

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

In the Matter of)	
)	
Inquiry Concerning Deployment)	GN Docket No. 17-199
of Advanced Telecommunications)	
Capability to all Americans)	
in a Reasonable and Timely Fashion)	
)	

**Reply Comments of
Communications Workers of America**

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In initial comments, the Communications Workers of America (CWA) provided substantial evidence to demonstrate that advanced telecommunications capability is not being deployed in a reasonable and timely fashion; advanced communications capability requires access to affordable wireline *and* wireless broadband; and the Commission’s 25/3 Mbps upload/download speed benchmark should not be dumbed down to a 10/1 Mbps for wireless.¹ The vast majority of commentators – individual consumers, educational organizations, consumer groups, rural associations, low-income constituencies, state broadband agencies, local governments, broadband providers, and leading companies including John Deere and Microsoft all agree.²

As CWA noted in our initial comments, there are still far too many school children who must sit on the library steps after it closes or go to McDonald’s for Wi-Fi access to do their homework. More than 34 million people do not have access to broadband at the Commission’s 25/3 Mbps speed definition.³ Only 38 percent of households have a choice of at least two

¹ CWA Comments, *Thirteenth Section 706 Report Notice of Inquiry, In the Matter of Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion*, GN Docket No. 17-199, Sept. 5, 2017 (“CWA Comments”).

² See Comments of John Deere Co.; Comments of Microsoft; Comments of Public Knowledge et al ; Comments of National Digital Alliance; Comments of TDI and Consumer Groups; Comments of Open Technology Institute; Comments of EdLiNC; Comments of State Educational Technology Directors Association; Comments of North Carolina Broadband Office; Comments of Massachusetts Department of Telecommunications and Cable; Comments of New York City; Comments of Institute of Local Self-Reliance/Next Century Cities; Comments of New America’s Open Technology Institute; Comments of Fiber Broadband Association; Comments of Mimosa Networks; Comments of Incompas.

³ FCC, *Broadband Progress Report*, Jan. 29, 2016 (based on 2014 FCC Form 477 data). CWA notes that the *Notice of Inquiry (NOI)* cites a staff analysis of June 30, 2016 Form 477 data shows that 7 percent of Americans, including 28 percent in rural areas, lack access to 25/3 Mbps broadband. The *NOI* notes that these estimates could “overstate or understate the estimate of Americans” because the analysis is based on 2015 estimates of population and household count data. Furthermore, the staff analysis has not been made public for public review. In addition, the staff analysis appears to use an inaccurate count for U.S. households (112 million) whereas the U.S. Census Bureau counts 116.9 million households in 2015, the most recent year for which data is available. See FCC, *Thirteenth Section 706 Report Notice of Inquiry, In the Matter of Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion*, GN Docket No. 17-199, Aug. 8, 2017 (“NOI”).

CWA further notes that US Telecom’s analysis of June 2016 FCC Form 477 data finds that 11 percent of “housing units” do not have access to 25/3 Mbps wired broadband, including 41 percent of rural housing units and three percent of non-rural housing units. Based on this analysis, CWA calculates that between 33.4 and 37.7 million

broadband providers offering speeds of 25/3 Mbps.⁴ One-quarter (27 percent of all Americans – with even higher percentages of African-Americans (35 percent), Hispanics (42 percent), and low-income households with annual earnings under \$30,000 (47 percent) – do not subscribe to broadband, many because they cannot afford it.⁵ And according to the Organization for Economic Co-Operation and Development (OECD), the U.S. ranks 16th in the world in broadband access and 13th in average broadband speed.⁶

In this proceeding, the Commission seeks comment on whether it should evaluate advanced telecommunications deployment based on the presence of either fixed *or* mobile services.⁷ In our initial comments, CWA provided extensive evidence to demonstrate that advanced telecommunications capability requires affordable access to wireline *and* wireless broadband.⁸ In these Reply Comments, we submit an expert report prepared by engineers and

Americans did not have access to 25/3 Mbps mid-year 2016. CWA calculation: According to the 2010 U.S. Census, there were 131.7 million “housing units” in 2010 of which 116.7 million were occupied (the other 15 million were vacant). We multiply 131.7 total housing units times 11 percent without broadband access to get 14.5 million housing units without 25/3 Mbps broadband. We multiply this number by the Census Bureau’s average household size of 2.6 people to find that as many as 37.7 million people lack 25/3 Mbps broadband access. To find the number of people without broadband access in *occupied* housing units, we repeat the calculation based on 116.7 million occupied housing units to find that 33.4 million people in occupied housing units do not have access to broadband at 25/3 Mbps. *See* Patrick Brogan, “U.S. Broadband Availability Mid-2016,” U.S. Telecom Research Brief, Aug. 25, 2017, Chart 5 (<https://www.ustelecom.org/sites/default/files/US%20Broadband%20Availability%20Mid-2016%20formatted.pdf>); For Census Bureau data, *see* U.S. Census Bureau, “Housing Characteristics 2010,” Oct. 2011 (<https://www.census.gov/prod/cen2010/briefs/c2010br-07.pdf>).

⁴ FCC, *Broadband Progress Report*, Jan. 29, 2016 (based on 2014 Form 477 data). US Telecom’s analysis of June 2016 FCC Form 477 data finds that less than half (49 percent) of “housing units” have access to 25/3 Mbps broadband. from two or more providers. Based on this data, CWA calculates that 67.2 million total housing units (174.6 million people) and 59.5 million occupied housing units (154.7 million people) lack competitive choice from at least two broadband providers for 25/3 Mbps service. CWA calculations: Total housing units 131.7 million times 51 percent without 25/3 Mbps broadband times 2.6 people per household = 174.6 million. Occupied housing units 116.7 million times 51 percent without 25/3 Mbps broadband times 2.6 people per household = 164.7 million. US Telecom Research Brief, Chart 1 (for broadband data); U.S. Census Bureau, “Housing Characteristics 2010” (for housing unit data).

⁵ Pew Research Center, “Internet/Broadband Fact Sheet,” data as of Nov. 11, 2016 (<http://www.pewinternet.org/fact-sheet/internet-broadband/>).

⁶ OECD, “Households with Broadband Access,” 2012 and “Average and Median Download Speeds, Fixed Broadband,” 2014 (<http://www.oecd.org/internet/broadband/oecdbroadbandportal.htm>).s

⁷ *NOI*, para. 9.

⁸ CWA Comments, pp. 4-13.

analysts of CTC Technology & Energy (“CTC Report”). CTC Technology & Energy is an independent communications and IT engineering consulting firm with more than 30 years of experience. The CTC report analyzes the current and emerging generation of mobile wireless technologies and compares those technologies to wireline technologies such as fiber-to-the-remises (FTTP), cable broadband, and copper DSL across a range of technical parameters, including reliability, resilience, scalability, capacity, and latency. The report also evaluates wireless carriers’ mobile pricing and usage structures – including so-called “unlimited” data plans – because those policies play a significant role in whether consumers can substitute mobile for wireline service. The CTC Report concludes that “ “for both technical and business reasons, wireless technologies are not now, and will not be in the near to medium future, adequate alternatives or substitutes for wireline broadband.”⁹

Below we summarize the major findings in the CTC Report.

Technology limitations. The CTC authors emphasize that existing mobile technologies must be evaluated based on their actual, current and relatively near-term performance, rather than on the hypothetical speeds posited for “5G” technologies that the industry suggests will emerge in the coming decade or so. “5G” has not been defined and standards have not been finalized for this new technology. Rather, the term “5G” has effectively served as a marketing tool—suggesting that new technologies that will deliver far faster mobile speeds are somewhere on the horizon. That horizon, from an engineering standpoint, is quite distant—and the path to it is undetermined.

Suggesting that “5G” can currently or in the near to medium term serve as a substitute for

⁹ CTC Technology & Energy, “Mobile Broadband Service Is Not an Adequate Substitute for Wireline,” Oct. 2017, p.1 (“CTC Report”).

adequate wireline service is suggesting that a non-existent, non-deployed technology should serve as an alternative. The hypothetical “5G” future should not serve as part of the current discussion about the relative merits of existing wireline and mobile networks.¹⁰

According to the CTC Report, “modern wireline broadband services are superior to wireless services in terms of capacity, reliability, and scalability. While cutting-edge wireless technologies may surpass the theoretical bandwidth capabilities of some wireline products, FTTP networks easily surpass even the best of all planned or deployed wireless technologies. Even DSL networks can deliver a higher bandwidth and more reliable experience to consumers than can mobile so long as the DSL network is well-maintained and includes adequate investment in electronics.”¹¹

The CTC report notes that while mobile speeds are increasing, mobile networks continue to face technical limitations. Wireless carriers have introduced 4G LTE with speeds comparable to many wireline services, but “the fastest wireless speeds require an ideal connection and low congestion on the wireless network.” Mobile broadband may not consistently be available, however – even in areas where cell service exists. Furthermore, there are some areas, particularly indoors, where the cell service is relatively weak, and the broadband services is nonexistent or limited to slower service with speeds comparable to telephone dial-up.¹²

Wireless technologies have other shortcomings compared to wireline services. Mobile broadband provides only about one-tenth the speed available from wireline. Mobile operates over a shared network, reducing speeds due to congestion. Moreover, mobile broadband offers asymmetrical capacity, with uploads limited in speed. Mobile has greater latency, with LTE ping

¹⁰ CTC Report, pp. 1-2.

¹¹ CTC Report, p.1.

¹² CTC Report, p. 11.

times (round-trip, end-to-end latency) in the range of 30 to 70 milliseconds, compared to 10 or 15 milliseconds on a typical wireline internet connection. This has an impact on sensitive interactive applications such as video and data transmission.¹³

Mobile broadband cannot deliver performance as consistent as wireline services. The report explains that “[e]ven a well-engineered mobile broadband network cannot provide entirely consistent service within a service area.” Speeds degrade as one moves farther away from the antenna, and as distance increases, more obstructions block the antenna and the user. Wireless signals are degraded by natural features such as mountains, valleys, trees, and weather; buildings and other structures; and interference from other radio frequency (RF) signals in the area.¹⁴

Mobile broadband may require a separate wireless network for indoor coverage. The report explains: “Mobile broadband is often inconsistent for users indoors, in part because the materials used to construct buildings attenuate wireless signals.” Where wireless carriers have installed microcells in a customer’s home or office, these devices send the mobile data back to the wireless carrier over the customer’s wireline broadband service, so they depend on, rather than replace, a wireline broadband connection.¹⁵

Mobile broadband access points have limited capacity. A wireless signal is a shared medium. While wireless carriers have technological solutions to serve multiple devices through “time slicing,” beam-forming, and other means, “limits in the capabilities of the parts of the mobile broadband network still fundamentally limit the number of devices connected to a single antenna before congestion begins to degrade service.” This limitation is particularly critical during emergencies, when a larger than usual number of users attempt to use a mobile

¹³ CTC Report, pp. 12-13.

¹⁴ CTC Report, p. 14.

¹⁵ CTC Report, p. 15.

network.¹⁶

Mobile broadband is not suited to some critical applications. While many tasks that consumers perform on mobile devices, such as web browsing, messaging, and checking e-mail, do not require a constant and consistent network applications, “slowdowns or breaks in mobile network service cause applications such as streaming video to experience severe delays or reductions in quality.” This might merely be an annoyance for a Netflix subscriber trying to watch a movie, but can mean a loss of revenue for a business or a loss of productivity for a student. Employees who need to operate over a virtual private network (VPN) may find that they are unable to reliably maintain the connection throughout the day. Health professionals may have a difficult time providing consistent care to their patients. Similarly, businesses that rely on real-time network communications, such as for credit card transactions or inventory lookups, may experience delays or lose sales. Some cloud-based applications, such as computer-aided design (CAD) and geographic information systems (GIS), continuously transfer large data files as employees work. Nightly tasks, such as computer backups or software updates, may not be completed before employees return to the office.¹⁷

The highest capacity wireless networks still require a large amount of fiber infrastructure for backhaul—meaning that rural communities and other areas where fiber infrastructure is scarce will likely have substandard, inadequate mobile service unless fiber is improved or expanded.

Business and usage policy limitations. The business policies imposed by mobile companies further impact the usability of mobile service as a primary or sole source of

¹⁶ CTC Report, pp.16-17.

¹⁷ CTC Report, pp.17-18.

broadband. Mobile pricing and usage limits make mobile service a poor substitute for wireline broadband services. CTC concludes: “Even though the two technologies can be used to access the same digital content, the differences in pricing structures and terms of service makes wireless broadband an inadequate substitute for wireline broadband.”¹⁸

The recent shift in mobile pricing models from data caps to so-called “unlimited” plans has not changed this outcome because, even though the product is not capped, users experience significant degradation of speeds via throttling after certain levels of use. Mobile providers dramatically limit customer usage and exert significant control over how applications run on their networks; these policies may have good technical or business justification but they have the impact of making the mobile service far inferior and less usable for consumers than wireline broadband service. The Table on the next page describes the limitations of so-called unlimited plans.

¹⁸ CTC Report, p.21.

Plan name	Connection speed	Cost per month* (1 user/ 4 users)	Throttling threshold	Hotspot allowance	Video quality limits
Verizon Go Unlimited ²⁵	4G LTE, but may be throttled at any time	\$75/\$160	0 GB	Unlimited, but speed limited to 600 Kbps	480p on phones, 720p on tablets
Verizon Beyond Unlimited ²⁶	4G LTE	\$85/\$200	22 GB	15 GB, then throttled to 3G	720p on phones, 1080p on tablets
AT&T Unlimited Choice ²⁷	3 Mbps	\$60/\$155	22 GB	Not allowed	480p
AT&T Unlimited Plus ²⁸	4G LTE	\$90/\$185	22 GB	10 GB, then throttled to 128 Kbps	720p
T-Mobile One ²⁹	4G LTE	\$70/\$160	32 GB	Unlimited at 3G	480p
T-Mobile ONE Plus ³⁰	4G LTE	\$80/\$200	32 GB	10 GB, then throttled to 3G	'Typically' in HD
Sprint ³¹	4G	\$50/\$90	23 GB	10 GB, then throttled to 2G	1080p

The CTC report notes that consumer behavior demonstrates that Americans do not view fixed and mobile products as substitutes for each other, but rather as compliments. While the number of Americans that rely on mobile subscriptions for home internet access has grown over the past few years, these households tend to be lower income.¹⁹ Those who have the option of wireline broadband in addition to mobile are likely relying heavily on Wi-Fi that is fed from a wireline broadband connection at home, school, and work, and in public places. Consumers who do not

¹⁹ CTC Report p. 21 (citation from Monica Anderson, "Digital divide persists even as lower income Americans make gains in tech adoption," Pew Research Center, March 22, 2017, <http://www.pewresearch.org/fact-tank/2017/03/22/digital-divide-persists-even-as-lower-income-americans-make-gains-in-tech-adoption/> (accessed September 2017).

have wireline broadband service at home because of financial restrictions are unlikely to purchase expensive data plans and may need to be heavy users of free Wi-Fi connections at libraries and restaurants.²⁰

Conclusion. The CTC Report provides powerful evidence that wireless today and in the near to medium term is not a substitute for wireline broadband. The Commission should reject any proposal that would evaluate whether *some form* of advanced telecommunications capability, be it wireline *or* mobile, is being deployed to all Americans in a timely and reasonable fashion. Rather, the Commission should continue to conduct its 706 Inquiry according to the conclusion reached in the 2016 Broadband Progress Report that “consumers have advanced telecommunications capability only to the extent that they have access to both fixed and mobile telecommunications.”²¹ In addition, the Commission must reject any proposal to “dumb down” its broadband definition from 25/3 Mbps to 10/1 Mbps for wireless service. While our nation has made significant progress, it is clear that broadband is not being deployed to all Americans in a reasonable and timely fashion. There is still much to be done to ensure that all Americans have access to affordable high-speed broadband, including a \$40 billion program of subsidized funding to accelerate broadband deployment in underserved communities; tax-related initiatives to spur investment in digital networks; digital inclusion initiatives to make broadband more affordable; and continued progress toward achieving the 2014 E-Rate modernization goals for schools and libraries.

²⁰ CTC Report, pp. 22-23.

²¹ 2016 Broadband Progress Report, *In the Matter of Inquiry Concerning the deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act*, Jan. 29, 2016 (rel), para 17 (“2016 Broadband Progress Report”).

Respectfully Submitted,



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