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

M E M O R A N D U M

Date : September 22, 2017

To : The Commission
(Meeting of September 28, 2017)

From : Kim Lippi
Public Utilities Counsel IV, Legal Division

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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 *Thirteenth* Broadband Progress Report Notice of Inquiry (NOI) released by the Federal Communications Commission (FCC).[1] 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."[2]

In this NOI, the five main topics that the FCC is investigating are:

1) Should the FCC consider mobile broadband to be a substitute for wireline home broadband service and should the FCC evaluate deployment of broadband based on the presence of BOTH fixed and mobile broadband services?
2) Should the FCC maintain its 25 Mbps download / 3 Mbps upload (25 Mbps / 3 Mbps) speed benchmark for fixed broadband, or should the FCC consider modifying that speed benchmark?

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[1] Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, *Thirteenth Broadband Progress Notice of Inquiry*, GN Docket No. 17-199, FCC 17-109, (rel. Aug. 8, 2017) (NOI).

[2] 47 U.S.C. § 1302(b).

3) Should the FCC have specific speed benchmarks for mobile broadband?
4) What benchmarks / metrics should the FCC use to evaluate mobile broadband deployment? Should the FCC incorporate measures of latency or consistency of service into their benchmarks for either fixed or mobile broadband?
5) The FCC also seeks comment on methodological issues related to the FCC's evaluation of a mobile broadband speed benchmark, and what effects might testing methods, failed speed tests and other characteristics of a particular speed test have on the appropriateness of a certain speed benchmark.

Staff proposes to file comments in this proceeding informing the FCC of the CPUC's findings regarding the substitutability of mobile broadband for wireline home broadband services. In Decision (D.) 16-12-025, the Commission found that mobile and residential broadband services are "generally not substitutes."[3] Staff further proposes to file comments in this proceeding which address the FCC's technical questions about how to measure both wireline and wireless service. Further, we propose to include links, as we have in the past, to the reports analyzing the mobile testing data we have collected that have been published by Ken Biba. Mr. Biba's reports were produced as part of the CPUC's contracts with CSU Chico and CSU Monterey Bay, and have informed our own analysis. For both fixed and mobile broadband testing, we wish to stress the importance of using quality metrics and not solely throughput speeds. We propose providing our current mobile availability data sets and analyses of both mobile and fixed broadband deployment in California, in order to inform the FCC's determination of whether advanced telecommunications services are being deployed to all Americans in a reasonable and timely manner.

As part of these 706 NOI comments, the CPUC will share mobile broadband testing data that was gathered as part of the CPUC's CalSPEED mobile broadband testing program. The CalSPEED testing program, which began in 2012, was partially funded by the National Telecommunications and Information Administration (NTIA), through the Federal Government's American Recovery and Reinvestment Act (ARRA) stimulus program. Since the end of the ARRA program in 2013, the CPUC has continued its CalSPEED program due to its critical role in our implementation of the California Advanced Services Fund (CASF) infrastructure grant program. These data provide insights regarding the mobile broadband market in California. We believe our data and conclusions will be useful to the FCC, as it contemplates how to evaluate mobile broadband service nation-wide.

Comments are due September 21, 2017, and reply comments are due October 6, 2017. We intend to file comments prior to October 6, within the comment cycle, along with a request to file late.

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[3] CPUC D.16-12-025, slip op. at p. 44.

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.[4] In this NOI the FCC solicits data and information that will help it make this annual determination.

The CPUC has filed comments in the FCC's two most recent 706 Report NOIs. In its Tenth Annual Report (*2015 Broadband Progress Report*),[5] 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. The CPUC's comments in that proceeding provided the FCC with data and analysis to inform its decision on whether to require both types of service, and on how and what to measure to determine quality and reliability of service, in addition to speed.

The CPUC shared results from the CalSPEED mobile broadband testing program, which showed that in California, "high quality" mobile broadband service was NOT routinely available in enough places to conclude that mobile technology provided reliable broadband service throughout the state. Citing to the CPUC's comments, among others, the FCC found in its *2015 Broadband Progress Report* that due to "mobile data quality issues and other concerns, we are unable to incorporate mobile in our 706 (b) finding. In the next [Broadband Progress] Report, however, we anticipate having more reliable mobile broadband deployment data."[6]

In its Eleventh 706 Report NOI, that resulted in the *2016 Broadband Progress Report*, the FCC asked 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.[7]

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[4] *See* 47 U.S.C. § 1302(b).

[5] In re Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, *2015 Broadband Progress Report*, GN Docket No. 14-126, FCC 15-10 (rel. Feb. 4, 2015) (*2015 Broadband Progress Report*).

[6] *Id.*, at ¶ 107 (citation omitted).

[7] 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).

In its comments in that proceeding, the CPUC recommended that the FCC defer adding mobile broadband to the definition of "Advanced Telecommunications Capability" at that time, pending the gathering and analysis of more data. The FCC incorporated the CPUC's input and found that "the current record is insufficient to set an appropriate speed benchmark for mobile service."[8]

DISCUSSION AND RECOMMENDATIONS:

Evaluating Mobile and Fixed Broadband Availability

In this NOI, the FCC asks whether to focus this Section 706 *Inquiry* on whether *some form* of advanced telecommunications capability, be it fixed *or* mobile, is being deployed to all Americans in a reasonable and timely fashion.[9] Alternatively, the FCC asks whether it should evaluate deployment based on the presence of both fixed *and* mobile services.[10]

Staff recommends the CPUC share the findings it made in the Competition OII D.16-12-025. There, the CPUC made the following statement:

> In defining whether residential and mobile broadband are separate and complementary markets, or substitutable for one another and therefore part of the same market, we apply a similar analysis as that described above with regard to the substitutability of voice services. Here, however, we arrive at a different result: while mobile voice service generally substitutes for landline voice service, mobile and residential broadband services are generally not substitutes.[11]

As the Commission noted in that decision, residential broadband service is typically delivered over coaxial cable or existing phone lines using DSL technology. Wireless data services access the Internet using a mobile phone (or tablet), and, in wireless' current leading technology, the 4G LTE protocol, which can provide download speeds faster than DSL but is often slow and unreliable compared with Internet provided over cable or fiber. Ultimately, the Commission found that while residential and mobile broadband data services are in many respects functional substitutes—both services allow users to access email, browse the web, stream audio and video content, etc.— lower data caps and much higher data use charges for mobile broadband suggest that they are not reasonable economic substitutes at present.[12]

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[8] In re Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, *2016 Broadband Progress Report*, GN Docket No. 15-191, FCC 16-6 (rel. Jan. 29, 2016) (*2016 Broadband Progress Report*), at ¶ 3.

[9] NOI at ¶ 6.

[10] *Id*. at ¶ 7.

[11] D.16-12-025 at slip op. p. 44.

[12] *Id*. at slip op. pp. 44-45, Finding of Fact No. 7(g).

Recommendation: The CPUC should share the bases of its finding that mobile and residential broadband services are "generally not substitutes," ~~in order to assist the FCC in its consideration of this issue~~ and recommend to the FCC that our experience and data do not support substituting mobile broadband for fixed broadband services. The object of the CPUC's investigation was to take a snapshot of the telecommunications marketplace in California, with an "as of" date of December 31, 2015. The CPUC should make clear that this finding was made within that timeframe, as the CPUC continues to measure wireless performance.[13]

Metrics and Benchmarks

Section 706 provides that advanced telecommunications capability "enables users to originate and receive high-quality voice, data, graphics, and video telecommunications using any technology." The FCC seeks comment on how to evaluate both fixed and mobile services, and what benchmarks and metrics the FCC should use to evaluate "advanced telecommunications capability."

The CPUC has been using industry-accepted algorithms, which use speed along with quality and reliability metrics we track, to evaluate whether consumers can use their broadband service to originate and receive high-quality voice, data, graphics, and video telecommunications services. This is precisely the functionality required for service to be considered as supporting "advanced telecommunications capabilities." We recommend the FCC do the same.

1. Mobile Metrics and Benchmarks

The FCC seeks comment on how to establish a speed benchmark for mobile broadband services, and whether to take into account consistency/reliability of services and latency in the mobile broadband environment, and their interaction with speed.[14] The FCC also asks whether it would be practical to use deployment of various air interface technologies (e.g., LTE) as a proxy for speed benchmarks.[15] The FCC further asks what data sources are available for an analysis of these metrics and benchmarks.

The CPUC's CalSPEED mobile testing program has enabled the CPUC to collect and analyze a vast array of data not only about mobile broadband speeds, but other aspects of service we measure, such as latency, jitter, packet loss, failed connections, and packet routing. We have concluded that, while throughput is relevant, the actual user's experience depends on the combination of these other measures as well. As our current data and analysis shows, it is crucial to consider quality and reliability in determining the capabilities of the networks that have been deployed. The disparity in failed connections between rural and urban areas is great, and

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[13] The substitutability of mobile for fixed/home broadband service will remain a moving target. The broadband market is very dynamic, with both fixed and mobile service quality changing virtually continuously, as are the applications consumers expect to receive, the way services are marketed and priced, the availability of tethering and the capabilities and requirements of connected devices.

[14] NOI at ¶ 17.

[15] *Id.* at ¶ 19.

speaks clearly to the question of whether advanced telecommunications services have been deployed to all Californians.

Another important variable in judging the quality of broadband service is the location of the server at the far end of the connection. A user's experience depends on the connection all the way from his or her device to the far destination, not just the quality of the connection between the device and the cellular transmitter. Most speed testing apps, including the one created by the FCC, measure to a near-by server by default. Our CalSPEED methodology measures to both a near and distant server, and we have found a large disparity in the quality of broadband connections between the two.

As for data sources, through our CalSPEED mobile testing, it has become clear that the data submitted by mobile providers to the FCC on Form 477 (of providers' lowest advertised speeds), does not help determine whether mobile broadband service at any given location is of high enough quality or reliability to support advanced communications services. Instead, structured mobile drive tests to collect data showing the actual service being received by mobile users would provide better geographic level of data needed to evaluate broadband availability.

Recommendations:

Staff recommends that the CPUC submit to the FCC its CalSPEED mobile test data and analysis to inform the FCC's deliberation, and urge the FCC to include other variables, in addition to speed, that affect the quality of mobile broadband service, as discussed above.

As noted above, we have submitted our mobile test data sets in prior comments to the FCC, along with the reports published by Mr. Biba. The FCC has found our data and analysis useful, and has performed its own analysis (using slightly different methods than we had used) of mobile broadband deployment in California and published its results using our data along with its analysis using other data sets, including its own.[16]

The CPUC should further recommend that the FCC conduct mobile drive tests, using sufficient test points so that interpolations of test data (predicting service characteristics in between those points) is reliable within one kilometer. If the FCC desires to achieve more granular interpolations, it can create a denser selection of test points.

Finally, the CPUC should urge the FCC to not use interface technologies as a proxy for speed benchmarks. While LTE (or newer generations of mobile technology about to be deployed) is required for mobile service to support advanced capabilities, the CPUC's mobile data and analysis show that LTE air interface technology often has quality and reliability problems that cause throughput to be highly variable. The sheer number of failed mobile broadband connections experienced in the California, especially in rural areas of California, shows that air interface technology should not be used as a proxy for speed, quality or reliability.

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[16] *2015 Broadband Progress Report* at ¶¶ 56-70, 110-112.

2. Fixed Broadband ~~Metries and~~ Speed Benchmark

For fixed services, the FCC currently defines advanced fixed telecommunications services only in terms of speed, or throughput. In 2010, the FCC increased their "advanced telecommunications capability" fixed broadband speed benchmark from 200 kbps in both directions to 4 Mbps down / 1 Mbps up. The FCC left the speed benchmark at 4 Mbps down / 1 Mbps up for three reports and in 2015, it raised the benchmark to the current 25 Mbps down / 3 Mbps up. To date, the FCC has focused on upload and download speed benchmarks to evaluate fixed broadband services. In the NOI, the FCC seeks comment on the appropriate benchmark for fixed advanced telecommunications capability and whether it should maintain the 25 Mbps download, 3 Mbps upload speed benchmark.

In the Competition OII Decision, D.16-12-025, the Commission found the FCC's speed benchmark for "Advanced Services," set at 25 Mbps download and 3 Mbps upload, to be a "useful, reasonable, and forward-looking division to separate the broadband market into 'low-speed' and 'high-speed' tiers.[17] The Commission stated in that decision:

> In evaluating these competing arguments, we begin by agreeing with TURN that the 25/3 speed tier, the FCC's current benchmark for "Advanced Services," represents a useful, reasonable, and forward-looking dividing point to define a "high-speed" broadband tier. We note that higher speeds improve the performance of video streaming services from companies like Netflix and Amazon, as well as live-video feeds from companies like Facebook and Twitter. While Netflix recommends a five Mbps connection for high definition video streaming, households that include multiple end-users using multiple devices to access multiple services at the same time may find that download speed inadequate.
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> A significant justification cited by the FCC in its 2015 Broadband Progress Report, in creating the new 25/3 benchmark, was that households may be comprised of multiple individuals using multiple devices. The FCC has periodically raised the minimum bandwidth for "Advanced Services" over the last decade, and it is reasonable to anticipate that "Advanced Services" will not be static in the next decade. Fixed providers (especially cable providers) are already routinely offering speeds substantially in excess of the 25/3 benchmark.[18]

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[17] CPUC D.16-12-025, slip op., Finding of Fact No. 12.

[18] *Id*. at slip op. pp. 48-49 (citations omitted).

Recommendation: The CPUC should inform the FCC of its findings in the Competition OII Decision, and recommend that at a minimum the FCC maintain its 25Mbps/3Mbps speed benchmark for fixed advanced telecommunications capability.

3. Other Fixed Broadband Metrics and Benchmarks

While pondering ~~now~~ whether to retain its 25 Mbps/ 3 Mbps benchmark, the FCC asks whether other factors than speed should be considered, including latency or consistency of service.

The FCC seeks comment on methodological issues that might affect testing methods. Examples include consistency/reliability of service, latency, failed speed tests, data allowances and other characteristics of particular types of speed tests that might affect accuracy of data and/or conclusions about which speed benchmarks to use.[19]

The FCC further asks whether reliable data exists that can be applied in a meaningful way year after year.[20]

Staff, working with CSU Monterey Bay and CSU Chico, has begun to design a device and a program to perform our CalSPEED testing of fixed connections. Such testing was ordered in the CPUC's Competition OII Decision.[21] This work is in the early stages. We have seen preliminary data showing that quality and reliability measures will be just as critical in determining wireline customers' Internet access experience as they are for mobile broadband. In past comments to the FCC, the CPUC has recommended that quality and reliability must be considered when evaluating fixed broadband services.

Recommendations:

Staff recommends that the CPUC urge the FCC to take quality and reliability into account, in addition to speed, when evaluating fixed broadband, and determining whether fixed advanced telecommunications services are being deployed to all Americans in a reasonable and timely manner.

Staff further recommends that the CPUC describe its new fixed testing program to the FCC, in which we will distribute 500 Internet devices to fixed (wireline) broadband locations throughout the state. CPUC testing devices may also be used to test the quality of fixed broadband services deployed with the assistance of the California Advanced Services Fund and federal subsidy programs, such as the FCC's Connect America Fund program.

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[19] NOI at ¶¶ 21, 22.

[20] *Id*. at ¶ 15.

[21] CPUC Decision (D.) 16-12-025, Analyzing the California Telecommunications Market and Directing Staff to Continue Data Gathering, Monitoring and Reporting on the Market, Investigation 15-11-007, (filed 11/ 5/ 2015), Ordering Paragraph 4, (rel. 12/8/2017).

The FCC has its own program that deploys Internet devices to test fixed broadband services called Measuring Broadband America (MBA). We recommend suggesting that the FCC expand its MBA program to provide a more robust picture of fixed broadband deployment. We also recommend that the FCC use its MBA program as a resource with which to validate broadband availability data submitted by providers on FCC Form 477. The CPUC should further recommend to the FCC that it engage the state commissions to design and execute similar fixed broadband test programs in their own states.[22]

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[22] Such an effort may require Congressional funding.