous Consumer Benefits and Further the Commission's Broadband Goals

Investment in advanced broadband networks, including fiber-based networks, has flourished over the past decade under the Commission's policies aimed at encouraging investment in next-generation broadband networks. As just one example, Verizon has spent approximately $23 billion to deploy a fiber-to-the-premises network past nearly 18 million homes and businesses, offering voice, Internet, and video services.[3] More than 14.5 million premises in Verizon's footprint are open for sale, and of those, more than 37 percent already subscribe to FiOS Internet service.[4] Verizon currently plans to continue to expand the reach of its fiber-based network to satisfy existing build-out obligations in various franchise agreements.[5] In addition, Verizon is currently upgrading the capacity of portions of its original fiber network – for example, transitioning from the original Broadband Passive Optical Network ("BPON") to Gigabit Passive Optical Network ("GPON") and otherwise upgrading facilities and equipment and increasing backhaul capacity as needed to continue to support higher capacity services.[6] For example, Verizon began offering FiOS Quantum speeds in 2012, offering consumers a range of services with download speeds up to 300 Mbps.

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[3] *See* Verizon News Release, *Verizon Ushers in New Era of Consumer Broadband; New FiOS Portfolio Features Speeds of 75, 150 and 300 Mbps* (May 30, 2012), http://newscenter2.verizon.com/press-releases/verizon/2012/verizon-ushers-in-new-era-of.html; *Verizon Communications Inc. at Barclays Capital Global Communications, Media, and Technology Conference*, FD (Fair Disclosure) Wire, Transcript 052411a4098804.704 (May 24, 2011) (Verizon Communications Inc., CFO and EVP Fran Shammo refers to "the initial $23 billion investment" in FiOS).

[4] Verizon, *4Q 2012 Investor Quarterly*, at 6, 14 (Jan. 22, 2013), http://www22.verizon.com/idc/groups/public/documents/adacct/vz_4q_quart_bulletins_2012.pdf.

[5] *See* Declaration of Claire Beth Nogay ¶ 22, attached as Exhibit A ("Nogay Decl.").

[6] *See id.*

Numerous other carriers also are investing in IP-enabled broadband networks. Cable operators have invested $200 billion in broadband networks to date, and cable broadband services are now available to at least 93 percent of U.S. households as well as a high percentage of businesses.[7] According to the Commission's data, approximately 38 percent of U.S. households subscribed to cable broadband services as of December 2011.[8] Cable's DOCSIS 3.0 services are now available to at least 82 percent of U.S. homes,[9] providing these households with broadband speeds in excess of 20 Mbps, compared to only 19 percent of U.S. households with access to these speeds in 2009.[10] And wireless providers are racing to roll out 4G LTE wireless broadband services, which offer broadband capabilities often exceeding what is possible over copper, while also bringing the significant benefit of mobility. Verizon Wireless's 4G LTE network, for example, will match the reach of its 3G network later this year – reaching

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[7] Comments of the National Cable & Telecommunications Association ("NCTA") at 1 n.1, *Connect America Fund*, WC Docket No. 10-90 (filed Jan. 28, 2013) ("The cable industry is the nation's largest provider of broadband service after investing $200 billion since 1996 to build two-way interactive networks with fiber optic technology."); NCTA, *Data: Availability (as of June 2012)*, http://www.ncta.com/StatsGroup/Availability.aspx.

[8] *See* Ind. Anal. & Tech. Div., Wireline Competition Bureau, FCC, *Internet Access Services: Status as of December 30, 2011*, at 31, Table 11 & 12, n.16 (Feb. 2012), http://transition.fcc.gov/Daily_Releases/Daily_Business/2013/db0207/DOC-318810A1.pdf.

[9] NCTA, *Data: Availability*, http://www.ncta.com/StatsGroup/Availability.aspx (as of June 2012).

[10] *See* Jaison T. Blair et al., Telsey Advisory Group, *NCTA's Cable Show*, at 1 (May 29, 2012). *See also* Jessica Reif Cohen et al., Bank of America/Merrill Lynch, *Battle for the Bundle: Easier Data, Tougher Voice for Cable*, at 7 (Nov. 21, 2011) (DOCSIS 3.0 will be available to 89 percent of cable homes by the end of 2012); Amy Lind et al., IDC, *U.S. Consumer Fixed Broadband Displacement by Mobile Broadband 2012-2016 Forecast*, at 2, IDC #238547 (Dec. 2012) ("IDC estimates that by year-end 2012, the majority of most operators' networks will be upgraded to DOCSIS 3.0.").

approximately 95 percent of the population[11] – and offers average download speeds of more than 12 Mbps and average upload speeds of approximately 7 Mbps.[12] And other wireless providers are now rolling out 4G LTE services in an effort to keep pace.[13]

The emergence and widespread deployment of advanced broadband networks have created enormous benefits for consumers and have given rise to a competitive and dynamic marketplace in which multiple providers – including device, application, and network providers – compete to provide consumers with access to a full range of IP-based communications services. These advanced broadband networks provide consumers with all of the traditional services they are used to receiving, such as voice, while also offering additional features and a broader range of services that provide even greater benefits to consumers. Moreover, newer broadband platforms are generally more resilient than legacy systems, making them more reliable during natural disasters and reducing operational and maintenance costs over the long term.

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[11] *See* Thomson Reuters Streetevents, *VZ – Q4 2012 Verizon Earnings Conference Call*, Tr. at 5 (Jan. 22, 2013) (Verizon EVP & CFO Fran Shammo refers to "the goal of having a nationwide 4G LTE footprint similar to [Verizon Wireless's] 3G network by midyear 2013"); Bill Stone, Executive Director-Technology, Verizon, *Verizon Wireless: Meeting Customers' Broadband Needs*, at 2 (May 30, 2012), *attached to* Letter from Tamara Preiss, Verizon, to Marlene H. Dortch, FCC, WT Docket No. 12-4 (June 1, 2012) ("Match existing 3G coverage (95% of US Pops) in 2013").

[12] *See* Patrick Linder, RootMetrics, *The Need for Speed! A RootMetrics Review of Data Performance* (Sept. 11, 2012), http://www.rootmetrics.com/special-reports/2012-data-review/.

[13] *See, e.g.*, AT&T Inc., Form 10-K, at 3 (SEC filed Feb. 22, 2013) (AT&T "plan[s] to expand [its] deployment of LTE wireless technology" and "expect[s] to cover at least 250 million people in the United States by year-end 2013 and approximately 300 million people in the United States by the end of 2014."); MetroPCS Communications, Inc., Form 10-K at 7 (SEC filed Mar. 1, 2013) ("As of December 31, 2012, [MetroPCS] served approximately 98% of the population covered by [its] CDMA/EVDO networks with 4G LTE."); Sprint News Release, *Sprint 4G LTE Now Available to Customers in Nine New Markets Including San Juan, Puerto Rico* (Mar. 4, 2013), http://newsroom.sprint.com/article_display.cfm?article_id=2524 ("Sprint introduced its all-new 4G LTE network in July 2012 and now offers service in 67 markets.").

For wireline services, these consumer benefits are particularly pronounced with respect to fiber networks. As the Commission recognized in the *National Broadband Plan*, "deployment of fiber offers consumers much greater potential speeds and service offerings that are not generally possible over copper loops. In addition, fiber is generally less expensive to maintain than copper."[14] The Commission further found that "driving fiber deeper into networks . . . will advance the deployment of both wireline and wireless broadband services" and will "considerably improve[] the performance and reliability" of broadband networks.[15] The Commission concluded that fiber will accordingly be "critical to the effective operation of future communications networks."[16]

As set forth in the attached declaration of Claire Beth Nogay, Senior Vice President of Network Planning and Administration for Verizon, an all-fiber network offers consumers numerous benefits. Fiber is capable of transmitting substantially more throughput than copper, which enables it to provide consumers with a much broader array of services.[17] This, in turn, fosters increased competition – particularly against cable operators – which yields additional

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[14] FCC, *Connecting America: The National Broadband Plan*, at 48-49 (2010), http://download.broadband.gov/plan/national-broadband-plan.pdf ("*National Broadband Plan*").

[15] *Id.* at 111, 114.

[16] *Id.* at 124. *See also Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers*, Report and Order and Order on Remand and Further Notice of Proposed Rulemaking, 18 FCC Rcd 16978 ¶¶ 219, 243 (2003) ("*Triennial Review Order*") ("FTTH is essentially a broad replacement of the existing loop plant. The use of fiber optic cable requires the deployment of network equipment with different features and capabilities from comparable equipment used for copper cable. . . . Upgrading telecommunications loop plant is a central and critical component of ensuring that deployment of advanced telecommunications capability to all Americans is done on a reasonable and timely basis and, therefore, where directly implicated, our policies must encourage such modifications. . . . The replacement of copper loops with fiber will permit far greater and more flexible broadband capabilities.").

[17] *See* Nogay Decl. ¶ 26.

consumer benefits in the form of lower prices and higher-quality services. Indeed, broadband providers have been engaged in a continual "arms race" to provide consumers with greater and greater throughput over newer generations of technology, such as from DOCSIS 2.0 to 3.0 on cable networks, from BPON to GPON on fiber-based networks, from 3G to 4G LTE on wireless networks, and the deployment of new satellite broadband technologies, all of which have driven down the price of bandwidth on a per-megabit basis. In addition, fiber facilities are much more resilient than copper and therefore have lower maintenance costs over time, enabling providers to concentrate future investment on next-generation technology rather than on repairing legacy copper plant.[18] Fiber facilities also face lower outage risks from weather events and aging than legacy copper facilities because, among other things, fiber is non-metallic, thus making it less susceptible to environmental risks such as water damage, corrosion, and lightning.[19] Fiber networks also consume less power than legacy copper facilities, which not only lowers operating expenses but also furthers U.S. environmental and energy policies that seek to replace older, less efficient technologies with newer and more efficient ones.[20]

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[18] *See id.* ¶¶ 6, 25, 37.

[19] *See id.* ¶ 25.

[20] P. Reviriego, D. Larrabeiti, J.A. Maestro, J.A. Hernández, P. Afshar and L.G. Kazovsky, 2010 Optical Society of America, *Energy Efficiency in 10Gbps Ethernet Transceivers: Copper Versus Fiber*, at 3 (2010), http://www.nebrija.es/~jmaestro/esa/papers/OFC10.pdf ("In this paper the energy efficiency of 10Gbps Ethernet copper and fiber PHYs has been compared. The results show that optical PHYs will be more energy efficient even when the new Energy Efficient Ethernet standard is implemented on copper PHYs. This is an interesting result that ensures the advantage of optical Ethernet in terms of energy efficiency for the coming future."); Corning Cable Systems, *The Green Advantage of 10G Optical Fiber*, at 3 (Dec. 2011), http://csmedia.corning.com/CableSystems//Resource_Documents/whitepapers_rl/LAN-1078-EN.pdf ("10G optical switch electronics and server adapter cards require less power to operate compared to 10G UTP copper. 10G UTP copper requires significant analog and digital signal processing for transmission that consumes significantly higher energy when compared to optical media. . . . 10G optical connectivity's lower energy utilization contributes to a more environmentally friendly performance compared to 10G copper. Lower energy consumption

Encouraging continued investment in the deployment and upgrade of next-generation networks, such as fiber and 4G LTE, has become particularly critical in light of the Commission's broadband goals. The Commission seeks to have broadband service at 100 Mbps available to 100 million homes by 2020.[21] And the Chairman issued his "Gigabit City Challenge," calling for at least one Gigabit-Internet community in every state by 2015.[22] The Chairman has also stated that "[f]or the United States to remain globally competitive, we need to keep pushing the boundaries of broadband capabilities and foster testbeds of broadband innovation. Abundance in broadband speeds and capacity – moving from megabits to gigabits – will unleash breakthrough innovations in healthcare, education, business services, and more."[23]

II. Preserving Providers' Flexibility To Decide What Technologies To Deploy and When To Move from One Generation of Technology to the Next Will Encourage Continued Investment in Advanced Broadband Networks

A. Policies that have given providers the flexibility over their technology choices and transitions have encouraged fiber investment and the transition to next-generation networks

The Commission's long-standing policies have given providers the flexibility to determine what technologies to deploy in their networks and when to move from one generation of technology to the next. As demonstrated above, market forces have successfully propelled

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equates to lower carbon dioxide (CO2) emissions. . . . In tangible terms, the reduction in CO2 emissions through use of one 48-port 10G optical system equates to nine fewer automobiles on U.S. highways.").

[21] FCC Chairman Julius Genachowski, *Broadband: Our Enduring Engine for Prosperity and Opportunity*, Remarks Before NARUC Conference, Washington, D.C. (Feb. 16, 2010).

[22] FCC News Release, *FCC Chairman Julius Genachowski Issues Gigabit City Challenge to Providers, Local, and State Governments To Bring at Least One Ultra-Fast Gigabit Internet Community to Every State in U.S. by 2015* (Jan. 18, 2013).

[23] FCC News Release, *Statement from FCC Chairman Julius Genachowski on Google Fiber Kansas City Announcement* (July 26, 2012).

broadband providers to invest heavily in next-generation broadband networks, which has long involved retiring old networks and technologies when the costs of maintaining them exceed the benefits. The Commission's policies to encourage investment in next-generation fiber networks have accordingly given providers the flexibility to determine when it makes sense to retire the legacy copper facilities.

If, as the petitioners urge, the Commission were to change the status quo by eliminating ILECs' flexibility over their networks and requiring them to incur the costs of maintaining copper or other facilities no longer needed to serve their customers – in effect, compelling them to maintain two networks rather than one – it would necessarily divert resources better spent deploying or enhancing their next-generation networks, to the detriment of consumers. This shift would threaten national broadband goals because reducing the anticipated cost savings associated with copper retirement would undermine the future business case for investment to deploy new and expand the capabilities of existing next-generation networks. It would also unfairly reverse the settled, and successful, policies on which providers have relied in making investment decisions over the last decade.

As companies consider whether to make the substantial investments required to deploy or to further enhance next-generation broadband networks, they must consider the return on these investments. This calculation includes accounting for not only the costs of deployment and the anticipated revenue from the full range of services that will be offered over new facilities, but also any anticipated cost savings and efficiencies from migrating customers off of, and ultimately retiring, less efficient legacy facilities.[24] As companies nationwide are making such investment decisions, eliminating the flexibility over their investments and requiring them to maintain

[24] *See* Nogay Decl. ¶¶ 18-21, 23, 25-26, 34-37.

duplicate networks not needed to serve their customers in areas with access to next-generation networks will only impose significant costs on their customers and undermine the investments required to deploy (and enhance) such networks.

B. The costs of maintaining copper facilities are substantial and unnecessary in areas where newer networks have been deployed and copper is not needed to serve customers

The costs to keep copper facilities maintained and running in areas where next-generation networks have been deployed are substantial. For example, where Verizon's all-fiber network has been deployed, Verizon's costs of maintaining the copper facilities in those areas are more than $200 million per year.[25] These costs are incurred even if *no* customers are actually being served by the copper. And these costs grow, as a relative matter, as fewer customers utilize the legacy facilities. As costs rise due to the increasingly underutilized copper facilities, those costs will hamper further investment in and enhancement of next-generation infrastructures that would otherwise supplant it.

As Ms. Nogay explains, the costs of operating and maintaining legacy copper facilities in areas where copper ultimately is no longer needed to serve customers would fall into three main categories. First, some maintenance operations are directly related to usage and would not be required if a provider retired copper in such areas and did not use the copper at all. The costs of such operations would include replacing and/or repairing aerial or buried drops, addressing customer-reported troubles in copper plant, repairing wiring, providing NID protection, and resolving troubles with smart jacks or loopback devices.[26] Second, other maintenance operations would be required to maintain the plant in a usable state regardless of usage, such as replacing

[25] *See* Nogay Decl. ¶ 19.

[26] *See id.* ¶ 15.

deteriorating cables and repairing damaged facilities, maintaining appropriate air pressure in cables, responding to trouble reports of faults or damage, addressing pressure leaks and issues related to wet cables, responding to customer reports of wires that pose a safety hazard or interfere with trees or construction, and many others.[27] To perform these maintenance operations, a provider would have to retain multiple repair systems and remote-monitoring protocols, including cable design records that provide details on the size and placement of plant assets, assignment and provisioning records that are used to connect individual customer services to the copper cables at specific customer addresses, and customer trouble reporting and testing systems.[28] Third, there are other costs such as local property taxes on the assessed value of copper facilities and private rental fees (*e.g.*, fees paid to electric utilities to attach copper cables to their poles) that a provider would bear regardless of the number of lines in service.[29]

To the extent a provider is required to expend significant sums to maintain its copper facilities in areas where fiber or other networks have been deployed and the copper is no longer needed to serve customers, this would divert resources that otherwise could be expended instead on extending and enhancing the capabilities of these networks.[30] For example, the original business case for Verizon's fiber deployment assumed that Verizon would achieve significant operational savings from the lower costs associated with serving customers over fiber and from eventually retiring copper where it was no longer needed to serve customers, and investors relied on these anticipated cost savings in their decision to provide Verizon the many billions it needed

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[27] *See id.* ¶ 16.

[28] *See id.* ¶ 17.

[29] *See id.* ¶ 18.

[30] *See id.* ¶¶ 5-6, 37.

to deploy its all-fiber network.[31] If these cost savings are reduced or eliminated, it alters the calculus as providers and investors consider the future business case for fiber investment or other investment related to the deployment and upgrade of next-generation broadband networks.[32]

III. Increased Investment in Next-Generation Networks Will Enhance Competition and Improve the Choices Available to Consumers, Even Where Copper Is Retired

Increasing investment in next-generation networks, such as fiber and 4G LTE, will greatly enhance, not reduce, competition for a broad range of services, even in areas where copper is retired. As explained above, for example, fiber provides much greater capabilities than copper, and therefore offers consumers a much more robust range of services than is available over copper. This fosters competition against cable operators for high-speed Internet, video, and voice services, and also furthers competition for all services that may ride on top of a broadband connection by expanding consumers' options for accessing those services. In order to promote continued investment in next-generation networks and the competition they create, the Commission should preserve the flexibility of all carriers, including ILECs, to decide what broadband technologies to deploy and when to transition from one generation of technology to the next, and should not impose new burdens that would force providers to bear the costs of maintaining and operating redundant, parallel network facilities when they and their customers are better served by one.

TelePacific *et al.* urge the Commission to change its existing polices based principally on the assertion that copper retirement may eliminate the ability of CLECs to provide Ethernet over Copper services and thus decrease competition. This concern is misplaced. Even where copper is retired, consumers will continue to have a range of competitive options for Ethernet services.

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[31] *See id.* ¶ 4.

[32] *See id.* ¶¶ 5-6, 37.

And obviously where copper remains available – which the petition itself acknowledges will be in most places, at least for the foreseeable future – then Ethernet over Copper remains one of the services potentially available to serve the needs of its purchasers. Moreover, as the Commission recognized at the time it adopted the current policies, which the D.C. Circuit affirmed, granting ILECs control over their network investments, including the flexibility to retire copper when it is no longer needed to serve customers, creates incentives for all providers to deploy next-generation networks. *See* § IV, *infra.* As the Commission noted, these policies create incentives for ILECs "to expand their deployment of these networks, enter new lines of business, and reap the rewards of delivering broadband services."[33] At the same time, "with the knowledge that incumbent LEC next-generation networks will not be available on an unbundled basis, competitive LECs will need to continue to seek innovative network access options to serve end users and to fully compete against incumbent LECs."[34] In affirming, the D.C. Circuit agreed that denying ILECs the flexibility over their networks and technology choices by imposing an unbundling requirement on fiber-based loops "seems likely to delay infrastructure investment, with CLECs tempted to wait for ILECs to deploy FTTH and ILECs fearful that CLEC access would undermine the investments' potential returns."[35] The Commission's policies have proven successful as both ILECs and competitive providers have invested heavily to deploy new broadband networks and continually to expand the capabilities of those networks.

As an initial matter, Ethernet over Copper is a technology primarily marketed toward small and medium business customers, and TelePacific *et al.* therefore provide no basis

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[33] *Triennial Review Order* ¶ 272.

[34] *Id.*

[35] *USTA v. FCC*, 359 F.3d 554, 584 (D.C. Cir. 2004).

whatsoever to alter current policies aimed at encouraging fiber investment to residential consumers. Moreover, even as to business customers, the availability and adoption of Ethernet services is expanding rapidly, with multiple types of providers offering these services to businesses over a range of different platforms.[36] Cable companies, fixed wireless providers, and others are all rapidly rolling out these services, primarily over their robust broadband networks.[37] For example, Comcast recently announced that it has "deployed Metro Ethernet . . . throughout our entire footprint," that has "hired a completely different sales force" to go after the customers of these services, and that it expects this to be a huge growth area for Comcast.[38] This experience demonstrates that the Commission's policies to give incentives to providers of all types to deploy their own advanced broadband networks are working as intended.

Although TelePacific *et al.* argue that they themselves have limited choice in facilities over which to provide their services, the relevant question is whether end-consumers have competitive alternatives, and TelePacific *et al.* cannot show that such competition is lacking. Indeed, all the evidence shows that there is significant and increasing competition for Ethernet services.[39]

TelePacific *et al.*'s claim also fails because Ethernet over Copper does not provide the same capabilities and advantages of fiber, and thus consumers are better off with fiber where it is available than with the less robust copper-based alternatives that are the petition's focus. Indeed,

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[36] *See* Nogay Decl. ¶ 41.

[37] *See id.*

[38] Thomson Reuters Streetevents, *CMCSA – Comcast Corporation at Morgan Stanley Technology, Media & Telecom Conference*, Tr. at 10-11 (Feb. 26, 2013) (statement of Michael Angelakis, CFO, Comcast Corp.).

[39] *See* Nogay Decl. ¶ 41.

TelePacific *et al.* admit that "fiber-to-the-home delivering 100 Mbps may be the ultimate national goal" and that "fiber remains the ideal solution."[40] Elsewhere, some of these same CLECs have admitted that "TDM-based Ethernet products are subject to limitations" such as the fact that "EoC is very distance sensitive – the end user location needs to be less than two miles from the closest Serving Wire Center (SWC), the copper pairs have to be clean end to end (i.e., no bridge taps), and multiple copper pairs must be available (e.g., five to eight copper pairs are required to support speeds of 20 Mbps)."[41] Due to these limitations, the CLECs have acknowledged that "most small business customer locations are not served by copper loops suitable for [EoC] technology."[42] The CLECs have further acknowledged that Ethernet over Copper cannot compare to fiber in terms of the bandwidth it provides – Ethernet over Copper is typically limited to 10 Mbps (and possibly more with ideal conditions that rarely exist in practice), whereas fiber can provide several hundred megabits or more.[43] The Commission's

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[40] TelePacific *et al.* Letter at 4-5, 9.

[41] Declaration of James A. Anderson ¶ 8, *attached to* Comments of XO Communications, LLC on Further Notice of Proposed Rulemaking on Sections IV.A and IV.C, WC Docket No. 05-25 & RM-10593 (filed Feb. 11, 2013) ("XO's Anderson Decl.").

[42] Cbeyond, Petition for Expedited Rulemaking at 4, *Cbeyond, Inc. Petition for Expedited Rulemaking To Require Unbundling of Hybrid, FTTH, and FTTC Loops Pursuant to 47 U.S.C. § 251(c)(3) of the Act*, WC Docket No. 09-223 (filed Nov. 16, 2009) ("Cbeyond Petition"); *id.* at 18-19 & n.57 ("In order to provide EFMC, copper loops cannot exceed a certain length. In particular, Cbeyond would not provide EFMC to customers served by loops that are longer than 15,000 feet" or that "contain[] fiber feeder unless EFMC equipment has been installed at a remote terminal, something which, based on Cbeyond's experience, no potential wholesale provider has done to date.").

[43] XO's Anderson Decl. ¶ 8; Cbeyond Petition at 18-19. *See* Frost & Sullivan, *Analysis of the U.S. Retail Carrier Ethernet Services Market, 2012*, NB8B-63, at 27 (Nov. 2012) ("EoC technology remains best suited for low bandwidth needs, typically in the range of 2-20 Mbps" and that, because "[t]he achievable bandwidth on EoC circuits is inversely proportional to the customer location from the serving central office, and depends on the available quality and quantity of copper pairs at a location," most customer locations are limited to 10 Mbps."). *See also* Cindy Whelan & Bruce McGregor, Current Analysis, *PAETEC Debuts 100 Mbps Ethernet*

policies should therefore focus on promoting greater fiber deployment and should give CLECs the same incentives as ILECs to deploy fiber to business customers.

Despite all this, TelePacific *et al.* argue that because there are still a large number of Americans that do not have access to fiber, the Commission should promote Ethernet over Copper as an interim technology "to bridge the divide between today's largely copper-based networks and the mainly fiber networks of the future."[44] The Commission should reject this request. That Ethernet over Copper may provide business customers access to broadband in areas where fiber is not available is irrelevant, and cannot support any modification to the Commission's copper-retirement rules where the superior technology *is* available. The issue is what policies will best encourage the "ideal" wireline solution of fiber. And as the Commission has recognized, and experience has shown, the Commission's current copper retirement policies have been successful at achieving this goal and promoting massive private investment in fiber.

TelePacific *et al.*'s request also ignores the investment-deterring effect of requiring ILECs to maintain costly and duplicative copper facilities in areas where fiber has been deployed. Nowhere does the petition mention (much less address) the Commission's finding that imposing such a requirement would deter investment in fiber or other broadband facilities in the first instance. Although TelePacific *et al.* argue that Ethernet over Copper also involves some investment in "network gear," such investments pale in comparison to the size and consumer benefits of fiber-based investment encouraged by the Commission's current policies. It is also disingenuous for TelePacific *et al.* to claim that Ethernet over Copper somehow "can turn what

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over Copper Network (May 5, 2011) ("It's important to note that EoC services carry distance limitations, and performance can be affected by the quality of the copper plant.").

[44] TelePacific *et al.* Letter at 5.

was once considered 'old' into something 'new.'"[45] Ethernet over Copper is made possible because ILECs continue to spend large sums to maintain their copper plant. There is no basis for requiring ILECs to continue to incur these costs once they have transitioned to next-generation broadband.[46]

TelePacific *et al.*'s attempt to deny ILECs the flexibility over their networks and investment that all other broadband providers enjoy also would competitively disadvantage one set of broadband providers – ILECs – over all others. This would unfairly allow other broadband providers – including larger competitors in the broadband space such as cable operators – to make more efficient decisions about when and how to deploy or retire technologies and facilities. For ILECs, and only ILECs, this would impede their ability to invest in new technologies and require them to spend large sums to maintain copper facilities that are unnecessary to serve their own customers. Although this may benefit TelePacific and other carriers that use ILECs' copper to provide Ethernet over Copper or other services, often at artificially low prices because CLECs pay artificially low rates for use of the ILECs' copper, it would harm the consumers who stand to benefit from increased availability of fiber and harm the companies that have demonstrated the willingness and ability to invest in the next-generation broadband networks.[47]

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[45] TelePacific *et al.* Letter at 3.

[46] For the same reasons, there is no merit to TelePacific *et al.*'s claim that, "[b]ecause AT&T and Verizon will continue to rely on copper loop infrastructure to deliver broadband services for the foreseeable future, it is disingenuous of them to claim that preserving CLEC access to copper thwarts or slows down the transition to all-IP networks." TelePacific *et al.* Letter at 4. To be sure, there will continue to be locations that in the near term will not receive access to fiber. But the only way to encourage the deployment of fiber to new areas and fulfill the Commission's broadband goals is to preserve the rules that allow ILECs to retire their costly copper when they no longer need it to serve their customers.

[47] There is accordingly no merit to TelePacific *et al.*'s claim (at 2-3) that "[t]he Commission should not accept the false choice between regulating 'legacy' TDM technology and deregulating 'new' IP technology."

Finally, to the extent there are concerns about the ability of competitors to continue providing high-capacity services to consumers, the Commission should encourage these parties to engage with ILECs and other network providers to develop workable wholesale solutions that use fiber and other next-generation platforms and/or to take this opportunity to invest in their own network facilities. As noted further below, Verizon and other ILECs that are deploying fiber have incentives to coordinate with their wholesale customers to find workable alternatives as copper is retired. Such an approach will best serve the evolving demands of consumers and is consistent with the Commission's policies of ensuring that all types of providers have incentives to deploy next-generation broadband networks and not perpetually rely on aging networks that are incapable of fulfilling consumer demand and the broadband goals of the future.

IV. The Commission Should Not Reverse Its Settled Policies by Forcing Providers To Maintain Outdated and Redundant Networks That They Do Not Need To Serve Their Customers

In reliance on the Commission's policies aimed at encouraging investment in next-generation broadband networks, broadband providers nationwide, including Verizon, have spent tens of billions of dollars deploying advanced broadband technologies to millions of U.S. homes. Any policy shift that now would impede or prevent copper retirement when it is no longer needed to serve the provider's customers would be patently unfair and unlawful.

TelePacific *et al.* argue that the Commission has the authority to modify its rules under "Sections 251(c)(3), 271, and 706 of the Act."[48] It further claims that the National Broadband Plan supports modification of the Commission's rules to prevent copper retirement where fiber has been deployed. TelePacific *et al.* are wrong on all fronts.

[48] TelePacific *et al.* Letter at 15.

First, Section 706 of the Act does not support modifying the Commission's rules to prevent copper retirement, but instead, if anything, supports the Commission's current policy of allowing the retirement of older facilities that have been replaced by more robust broadband alternatives. Section 706 requires the Commission to "encourage" broadband deployment by using its existing authority from other section of the Act to "remove barriers to infrastructure investment." As the Commission has repeatedly explained, "the directives of section 706 . . . require that we ensure that our broadband policies promote infrastructure investment, consistent with our other obligations under the Act."[49] The D.C. Circuit has likewise held that "section 706(a) identifies one of the Act's goals . . . namely, removing barriers to infrastructure investment."[50] In the *Triennial Review Order*, the Commission found that "promoting the deployment of FTTH loops is particularly important in light of our section 706 mandate," and that "[w]hile copper loops enable carriers to deliver . . . broadband services, FTTH loops significantly enhance the broadband capabilities a carrier can deliver to consumers."[51] The Commission thus recognized that Section 706 required policies that promote fiber deployment,

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[49] *Qwest Petition for Forbearance Under 47 U.S.C. § 160(c) from Title II and Computer Inquiry Rules with Respect to Broadband Services*, Memorandum Opinion and Order, 23 FCC Rcd 12260, ¶ 52 (2008); *see also Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities*, Report and Order and Notice of Proposed Rulemaking, 20 FCC Rcd 14853, ¶ 19 (2005) (finding that "the directives of section 706 of the 1996 Act require that we ensure that our broadband policies promote infrastructure investment, consistent with our other statutory obligations under the Act.").

[50] *United States Telecom Ass'n v. FCC*, 359 F.3d 554, 579 (D.C. Cir. 2004).

[51] *See Triennial Review Order* ¶ 278; *id.* ¶¶ 219, 243 ("FTTH is essentially a broad replacement of the existing loop plant. The use of fiber optic cable requires the deployment of network equipment with different features and capabilities from comparable equipment used for copper cable. . . . Upgrading telecommunications loop plant is a central and critical component of ensuring that deployment of advanced telecommunications capability to all Americans is done on a reasonable and timely basis and, therefore, where directly implicated, our policies must encourage such modifications. . . . The replacement of copper loops with fiber will permit far greater and more flexible broadband capabilities.").

even where that meant curtailing competitors' use of copper loops. And in the *National Broadband Plan*, the Commission specifically acknowledged that requiring ILECs to maintain copper facilities in areas where they have deployed fiber would "reduce the incentive for incumbents to deploy fiber facilities."[52]

TelePacific *et al.* cannot show how the Section 706 mandate can be squared with policies that promote continued use of copper facilities at the expense of infrastructure investment in new fiber networks or other next-generation broadband facilities. TelePacific *et al.* do not dispute that preventing copper retirement will undermine investment in fiber, but instead argue that the Commission should also promote investment in technologies that use legacy copper facilities. But these objectives are mutually inconsistent. The Commission has already concluded that, when faced with this choice, Section 706 favors investment in new fiber technologies over competitors' use of ILEC copper loops, and TelePacific *et al.* provide no basis to reverse this settled precedent.

TelePacific *et al.* also assert that Section 706(b) provides the Commission authority to "promote affordable broadband over copper," but that is incorrect. Section 706(b) authorizes the Commission, upon a finding that advanced telecommunications capability is not being deployed to all Americans in a reasonable and timely manner, to "take immediate action to accelerate deployment of such capability by removing barriers to infrastructure investment and by promoting competition in the telecommunications market." 47 U.S.C. § 706(b). Thus, even assuming that the Commission could make such a "negative finding" – which the facts do not support – it would necessarily be limited to areas where fiber or other forms of broadband have not been deployed. Where fiber exists, advanced telecommunications capability is clearly

[52] *National Broadband Plan* at 48-49.

available, and Section 706(b) cannot provide a basis for the Commission to prevent copper retirement or take other steps that would deter investment.

Second, Section 251(c)(3) does not provide a basis for the Commission to prevent copper retirement in areas where fiber or other next-generation broadband facilities has been deployed. TelePacific *et al.* argue that, "[b]ecause the Commission has the authority to require Section 251(c)(3) unbundling of copper loops . . . the Commission likewise has the authority, in an effort to promote competition and affordable broadband over copper, to prevent ILECs from retiring copper loops and subloops that CLECs require as Section 251(c)(3) UNEs to provide broadband over copper."[53] This argument is misplaced. The fact that Section 251(c)(3) grants the Commission authority to require unbundling of ILEC facilities does not mean that the Commission can require ILECs to maintain those facilities solely for the purpose of providing them on an unbundled basis to competitive providers. And even if Section 251(c)(3) did provide such authority, the Commission would have to exercise that authority consistent with other statutory provisions, including Section 706, which would not permit such a result. Moreover, the Commission could require unbundling under Section 251(c)(3) only upon a finding of impairment, which it could not make here given the robust and increasing competition for broadband services.[54]

Third, Section 271 also does not authorize preventing copper retirement where fiber has been deployed. TelePacific *et al.* argues that "while UNEs under Section 251(c)(3) are only

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[53] TelePacific *et al.* Letter at 18.

[54] *See, e.g.*, Comments of Verizon and Verizon Wireless on the Ninth Broadband Progress Notice of Inquiry, *Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps To Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act*, GN Docket No. 12-228 (filed Sept. 20, 2012).

available where the Commission has determined requesting carriers are impaired, Section 271 imposes on the BOCs a permanent duty to provide access to the items enumerated on the competitive checklist," including UNE loops.[55] But TelePacific *et al.* neglects to mention that the Commission has granted forbearance from applying the loop unbundling requirements of Section 271 with respect to the broadband elements that the Commission, on a national basis, had relieved from unbundling in the *Triennial Review Order*.[56] The Commission expressly recognized the investment disincentives that would otherwise be imposed on the deployment of next generation broadband facilities:

> Those disincentives are attributable to not only the prospect that regulated unbundling will diminish the compensation BOCs receive from users of their broadband facilities, but also the costs of constructing BOC broadband facilities in a fashion that will allow the BOC to satisfy whatever access requirements might foreseeably be imposed under section 271, as well as the significant costs that can be associated with regulatory proceedings themselves. In light of the competitive benefit of the BOCs' continued investment in fiber-based broadband facilities, the disincentives associated with regulated broadband unbundling under section 271 support our decision to grant forbearance from those requirements. We conclude that removing those disincentives will promote just and reasonable charges and practices through the operation of market forces.[57]

Thus, Section 271 does not impose unbundling obligations beyond those imposed by section 251, and TelePacific *et al.*'s argument fails for the same reasons noted above.

Fourth, the National Broadband Plan does not support TelePacific *et al.*'s request. As noted above, the National Broadband Plan expressly acknowledged the investment-deterring

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[55] TelePacific *et al.* Letter at 18.

[56] *Petition for Forbearance of the Verizon Telephone Companies Pursuant to 47 U.S.C. § 160(c); SBC Communications Inc.'s Petition for Forbearance Under 47 U.S.C. § 160(c); Qwest Communications International Inc. Petition for Forbearance Under 47 U.S.C. § 160(c); BellSouth Telecommunications, Inc. Petition for Forbearance Under 47 U.S.C. § 160(c)*, Memorandum Opinion and Order, 19 FCC Rcd 21496, ¶ 12 (2004).

[57] *Id.* ¶ 25.

effect of requiring ILECs to maintain copper where fiber had been deployed. And while TelePacific *et al.* correctly note that the Commission recommended "appropriate balance in its copper retirement policies," that balance is more than adequately achieved under the Commission's existing rules. Indeed, if anything, the current rules continue to deter investment in new fiber facilities, by requiring ILECs, and only ILECs, either to keep the existing copper loop connected after deploying fiber to the home, or, if the ILEC has retired the copper loop, to "provide unbundled access to a 64 kbps transmission path over its FTTH loop."[58] As Verizon has explained elsewhere, the Commission should now eliminate these requirements that force ILECs either to incur wasteful costs associated with maintaining two redundant networks (one of which is unnecessary to serve our customers), or provide competing carriers access to brand-new networks without having borne the substantial risks of the investments funding them.[59]

Finally, the Commission should reject TelePacific *et al.*'s various requests to prevent copper retirement or make this process more difficult, including its requests that the Commission "clarify" that copper retirement does not entail the right for ILECs physically to remove copper, subject copper removal to greater oversight and data collection requirements, and permit state commissions to "adopt restrictions on disconnection, removal, or disabling of copper loops that are stronger than the Commission's rules."[60] Because there are also costs associated with

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[58] *Triennial Review Order* ¶ 277.

[59] Comments of Verizon and Verizon Wireless at 28, *AT&T Petition To Launch a Proceeding Concerning the TDM-to-IP Transition; Petition of the National Telecommunications Cooperative Association for a Rulemaking To Promote and Sustain the Ongoing TDM-to-IP Evolution*, GN Docket No. 12-353 (filed Jan. 28, 2013).

[60] *See* Russ Shipley & Nancy Lubamersky, TelePacific Communications, *Delivering Competitive High-Speed Broadband Over Copper* at 15 (Feb. 2013), *attached to* Ex Parte Letter from Tamar Finn, Bingham, to Marlene Dortch, FCC, GN Docket No. 09-51, RM-11358, WC Docket No. 10-188, GN Docket No. 13-5, GN Docket No. 12-353 (Feb. 26, 2013).

removing copper, providers need flexibility to make the determination when removal is appropriate. Given their incentives to do so responsibly, there is no need for Commission action. Nor should the Commission leave to the states the ability to impose such restrictions. Any such state regulation would be inconsistent with the Commission's existing rules and broader, pro-investment broadband goals and are therefore preempted as inconsistent with federal policies. There is no basis for the Commission to reverse these successful policies.

V. The Commission Should Encourage Parties To Explore Market-Based Alternatives for Wholesale Services

Although Verizon believes it is important that it has the flexibility to retire legacy copper facilities in areas copper ultimately is no longer needed to serve customers, Verizon and other providers also have incentives to cooperate with their wholesale customers to find workable alternatives as copper is retired. For example, providers could explore fiber-based solutions for wholesale customers that satisfy the function now being served, in some instances, by Ethernet over Copper. Critically, however, the Commission should not upend that market-based approach by denying providers the flexibility to move away from technologies they no longer need to serve their customers and artificially extending reliance on legacy facilities.

Conclusion

The Commission should continue to encourage investment in fiber and other advanced broadband networks and should reject the request by TelePacific *et al.* to change radically the Commission's long-standing copper-retirement rules.

Respectfully submitted,
/s/ William H. Johnson

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March 5, 2013

Exhibit A

Declaration of Claire Beth Nogay

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

In the Matter of	
Technological Transition of the Nation's Communications Infrastructure	WC Docket No. 12-353
Petitions for Rulemaking and Clarification Regarding the Commission's Rules Applicable to Retirement of Copper Loops and Copper Subloops	RM-11358

DECLARATION OF CLAIRE BETH NOGAY

1. My name is Claire Beth Nogay. I am Senior Vice President of Network Planning and Administration for Verizon. In this capacity, I oversee network and technology planning and set the technology direction for the Verizon Wireless, Verizon Enterprise Solutions, and Verizon Consumer and Mass Business business units. I am responsible for Verizon's strategic network planning, network security, and allocation of network capital. I also am responsible for leading business continuity and emergency planning. I provide process and system support, expense budget oversight, and business planning for Verizon's Network and Technology group. I have over 30 years' experience with Verizon or its predecessors in most areas of operations, such as outside plant engineering, construction, switching and transport, special services, and systems implementation.

2. The purpose of this declaration is to discuss (i) the operational issues and associated costs of maintaining legacy copper facilities in areas where Verizon has deployed fiber-to-the-premise (FTTP) networks, (ii) how these operational costs impact the business case for deploying FTTP, and (iii) the impact of copper retirement on the availability of services for end-user customers.

I. INTRODUCTION AND OVERVIEW

3. In 2004, Verizon began deploying an FTTP network in many locations throughout its traditional incumbent LEC footprint. The decision to deploy FTTP was one of the largest investment decisions that Verizon has ever made as a company, and represents the largest investment in FTTP that any private company – in the U.S. or the world – has made to date.

4. As with any major investment, Verizon made the decision to deploy FTTP after formulating a business plan to determine what type of return on invested capital it would be able to earn. In order to be able to attract significant capital for an investment such as FTTP, Verizon must be able to demonstrate to investors not only that it will earn a positive return, but that the return would be equal to or greater than what could be earned by investing that capital elsewhere. Of course, such returns are not guaranteed and every investment has risks, but unless Verizon is able to demonstrate that it will earn an attractive recovery, investors may be reluctant to provide capital necessary to fund massive new infrastructure investment.

5. The business case for FTTP considered (i) the anticipated costs of deploying the new network, (ii) the anticipated revenues that Verizon would be able to earn from the full range of advanced services that could be provisioned over the new technologies, and (iii) the anticipated savings that could be realized by migrating customers off of older copper-based network facilities to new FTTP facilities and ultimately retiring facilities no longer needed to serve customers. As detailed below, Verizon's legacy copper facilities are expensive to maintain, particularly as compared to the newer FTTP network. Likewise, these legacy copper facilities do not always provide the same quality or reliability of service, nor the range of services, as the newer FTTP network. This can result in frustration for some customers served by copper with chronic problems, and also increases Verizon's expenses in maintaining and repairing the older copper facilities. The savings from migrating customers from copper to

FTTP, and ultimately from retiring the copper where it is no longer needed to serve customers, are projected to be significant. These savings were a component of the FTTP business case that shows a positive return on Verizon's investment.

6. If Verizon were forced to maintain legacy copper facilities after they are no longer needed to serve Verizon's customers, it would negatively impact the business case both for deploying and for upgrading FTTP. Moreover, it could have a chilling effect on future investment by Verizon and other providers, both with respect to the rollout and the upgrade of FTTP networks. This is because such ongoing investment is premised on a business case that continues to factor in cost savings from the migration of customers from copper to fiber and, ultimately, the savings associated with no longer having to maintain copper after it is not needed to serve customers.

II. OPERATIONAL ISSUES AND COSTS OF MAINTAINING THE COPPER NETWORK

7. Legacy copper facilities are becoming more costly to operate and maintain as these facilities age. Moreover, customers have for many years steadily been migrating off of legacy copper facilities to more advanced wireline and wireless networks. Customers increasingly demand the variety of services, including higher speed broadband Internet access services and video services, which are available only over more advanced broadband networks. As a consequence, revenues from operating the legacy network are declining, and the increasing costs of operating and maintaining this network must be spread over a diminishing base.

A. Basic Components and Operation of the Copper Network

8. To understand the significant costs associated with operating and maintaining legacy copper facilities, it is useful to have an understanding of the components of the network. In a traditional copper-based network, telephone service is delivered to customers over a copper

pair, often referred to as a loop. Each telephone line requires its own individual copper pair, which consists of two wires that complete an electrical circuit when a telephone is "off hook." Copper pairs are grouped together to form copper cables, ranging in size from 25- to 3,600-pair cables. Copper cables are further distinguished by their gauge, with progressively coarser gauged wires used to provide service over increasing loop distances.

9. Connector blocks are used to terminate copper cable pairs on the Main Distribution Frame (MDF) in a Central Office (CO). Cables are terminated in 100-pair complements. These blocks enable access to individual copper pairs and provide for electrical protection of CO equipment from lightning or stray currents that may exist on exposed cables.

10. Stub cables from the connector blocks are spliced to cables, termed feeder cables, which emanate from the CO. Feeder cables are constructed in a "tree and branch" type architecture, where large cables leaving the CO branch off to smaller-sized cables that provide loop facilities to defined geographic areas. In order to optimize infrastructure resources, main feeder cables are typically grouped together to form feeder routes.

11. Feeder cable pairs are terminated on individual binding posts in a cross connection device termed a Feeder Distribution Interface (FDI), also commonly referred to as a Serving Area Interface. Serving areas are typically sized to provide access to between 200 and 600 homes or small businesses. Large business locations are typically fed directly by feeder cables. Cables extending from an FDI are termed distribution cables. Under standard FDI guidelines, typically two cable pairs are dedicated to each residential or small business address. These dedicated distribution cable pairs are spliced to cable terminals located near the places they are intended to serve. The FDI design allows any feeder pair to be cross-connected to any

distribution pair. This approach provides for optimal utilization of feeder cable facilities as well as allowing for uneven demand requirements within a serving area.

12. Drop wires are utilized to extend the copper loop from the cable terminal to the desired service address. The drop is terminated at the service location on a Network Interface Device (NID), which serves as a demarcation point between Verizon's network and the customer's inside wire. The NID also serves as a test point and provides electrical protection to the customer's equipment from external sources.

13. Under certain conditions, load coils are required on copper loops. Analog voice grade telephone service is transmitted in the range of 0 to 4 kilohertz (kHz). On loops over 18 kilo feet (kf), induced noise from frequencies above 4 kHz degrades voice quality transmission. To address this noise issue, load coils are placed on copper pairs to inhibit the transmission of signals above 4 kHz. On loops exceeding 18 kf, load coils are placed approximately every 6 kf, starting 3 kf from the CO. Cable pairs equipped with load coils do not support transmission of digital services, such as ADSL, DS1 or ISDN, which utilize frequencies above 4 kHz. To provide such digital services, the load coils must be removed. For some digital services, such as ISDN or DS1s, circuit repeaters may also need to be placed in order to enable service. Repeaters are used on longer loops to regenerate the signal to enable suitable transmission quality for service farther from the Central Office.

14. In addition to transmission facilities, there are also infrastructure components required to create a physical means of carrying copper cables. These components include poles, strand (steel cable to which copper cables are lashed), guys, anchors, manholes and conduit. Cables can also be directly buried, which requires fewer carrying structures, but requires conduit for road crossings and pedestals and hand holes for service access. Most copper cables placed in

conduits must be pressurized. Positive air pressure, applied to a cable sheath, minimizes the intrusion of water into the cable. Excessive moisture within a cable leads to short circuits, rendering the cable useless for transmitting telephone services.

B. Maintenance Requirements

15. Copper facilities require ongoing maintenance and repair for a variety of reasons to remain operable, even if these facilities are not used to serve customers. Some maintenance operations are directly related to usage and are required only if the plant is connected to customers. These operations include:

- Replacing/repairing aerial or buried drops;
- Testing for, locating and clearing customer-reported troubles in copper cable plant and associated terminals;
- Repairing wiring from the terminal to the first jack in multi-tenant dwellings
- Providing NID protection; and
- Resolving trouble with a smart jack, loopback device, or xDSL splitter.

16. Other maintenance operations must be carried out in order to maintain the plant in a usable state of repair regardless of whether the plant is currently in service. These include:

- Replacing deteriorating cables and repairing facilities damaged by mechanical issues (*e.g.*, auto accidents), rodent issues (*e.g.*, squirrels), line cuts, and storm damage (*e.g.*, wind, water and falling trees);
- Rearranging plant to address end user requests and government projects (*e.g.*, pole and pedestal moves due to road construction);
- Addressing other improvements such as beautification and undergrounding of aerial facilities (poles and cable);
- Maintaining appropriate air pressure in cables;
- Responding to air pressure alarms;
- Maintaining air dryers;
- Addressing transducer housing pressure leaks;

- Responding to issues related to wet cables;
- Maintaining nitrogen bottles used for cable pressurization;
- Responding to employee reports of faults or damage observed when working in the cable or when passing by (*e.g.*, pedestal cover off, aerial terminal cover off, pedestal damage, splice cover off, broken lashing wire, and/or drop wire down or loose);
- Responding to trouble reports generated by automated testing systems used for monitoring;
- Responding to cable trouble reports generated by CO switch diagnostics;
- Responding to reports from city workers regarding unsafe conditions within Verizon plant;
- Responding to pole owner advising of pole removal (*e.g.*, Verizon must remove attachments and make other arrangements for facilities);
- Responding to pole owner advising of pole replacement (*e.g.*, Verizon must be on-site to remove attachment and then re-attach facilities when the pole is set);
- Responding to customer reports of cable or drop wire down, creating a safety hazard across yard, walkway, or road;
- Responding to customer reports that aerial drop has been pulled away from house causing fascia board to be pulled loose, house damage;
- Addressing reports from a property owner or construction company that a pedestal or pole is in the way of new construction;
- Responding to tree trimming company or property owner advising that cable or drop has been cut when trimming trees;
- Responding to property owner reporting aerial drop or cable is in tree, requiring Verizon to trim the tree; and
- Maintaining load coils.

17. Attending to the maintenance operations detailed above requires the ongoing engagement of multiple repair systems and remote-monitoring protocols. For example, Verizon must continue to employ and maintain:

- All cable design records which provide detail on the year of asset placement and size of the asset for tax purposes and are also used to design future plant additions or rearrangements to meet service demands;
- Existing assignment/provisioning records, which are used to connect individual customer services to the copper cables at specific customer addresses;
- Customer trouble reporting and testing systems; and
- Applicable licensing, leasing and right-of-way policies.

C. Non-Maintenance Requirements

18. In addition to maintenance operations, Verizon incurs other expenses to keep copper facilities available for service regardless of whether the plant is serving any active lines. These include:

- Property taxes on the assessed value of the copper outside plant; and
- Rental fees and assessments for use of private structures and rights-of-way (e.g., electric utility poles).

19. Verizon estimates that the annual cost of operating copper facilities in areas where FTTP has been deployed is more than $200 million. These costs (which are accounted for in accordance with FCC Part 32 rules) consist of both expensed items and capitalized items (*i.e.*, new investments used to remedy problems such as may occur with the replacement of a deteriorated cable with a new cable). These costs are predominantly associated with the following activities: (i) large maintenance jobs (*e.g.*, recovering copper pairs, maintaining air pressure, and locating cables); (ii) responding to trouble tickets; (iii) operating Care Centers that receive external calls related to troubles and determine whether the reported problem can be fixed remotely or requires a dispatch; (iv) ongoing structure costs related to maintaining or renting poles and conduit; (v) maintaining Operations Support Systems (OSS) for the copper network; (vi) costs caused by damaged/cut cables and externally initiated cable moves; and (vii) property taxes.

20. If Verizon were required to maintain copper facilities after it no longer needs them to serve its customers, it would incur these costs even if none of the copper was actually being used. This scenario still requires the same categories of activities. Although there would be no in-service loops in this scenario, Verizon would still receive trouble tickets related to problems with its copper cables, would still pay property taxes on its copper assets, and would still need to undertake maintenance activities involving both expensed and capitalized items. For example, Verizon would still need to:

- Apply nitrogen and air pressure for unused copper cables, just as it does today;
- Monitor its network and dispatch for troubles in its terminals, splice closures, jumpers, and cut cables;
- Make business decisions to spend capital to rehabilitate an entire area rather than continue to maintain copper that demands ongoing dispatches;
- Incur Care Center costs related to Verizon associates receiving external calls for cut and damaged cables;
- Perform many of the activities identified above in Paragraph 16.

21. Thus, a significant amount of activity is required to keep Verizon's copper facilities in the appropriate workable condition even if none of the cable pairs in the copper cable is in use.

III. FTTP DEPLOYMENT

22. Verizon began deploying FTTP in 2004. Since then, Verizon has spent billions to deploy FTTP past nearly 18 million homes and businesses, offering voice, Internet, and video services. More than 14.5 million premises in Verizon's footprint are open for sale on the FTTP network. Verizon currently plans to continue to expand the availability of the FTTP network to satisfy existing build-out obligations in various franchise agreements. In addition, Verizon is currently upgrading the capacity of portions of the original FTTP network – for example,

transitioning from the original Broadband Passive Optical Network (BPON) to Gigabit Passive Optical Network (GPON) and otherwise upgrading facilities and equipment and increasing backhaul capacity as needed to continue to support higher capacity services. For example, Verizon began offering FiOS Quantum speeds in 2012, offering consumers a range of services with download speeds of up to 300 Mbps.

23. As explained above, the original business case for FTTP considered not only the costs of deploying the new network and the anticipated revenues from advanced services sold on the network, but also the savings realized from migrating customers off of older copper-based network facilities to new FTTP facilities and ultimately avoiding the costs of maintaining the aging copper facilities when they would no longer be needed to serve customers.

A. Basic Components and Operation of the FTTP Network

24. Most of the FTTP that Verizon has deployed is in areas that are already served with copper facilities; these are called "overbuild" or "overlay" areas. Only a relatively small percentage of Verizon's FTTP deployment has been in new growth areas with no existing facilities; these are called "greenfield" areas.

25. FTTP network technology is fundamentally different from the copper-cable based network that usually runs parallel to the new FTTP network. Whereas copper cables utilize electrical current for signal transmission, fiber cables use pulses of laser light to transmit signals over a glass fiber strand, uninterrupted from the CO all the way to a customer's home. Because fiber has very low signal attenuation (loss), it does not require mid-span equipment or electronics to regenerate signals. Since fiber is non-metallic, it is less susceptible to environmental risks such as water damage, corrosion, and lightning. This simple structure also eliminates most potential points of failure that exist with the copper network, thus yielding substantial operational

cost savings. Fiber also is much less sensitive to distance limitations, and is not affected by electromagnetic radiation electrical noise (noise ingress/egress) or crosstalk.

26. Due to its very low signal loss characteristics and the ability to utilize multiple wavelengths, fiber is capable of transmitting substantially more throughput than copper. For example, Verizon's FTTP network originally used BPON technology, which enabled Verizon to offer individual data services up to 50 Mbps downstream and 20 Mbps upstream. By comparison, the highest speed DSL service that Verizon offers over a copper loop is 7.1 Mbps to 15 Mbps downstream and up to 1 Mbps upstream. Ethernet over Copper services, which bond multiple loops together, is typically limited to 10 Mbps (and possibly more with ideal conditions that rarely exist in practice due to distance limitations and the sparse availability of clean copper pairs – *i.e.*, without bridge taps).[1]

27. After an FTTP network is in place, future upgrades are possible by upgrading the optical equipment in the central office and at the customer premises, leaving the actual fiber network unchanged. For example, Verizon has begun deploying GPON technology, which does not require changes to passive components, but which can provide much greater throughput than BPON. In locations where GPON is available, Verizon offers individual data services up to 300 Mbps downstream and 65 Mbps upstream. Future generations of PON technology will permit even higher speeds.

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[1] *See* Frost & Sullivan, *Analysis of the U.S. Retail Carrier Ethernet Services Market, 2012*, NB8B-63, at 27 (Nov. 2012) ("EoC technology remains best suited for low bandwidth needs, typically in the range of 2-20 Mbps, to connect customer locations to Internet and VPN networks. The achievable bandwidth on EoC circuits is inversely proportional to the customer location from the serving central office, and depends on the available quality and quantity of copper pairs at a location. Most [communications service providers] report that this pre-qualifying requirement usually limits bandwidth availability to 10 Mbps in most locations. Higher bandwidth speeds can be achieved, but at shorter distances – 3000 to 5000 feet – thus limiting the addressable market for the technology.").

28. Although the underlying technology of the FTTP network is different, the architecture of the network, and the structure used to support the fiber cables, is very similar to the "tree and branch" design of the copper network. Fiber feeder cables emanate from the CO and terminate at an interface device termed a Fiber Distribution Hub (FDH), from which fiber distribution cables are extended to serve defined geographic areas. One fiber is dedicated to each residential service address and to each business address. These fibers are spliced into a distribution cable terminal located near the addresses they are intended to serve. Fiber cables may be placed alongside existing copper cables, or lashed directly to those cables.

A. Deployment of FTTP in Overlay Areas

29. FTTP deployment in a wire center begins with the placement of Passive Optical Network (PON) components, fiber cables, splitters, Fiber Distribution Hubs (FDHs) and cable terminals. An FDH is placed to serve approximately 200 to 400 homes or small businesses. Every address in an FDH serving area has a fiber assigned to it that terminates in a cable terminal located near the premises location. The placement of PON equipment may also require structure work, such as pole replacements or trenching of buried cable.

30. When a customer orders a fiber-based service, such as FiOS TV, FiOS Internet, or FiOS Digital Voice, a fiber drop is placed from the cable terminal to the customer's service location. The fiber drop is terminated in an ONT, which provides standard connections for voice, data and video services. For existing Verizon voice customers, this migration to the FTTP network spares one cable pair in the copper network. Once the fiber drop is installed, the copper drop is generally left in place, unless either safety reasons dictate that it be left in place (to avoid possible lightning strikes) or where the customer requests, usually for aesthetic reasons, that it be removed.

31. So far, with very limited exceptions, Verizon has not endeavored to connect 100 percent of all customers passed to its FTTP network due to the relatively high cost of installation. In some cases, such as where customers have experienced repeated problems with their services provided over copper facilities, Verizon has migrated those customers to fiber in order to provide better and more reliable services to those customers and to avoid the high costs of repeated maintenance and repair calls for trouble-prone segments of the copper facilities. Where this occurs, customers receive the same service over FTTP that they did over copper, unless the customer has chosen to upgrade their service. Costs involved in connecting a home to the FTTP network involve the fiber drop and ONT installation, ensuring that the premises wiring is adequate, and loading software and configuring the customer's computer.

32. In FTTP overbuild areas, retiring copper could involve removal of distribution plant depending on cost, engineering, and safety requirements. In some scenarios, particularly if the copper loop is buried or lashed to fiber, Verizon may leave the loop in place, effectively "retiring in place."[2] Disconnection of the copper drop line happens at the network interface device (NID) located at the customer's premises.

IV. COPPER RETIREMENT AND THE BUSINESS CASE FOR FTTP DEPLOYMENT

33. Although there are many economic considerations that factor into Verizon's decision to deploy FTTP in a given area, one of those considerations involves the cost savings associated with migrating customers off of copper facilities and onto FTTP and ultimately

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[2] In some instances currently, *e.g.*, for aesthetic or maintenance reasons, Verizon does remove the aerial copper drop line running from the telephone pole in the public right of way to the side of a customer's home when it installs a fiber drop. In this situation, however, neither the copper loop nor the drop line is "retired." If a customer subsequently orders service from a competitor that seeks unbundled access to Verizon's facilities, Verizon replaces the copper drop line at no charge to the customer or the competitor.

avoiding the costs of maintaining copper facilities when they are no longer needed to serve Verizon's customers. Even in areas where Verizon has deployed FTTP, a significant, though consistently declining, number of customers continues to be served by legacy copper facilities. As the utilization of copper facilities in those areas decreases, and/or the costs of maintaining the network rise, it may become cost effective to migrate customers to the FTTP network. In this scenario, consumers will transfer to this fiber-based broadband network with the ability to receive the same voice service they received over the copper network, as well as the opportunity to obtain additional features that provide even greater benefits to consumers. The remaining copper facilities at that point will be wholly redundant to the fiber network serving customers.

34. When Verizon made the decision to deploy FTTP, it relied on FCC rules that permit copper retirement in areas where fiber is deployed provided that Verizon continue to make available to competing carriers access to a 64 kbps voice-grade channel over the fiber in order to compete for narrowband services. Based on these rules, Verizon factored in expected revenues from selling services over the FTTP network (properly discounted for the time value of money), the costs of deploying and maintaining the FTTP network (also properly discounted), and cost savings from reducing maintenance costs of copper facilities as customers migrate to FTTP and from being able ultimately to retire copper where fiber has been deployed and the copper is no longer needed. Because the costs of maintaining one network are lower than the costs of maintaining two, and because the costs of maintaining copper are much greater than the costs of maintaining FTTP, the ability to retire copper where FTTP is deployed makes the economics of FTTP deployment more attractive.

35. Even when factoring in the cost savings from copper retirement, Verizon must make a large up-front fixed investment in deploying FTTP to an area before it can sign up a

single customer. A significant fraction of the investment necessary to provide Verizon's FTTP network in a geographic area is fixed with respect to the number of customer actually served in that area. Verizon then incurs additional costs for each customer it signs up, which involve connecting that customer's premises to the FTTP network.

36. In sum, given the high costs of deploying FTTP, if Verizon is prevented from retiring copper in areas where it deploys FTTP, it will make it less likely that Verizon will make the investment in the first instance. As noted above, Verizon is currently upgrading areas of its existing FTTP network from BPON to GPON and has plans to extend its FTTP network to pass 19.5 million homes and businesses. If Verizon is prevented from retiring copper in areas where FTTP is deployed and the copper is no longer needed to serve customers, it will negatively impact Verizon's ability to continue investing in its FTTP network.

V. AVAILABILITY OF SERVICES WHERE FTTP IS DEPLOYED AND COPPER RETIRED

37. Consumers benefit greatly in areas where Verizon deploys FTTP. FTTP is capable of delivering services and features that copper facilities cannot. Thus, when customers are migrated to fiber, they will have access to better and more reliable services than they did previously.

38. FTTP deployment enhances competition. Verizon's principal competitors in the provision of voice, video, and high-speed Internet service are cable operators. Cable networks use a Hybrid Fiber Coaxial architecture that is capable of providing much greater bandwidth than the copper network. Verizon's FTTP network allows it to compete more effectively against cable operators, providing consumers with another option to receive broadband based services.

39. Nor will competition be reduced where Verizon deploys FTTP and subsequently retires copper. First, competing providers have the option of deploying their own network

facilities rather than using unbundled loops. Where copper is retired, competing providers also currently have the ability to obtain access to a 64 kbps voice-grade channel over the fiber in order to compete for narrowband services.

40. Second, to the extent CLECs are using Verizon's unbundled copper loops to provide Ethernet services, consumers will continue to have access to Ethernet services over a range of other platforms. For example, all of the largest cable operators in Verizon's region (such as Comcast, Time Warner, Cox, Cablevision, Charter, and Bright House) offer Ethernet services over their own facilities.[3] Numerous fixed wireless providers, such as Airband, Conterra Broadband, One Ring Networks, and Towerstream also offer Ethernet services.[4] Many CLECs also offer Ethernet services over their own metropolitan fiber networks.[5]

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[3] *See*, *e.g.*, Charles Carr, Frost & Sullivan, *Cable MSO Ethernet Strategy: Moving Up-Market for New Opportunities*, BCS 6-3, at 13-14, Figure 1 (Mar. 2012); Bright House Networks, *Business Solutions – Metro Ethernet – Overview*, http://business.brighthouse.com/products-and-services/data-and-internet/metro-ethernet.html.

[4] *See*, *e.g.*, Airband, *Metro Ethernet Solutions Baltimore* (Jan. 25, 2013), http://www.airband.com/baltimore/metro-ethernet-solutions-baltimore/; Conterra Broadband Services, *High Speed, Low Latency Financial Exchange Connectivity* (2012), http://www.conterra.com/low-latency.html; One Ring Networks, *Fixed Wireless*, http://www.oneringnetworks.com/Services/FixedWireless.aspx; Towerstream Corporation, Form 10-K, at 4 (SEC filed Mar. 14, 2012), http://www.sec.gov/Archives/edgar/data/1349437/000114420412014858/v303853_10k.htm.

[5] *See*, *e.g.*, Alpheus Communications, *Metro Ethernet*, http://www.alpheus.net/carrier-solutions/metro-ethernet/; Cogent Communications, *Cogent Ethernet Point-to-Point*, http://www.cogentco.com/files/docs/network/ethernet/brochure_ethernet.pdf; Expedient, *Ethernet Anywhere*, http://www.expedient.com/products/ethernet-anywhere.php; FiberLight, *Ethernet*, http://www.fiberlight.com/services/ethernet/; Fibertech Networks, *Ethernet Services*, at 2, http://www.fibertech.com/docs/fibertech_ethernet.pdf ("Fibertech offers an affordable way to connect your business locations via Ethernet with the speed you need – from 3 Mbps to 1 Gbps. . . . Direct fiber connections between your business locations are carried end-to-end via our Fibertech network."); Lightower Fiber Networks, *Ethernet*, http://www.lightower.com/products/ethernet/; Zayo Group, *Ethernet*, http://www.zayo.com/ethernet.

41. Moreover, CLECs that provide Ethernet over Copper generally use unbundled loops that are obtained at regulated rates that assumed that most consumers would be served on the legacy copper-based network, and therefore the costs of that network could be spread widely across that customer base. As customers migrate to FTTP, however, the costs of maintaining aging copper facilities must be borne by a declining base, thereby increasing the cost of each loop. It is far from clear that there will be demand for Ethernet over Copper services – which, as described above, are inferior to fiber in important respects – once these services are required to bear the full costs that they impose.

I declare, under penalty of perjury, that the foregoing is true and correct.

Claire Beth Nogay

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