State of California **Public Utilities Commission**
San Francisco

M E M O R A N D U M

Date : August 24, 2015

To : The Commission
(Meeting of August 27, 2015)

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Subject: Filing of Comments in Response to FCC's Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion

RECOMMENDATION: The California Public Utilities Commission (CPUC) should file comments in response to the Eleventh Broadband Progress Report Notice of Inquiry (NOI) released by the Federal Communications Commission (FCC). Pursuant to Section 706 of the Telecommunications Act of 1996, the FCC determines and reports annually on "whether advanced telecommunications capability is being deployed to all Americans in a reasonable and timely fashion."[1] In this NOI, the FCC is investigating specifically whether mobile broadband Internet access service should be considered when determining whether "advanced telecommunications service" is available. It is also asking whether a finding of "advanced telecommunications capability" should require the availability of both mobile and fixed broadband Internet access service. Comments are due September 15, 2015.

BACKGROUND:

As required by Section 706 of the Telecommunications Act of 1996, the FCC annually reports to Congress on whether advanced telecommunications capability is being deployed to all Americans in a reasonable and timely fashion.[2] In this NOI the FCC solicits data and information that will help it make this annual determination. In particular, the FCC seeks

[1] 47 U.S.C. § 1302(b).

[2] Section 706 of the Telecommunications Act of 1996, as amended (1996 Act), requires the Commission to determine and report annually on "whether advanced telecommunications capability is being deployed to all Americans in a reasonable and timely fashion." *See* 47 U.S.C. § 1302(b).

comments on whether "advanced telecommunications capability" should include access to mobile broadband service as well as fixed broadband service, what basic criteria the FCC should use in defining advanced telecommunications capability, including speed, latency, and service consistency, and the development of specific benchmarks to judge whether the criteria have been met.[3]

In its Tenth Annual Report[4], the FCC determined that it did not have reliable enough data on mobile broadband service to include consideration of mobile service in determining whether advanced telecommunications capability is being deployed in a timely fashion to all Americans.

CPUC Communications Division (CD) Staff have been studying broadband measurement techniques, particularly with regard to mobile broadband service. Staff have: 1) created and implemented CalSpeed, an application to develop measurement techniques; 2) published a mobile crowd-sourcing application; and 3) performed semi-annual field testing of mobile broadband service quality in urban, rural and tribal areas throughout the State. Every six months since 2012, CD Staff have collected approximately 2,000,000 test results at the same 1,986 locations throughout the State.[5] In addition, Staff developed an on-line tool, calspeed.org, to collect fixed broadband service speed, quality and reliability information. Enhancements were made in our CalSpeed app to capture backhaul and middle mile information in order to compare urban, rural and tribal service characteristics. Analysis of the latest data collection is currently under way.

DISCUSSION AND RECOMMENDATIONS:

A. The CPUC Should Provide California's Data and Analysis

The NOI seeks comment on developing criteria and benchmarks for assessing consumer broadband, including criteria for speed, consistency and latency.[6] Because of our CalSpeed program, the CPUC is in a unique position among the states to be able to provide data-driven recommendations to the FCC on the issue of how and what to measure to determine the speed, quality and reliability of fixed and mobile broadband service. The data provides unique empirical evidence on the FCC questions relating to how it should measure and analyze mobile services.

CD Staff analysis of the CalSpeed data can also inform the FCC regarding how upgrading the speed benchmark to a more aggressive standard in order to be considered advanced

[3] In re Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, *Eleventh Broadband Progress Notice of Inquiry*, GN Docket No. 15-191, FCC 15-101, rel. Aug. 7, 2015.

[4] *2015 Broadband Progress Report*, 30 FCC Rcd 1375 (2015).

[5] Test locations increased from 1,200 to 1,896 as of Fall 2013.

[6] NOI, at ¶ 19.

telecommunications service would affect the total number of households in California with access to mobile service. Our analysis calculates the number and percentage of households and square miles in California with access to mobile service by at least one of the four largest wireless providers that meets or exceeds several speed thresholds.

Recommendation 1: Staff recommends the CPUC provide the FCC with California data and analysis to inform its decision on how and what to measure to determine the quality and reliability of service, in addition to speed, for purposes of defining criteria necessary for fixed and mobile service to be deemed "advanced telecommunications capability."

Recommendation 2: Staff also recommends that the CPUC encourage the FCC to consider numerous metrics and testing methodologies before making a determination. Staff proposes that the CPUC file comments to inform the FCC's decision about whether "advanced telecommunications capability" should be deemed to include access to either terrestrial fixed or mobile broadband service, and to set criteria for mobile services in determining whether advanced telecommunications capability is being deployed to all Americans on a reasonable and timely basis.

Recommendation 3: Staff also recommends the CPUC file comments urging the FCC to use latency and consistency as part of the criteria defining "advanced telecommunications capability", both for fixed broadband services, as well as mobile, should the FCC decide to include mobile in the definition. Additionally, the CPUC should file informational comments regarding the state of mobile broadband service in California.

B. The FCC Should Set Criteria and Benchmarks for Assessing Advanced Telecommunications Capability.

Section 706 provides that advanced telecommunications capability "enables users to originate and receive high-quality voice, data, graphics, and video telecommunications using any technology."[7] To date, the FCC has focused on upload and download speed benchmarks to evaluate broadband services. This NOI asks whether the FCC should use additional criteria to define advanced telecommunications capability, including latency and consistency of service. The NOI asks whether and how to apply these criteria to both fixed and mobile broadband services.

Recommendation 4: Staff recommends that the FCC set minimum standards and benchmarks to define what constitutes fixed and mobile "advanced telecommunications capability".

1. Speed benchmark

a. Mobile Broadband Service

[7] NOI, at ¶ 19, citing 47 U.S.C. § 1302(d)(1).

The NOI seeks comment on various benchmarks the FCC should use to define advanced telecommunications capability, including speed.[8] The NOI proposes to retain the previous 2015 Broadband Progress Report's definition of wireline advanced communications capability – upstream/downstream throughputs of 25/3 Mbps –for fixed terrestrial broadband services.[9] The FCC seeks comment on what speed benchmark it should apply to mobile broadband services.[10]

Staff recommends that the CPUC submit to the FCC its data and analysis to inform the FCC's decision. As noted above, the CPUC's analysis shows the impact of various benchmark speeds (e.g., 6/1.5, 10/1, 10/3, 25/3) on the number and location of California households that would be considered as having access to advanced communications services.

Mobile broadband is fundamentally different than wireline in that mobile service is subject to extreme variability. A consumer may receive 10/3 throughput one moment, but 3/1 the next, and 20/10 the moment after that. The question thus becomes, in light of this variability, what is the typical consumer experience?

Recommendation 5: Staff recommends that the CPUC provide to the FCC data showing speed "throughput" experience in California to assist the FCC in its development of a speed benchmark for mobile "advanced telecommunications capability." Staff's analysis quantifies expected speeds at varying confidence intervals, i.e., if the mean throughput is 10/3, one standard deviation below the mean indicates that a consumer will receive service at least as fast as the adjusted mean most of the time.[11] That is one possible way to quantify a "typical" consumer experience.

Staff also proposes to submit data showing throughput that can be expected within two standard deviations below the mean, indicating that a consumer will receive service at least as fast as the adjusted mean over 90% of the time.[12]

To be considered adequate, mobile broadband Internet access service should be subject to a reliability service quality standard, such that service is available most all-of-the-time at the speed benchmark.

b. Fixed Broadband Service

[8] NOI, at ¶¶ 22-30.

[9] NOI, at ¶ 24.

[10] NOI, at ¶¶ 27-30.

[11] The percentage of availability is dependent on the distribution of test results for each location. In our analysis we assume a normal distribution of results.

[12] *Id*. By way of comparison, initial FirstNet specifications require service to first responders to have at least 95% reliability.

The NOI proposes to retain the 25 Mbps/3 Mbps speed benchmark for fixed terrestrial broadband services and seeks comment on applying this speed benchmark to fixed satellite service as well.[13]

Recommendation 6: Staff has no recommendation on these questions; however, as discussed above, the CPUC should provide information to assist the FCC in its efforts to measure fixed broadband service.

2. Quality of Service Benchmarks

The FCC seeks comment on whether it should include latency[14] and service consistency[15] in addition to speed, as part of the basic criteria used in defining advanced telecommunications capability, and what those benchmarks should be. While the FCC's 2015 Broadband Progress Report declined to set a benchmark for fixed broadband latency due to limited data, it stated that collecting reliable data on latency should be a priority in the next Inquiry.[16] A consistency of service standard could include consideration of variation in the speeds consumers actually experience when using their service, variations in latency (i.e., jitter) experienced by consumers over time and the effect of weather conditions and physical obstacles on service quality.

Recommendation 7: Staff recommends the CPUC file comments urging the FCC to include latency and consistency as part of the criteria defining "advanced telecommunications capability" for fixed and mobile broadband services. (See 1. and 2. below)

1. Applying Latency and Consistency Criteria to Mobile Broadband Service.

Failure to connect and dropped connections are critical measures of broadband quality, reliability and consistency. The CPUC's analysis shows that generally, mobile broadband quality is currently poor in rural and tribal areas relative to urban areas. On average, rural/tribal consumers experience four times the number of dropped connections than urban user's experience. This difference in reliability and consistency between urban and rural/tribal areas is notable and raises serious concerns about whether advanced mobile capabilities can be said to be deployed to all Americans in a timely fashion, including rural and tribal areas, at this time.

Recommendation 8: The CPUC should urge the FCC to adopt the CPUC's methods of determining quality and reliability and consistency – dropped connections and Mean Opinion

[13] NOI, at ¶ 22.

[14] NOI, at ¶¶ 31-40. Latency is a measurement of the time it takes a packet of data to travel from one point in the network to another, and is typically measured by round-trip time in milliseconds (ms).

[15] NOI, at ¶¶ 41-46.

[16] NOI, at ¶ 33, citing 2015 Broadband Progress Report at ¶ 75.

Score (MOS). CD Staff calculates a MOS for each test location.[17] A method of determining the quality of streaming video service should be included as well (e.g., staff is creating a MOS equivalent for video streaming quality, which we are in the process of building into our testing and evaluation.)

2. Applying Latency and Consistency Criteria to Fixed Broadband Service.

The NOI also seeks information about whether the FCC should develop benchmarks for quality of service, including latency and consistency (reliability) for fixed broadband service as well, as part of its definition of advanced telecommunications capability.

Recommendation 9: Staff recommends that the CPUC support use of quality and reliability as necessary ingredients of advanced capabilities for fixed broadband services. The same metrics as used in the mobile CalSpeed app and analysis should be applied to fixed service. The CPUC has developed an online tool, calspeed.org, to measure these factors for fixed service. It mirrors the testing protocol used to measure mobile performance in CalSpeed.[18] The CPUC has previously submitted comments to the FCC regarding fixed broadband testing.[19]

C. Measuring Fixed and Mobile Broadband Service

Although the NOI does not specifically request such information, CD has experience and knowledge that could assist the FCC in its efforts to measure various service metrics for both fixed and mobile broadband service. Recently, calspeed.org was used by the CPUC to support a California Advanced Services Fund grant challenger's claim that it was already providing fixed service to an area claimed to lack service by an infrastructure grant applicant. In the same way, calspeed.org can also be used both to confirm that a designated area is Connect America Fund (CAF)-eligible. Calspeed.org can also be used to determine whether CAF and other broadband grantees deliver on the technical requirements of their grant, i.e., that they actually deliver speeds of at least 10/1.

Recommendation 10: The CPUC should inform the FCC that it has created an on-line testing application, calspeed.org, to measure fixed broadband performance in the same way the CalSpeed app measures mobile performance. The CPUC should encourage the FCC to adopt the CPUC's testing methodology for broadband internet services regardless of technology providing

[17] MOS is a mathematical calculation of users' subjective judgement of whether voice service is acceptable. MOS takes into account jitter and other metrics of whether the underlying broadband service is stable enough to provide good quality (Over the Top) VoIP service.

[18] The CPUC, however, has not yet had the opportunity to analyze calspeed.org results, as the tool has just recently been completed and released.

[19] *See* Comments of the California Public Utilities Commission, Inquiry Concerning Proposed Methodology for Connect American High-Cost Universal Service Support Recipients to Measure Speed and Latency Performance to Fixed Locations (WC Docket No. 10-90, DA 14-1499), Dec. 22, 2014.

the service. CalSpeed differs from other testing tools in key ways that make its measurements closer to consumers' actual experience, and our method should be adopted in any testing used by the FCC.

D. D. The CPUC Should Recommend That the FCC Defer Including Mobile Broadband In Its Definition of "Advanced Telecommunications Capability" Until Standards Are Adopted

The NOI notes "[t]here are a number of factors that appear to indicate that mobile and fixed broadband are different services that address different consumer telecommunications needs and different components of the definition of advanced telecommunications capability."[20] Accordingly, the FCC seeks comment on whether both services are necessary to meet the goal that all Americans have access to "advanced telecommunications capability."[21]

Recommendation 11: Staff recommends that the CPUC propose to the FCC that its goal should ensure the availability of at least one advanced broadband Internet access service to all Americans. Requiring the availability of both fixed and mobile advanced telecommunications capability for all Americans would be very costly to ensure, in particular in high cost rural areas. Such a determination would lead to double funding of broadband availability.

For instance, the current CPUC practice is to not to require the presence of both fixed and mobile broadband Internet access service. The CPUC's California Advanced Services Fund (CASF) will consider ineligible program grant areas where broadband is already available at speeds above 6 Mbps downstream and 1.5 Mbps upstream provisioned by either wireline, fixed wireless or mobile technologies. However, in several grant applications community representatives and public commenters have stated that the available mobile and/or fixed wireless services were insufficient to meet community needs. Such situations may be evaluated on a case-by-case basis where a wireline project is considered despite the presence of mobile or fixed wireless.

The FCC should ensure availability of an advanced broadband Internet access service, but not more than one as it can be conceivably too costly. Moreover, as discussed above, standards are needed for mobile broadband because of variabilities in speed and quality of service. Until the FCC adopts standards and benchmarks for mobile broadband technology, it should defer including mobile service at this time in its definition of "advanced telecommunications capability".

[20] NOI, at ¶ 10.

[21] *Id*.