2 INTRODUCTION AND BACKGROUND FOR THIS STUDY

Principal observations and takeaways

- The ongoing failure of the carriers to meet the specified minimum GO 133-C/D service quality standards may warrant additional corrective measures, including revision of existing minimum standards and imposition of financial incentives and penalties.
- The GO 133 maximum Customer Trouble Report Rates of 6%, 8% or 10% of switched access lines per month (based on wire center size) are unduely generous because failure rates as high as these can hardly constitute acceptable service quality.
- The only time that either ILEC has met the GO 133-C/D requirement of 90% of out-of-service conditions cleared within 24 hours occurred during the last two months of Verizon's ownership, and only because the Commission required such compliance as a condition for approval of the sale of the ILEC to Frontier.

INTRODUCTION AND BACKGROUND FOR THIS STUDY

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The Genesis of this Study

In December 2011, the Commission opened Rulemaking (R.) 11-12-001 to (a) review telecommunications carrier performance in meeting the GO 133-C/D service quality standards and measures in 2010; (b) assess whether the existing GO 133-C/D service quality standards and measures meet the goals of the Commission to adequately protect California customers and the public interest; (c) determine whether the existing GO 133-C/D standards are relevant to the current regulatory environment and market; and (d) determine whether there is a need to establish a penalty mechanism for substandard service quality performance.[1] In the Scoping Memo issued the following September, the ALJ and the then-Assigned Commissioner noted that:

> In order to maintain acceptable levels of service quality for California customers, it is necessary to ensure that carriers have access to an adequate network of infrastructure. Without ubiquitous functional infrastructure that is adequately maintained, services provided to customers will degrade. In extreme cases, facilities failures will lead to a complete loss of service, including E911, to customers served by those facilities.[2]

The *Scoping Memo* noted that

> the OIR suggested several related issues potentially within the scope of this proceeding, including an assessment of the condition and maintenance of telecom-munications facilities, and an examination of telecommunications corporations' internal policies and practices that could affect the quality of service experienced by consumers. The OIR further allowed for the scope of this proceeding to include various technological approaches to providing voice telecommunications services, including the use of wire line, wireless, and potentially other ways of accessing voice services through the telecommunications network.[3]

The *Scoping Memo* identified five (5) principal issue areas for initial examination:

1. Are telecommunications facilities being appropriately maintained to ensure quality service is being, and will continue to be, provided to retail and wholesale customers?

1. *Order Instituting Rulemaking to Evaluate Telecommunications Corporations Service Quality Performance and Consider Modification to Service Quality Rules*, R.11-12-001, December 1, 2011, at 3-4.

2. September 24, 2012, R.11-12-001 Assigned Commissioner's *Scoping Memo and Ruling*, at 12.

3. *Id.*, at 5, citations omitted.

2. How have telecommunications corporations performed since 2009 relative to the service quality standards adopted in GO 133-C/D?

3. Are telecommunications companies providing reliable telecommunications services of sufficient quality to ensure public safety and meet their obligations under state law11 and Commission directives?

4. Are existing service quality standards and reporting requirements reasonable, appropriate, and/or sufficient to ensure that California consumers receive adequate service and support public safety?

5. If new service quality standards are adopted or existing standards are maintained, should enforcement mechanisms such as penalties apply when telecommunications carriers fail to meet those standards?[4]

The Scoping Memo finds that:

> In order to maintain acceptable levels of service quality for California customers, it is necessary to ensure that carriers have access to an adequate network of infrastructure. ... As a part of our review of the factors that may affect service quality, Communications Division shall oversee an examination of carriers' facilities. This examination will focus on the facilities of AT&T and Verizon, and will be conducted by an independent consultant under a contract managed by Commission staff. I expect that this study will be a foundational activity in this proceeding, providing valuable information that will assist parties and the Commission in addressing the issues within the scope as outlined above.
>
> This examination is likely to include, but may not be limited to, physical inspection of network facilities throughout the state and a review of carrier policies, procedures, and documents. Policies and procedures related to investment, maintenance, and problem ticket response will be assessed, among other subjects. The Communications Division will select a qualified team to conduct the examination via a Request for Proposal (RFP), and will manage the resulting study contract. ... I anticipate that the cost of this study will not exceed $1 million.[5]

4. *Id.*, at 8-11; affirmed by the Commission at D. 13-02-023, at Ordering Paragraph 1.

5. *Id.*, at 12-13.

In D.13-02-023, a "Decision Affirming Provisions of The Scoping Memo and Ruling," the Commission reaffirmed the need to examine the AT&T CA and Verizon CA networks, and directed that a consultant be engaged to undertake such a study.

> This decision also affirms the finding in the scoping memo that an evaluation of carrier network infrastructure, facilities, and related policies and procedures is a necessary foundational activity within this proceeding, and further requires AT&T and Verizon to split the costs of this study, which we estimate will be approximately $1 million. ...[6]

The Request for Proposals ("RFP") for the Network Study was initially issued on June 5, 2017 followed by two subsequent revisions.[7] In responding to the second revised RFP, ETI outlined a "data-driven" approach that would rely upon the extensive amount of data that had been submitted by the two ILECs pursuant to GO 133-C/D and other CPUC and public data sources, together with the results of the CD Staff's on-site inspections and data requests to be drafted by ETI. ETI was notified of the award of this contract to us on January 12, 2018, and was authorized to commence work under the contract as of February 26, 2018. This report is the result of that undertaking.

This Study relied on a "data-driven" analysis methodology utilizing the extensive GO 133-C/D data that the ILECs had submitted, on ILEC responses to data requests, on other CPUC and public data sources, and on the results of the CD Staff's on-site inspections.

6. D.13-02-023, at 3.

7. The budget for the Network Study was subsequently cut to $500,000. The June 5, 2017 RFP would have required, among other things, that the consultant conduct on-site physical inspections of up to 25 AT&T-CA and 25 Frontier-CA wire centers (RFP 16PS5014, June 5, 2017, at 4; RFP 16PS5014 Questions & Answers, July 17, 2017, Comment#1, at 2.). ETI determined that the scope of the project, including these 50 on-site inspections, could not be accomplished within the specified budget limit. CD advised that no qualified bidders had responded to this RFP. On August 31, 2017, CD issued a revised RFP that retained the on-site physical inspection requirement. Once again, ETI declined to submit a bid for the same reason as in the initial RFP. CD advised that no qualified bidders had responded to this revised RFP.

On October 31, 2017, CD issued yet another revision to the RFP that assigned the responsibility for all on-site physical inspections of AT&T and Frontier facilities to "the CPUC communication division staff," thus eliminating all on-site visits from the consultant's scope of work (RFP 17PS5007, October 31, 2017, at 8; see also RFP 17PS5007 Questions & Answers, 11/15/2017, Item 2: "Staff has a telecommunications engineer on staff, however this engineer will not be performing outside plant tests. The work plan for locations will be agreed with staff according to availability. The staff will be able to take pictures of outside plant to inform the consultant's findings in the area requested. Service quality data available to the CPUC is at the line level and physical address can be requested from the telephone corporation.") With the modifications to the scope as set out in the second revised RFP, ETI concluded that it could undertake and complete the revised scope of work within the specified budget, and submitted a proposal for the project.

Overview of OIR.11-12-001 to evaluate URF ILEC Service Quality performance

Public Utilities Code Section 451 requires that telecommunications carriers provide a level of service "…as necessary to promote the safety, health, comfort, and convenience of its patrons … and the public." As the Commission observed at the outset of this OIR:

> The Commission has a statutory duty to ensure that telephone corporations provide customer service that includes reasonable statewide service quality standards including, but not limited to, standards regarding network technical quality, customer service, installation, repair and billing.[8]

The Commission's concern about telecommunications carrier service quality has a long history. The initial version of General Order 133 was adopted in Case No. 9353 in1972, at D.80082. In that Order, the Commission viewed the new GO 133 as "represent[ing] a completely new approach to this area of regulation." The Commission explained that the General Order defined "a range of performance wherein service would be considered to be adequate. Each individual reporting unit would be expected to generally provide service at levels within the standard range. Reporting service levels are established so as to indicate reporting units which are performing significantly below standard service ranges and to provide an indication of inadequate service."[9] There have been several revisions to GO 133, the most recent of which occurred in August 2016, when the current GO 133-D was issued.[10]

The adoption of "price cap" type incentive regulation in 1989 – the "New Regulatory Framework" ("NRF") – raised new concerns about service quality. A central feature of incentive regulation is that, unlike the traditional "cost plus" approach to economic regulation of public utilities, under incentive regulation carriers are permitted to retain some, or perhaps even all, of any additional profits they are able to amass through implementation of efficiencies and other profit-enhancing measures. But short-run profits could also be increased by "cutting corners" – i.e., by scaling back on infrastructure investment and ongoing expenditures on maintenance.

To protect against such tactics, incentive regulation plans would often require that certain minimum service qualify standards be maintained and, in the event of a failure in that regard, impose financial penalties upon the carriers. The *New Regulatory Framework* order, D.89-10-031, contains an extensive discussion of this issue. However, rather than impose specific finan-

8. D.09-07-019 at 12; P.U. Code § 2896.

9. *Invest1gation into the Need and Requirements for a General Order Governing Standards of Telephone Service to be Furnished by Telephone Utilities in the State of California*, CPUC Case No. 9353, D.80082, 1972 Cal. PUC LEXIS 1071, 73 CPUC 426.

10. D.16-08-021, 2016 Cal. PUC LEXIS 458 (Cal. P.U.C. August 18, 2016)

cial penalties for failing to meet service quality targets, the Commission instead adopted an earnings sharing and earnings cap mechanism as a means for protecting consumers against ILEC measures that would otherwise result in excess profits.[11] Notably, other state PUC price cap plans adopted at around the same time as the NRF did impose specific service quality benchmarks and financial penalties for failure to achieve them. For example, in adopting price cap regulation for Illinois Bell in 1994, the Illinois Commerce Commission adopted a service quality component based upon a structure that had actually been recommended by the ILEC itself:

> ... the Commission concludes that it will adopt a service quality component in the price cap formula. We recognize that one of the theoretical risks of price regulation is that the Company may, while seeking to maximize its income, reduce expenditures in certain areas in such a manner as to impact service quality adversely. This is especially true for residential services which are the most inelastic services and are unlikely to be exposed to competitive pressures in the near term.
>
> [Illinois statutes] Section 5/13-506.1 (b)(6) requires the Commission to find that an alternative regulation plan will maintain the quality and availability of telecommunications services (emphasis added). The Commission believes that the best way to eliminate the Company's incentive to reduce service quality will be to adopt a service quality component which penalizes the Company for not maintaining service quality but does not provide additional reward for exceeding current performance. Therefore, we will adopt the Company's eight separate quality of service measures using the Company's average actual performance in 1990 and 1991 as performance benchmarks. Since the Company has exceeded the Commission's Part 730 rules, which are intended to be minimum standards which all LEC's must satisfy, [*128] it is necessary to establish these higher standards to safeguard against erosion of service quality.
>
> Each measure is given equal weight in calculating the service quality component. For each measure, the Company receives a score of zero if it meets the benchmark, and a score of -.25 if it fails to meet the benchmark. Under this scenario, the price regulation formula will be GDPPI [Gross Domestic Product Price Index] minus 4.3% minus 0.25% for each service measure in which the Company fails to meet its benchmark. If, for example, the Company fails to meet its benchmark in all eight measures the regulation formula will be GDPPI minus 6.3%. This should provide a considerable

11. *I/M/O Alternative Regulatory Frameworks for Local Exchange Carriers.; In the Matter of the Application of Pacific Bell (U 1001 C), a corporation, for authority to increase intrastate rates and charges applicable to telephone services furnished within the State of California*, D.89-10-031, I.87-11-033, 1989 Cal. PUC LEXIS 576; 33 CPUC2d 43; 107 PUR 4th 1.

> incentive for the Company to meet its benchmarks and not allow quality to deteriorate.[12]

In 2006, the Commission replaced the NRF with the Uniform Regulatory Framework ("URF") that was intended to apply to all carriers – incumbents and entrants alike – and to largely eliminate price and earnings regulation with respect to most ILEC services that had by then been deemed to have become subject to competition.[13] The ILECs that were to be subject to the URF (AT&T-CA and Verizon-CA) had argued that further monitoring of their service quality was no longer necessary since the operation of a competitive market would force them to maintain a high level of service quality or risk losing business to competitors.[14] But in adopting GO 133-C in D.09-07-019, the Commission concluded that:

> Consistent with the general agreement of the parties that competitive environments act to apply a natural pressure for carriers to ensure adequate service quality, it is reasonable to simplify the existing reporting requirements. *At the same time, we do not believe a complete elimination of service quality reporting is warranted or reasonable because this Commission has a statutory duty to ensure customers receive adequate service quality pursuant to Public Utilities Code §§ 709, 2896 and 2897.* Accordingly, today's decision adopts GO 133-C containing a minimum set of service quality measures. *We believe continued reporting of these measures will ensure that telecommunications carriers provide relevant information to this Commission so that we may adequately protect California consumers and the public interest.*[15]

The Commission's concerns as expressed in 2009 were soon borne out. As discussed extensively in its November 2011 Order initiating this Rulemaking, the Commssion observed that:

> In December 2010 and early January 2011, a series of severe rainstorms battered Southern California, resulting in flooding that led to the Governor's

12. *Illinois Bell Telephone Company: Petition to Regulate Rates and Charges of Noncompetitive Services Under An Alternative Form of Regulation* et al, Ill. Commerce Comm'n, Docket No. 92-0448, 1994 Ill. PUC LEXIS 437, October 11, 1994, at *126-*128.

13. *Uniform Regulatory Framework*, D.06-08-030.

14. See, D. 09-07-019, §4.2.2, at 28: "AT&T and Verizon contend that all service quality measures and reporting requirements should be eliminated. They assert that in view of the development of competitive markets and the Commission's policy direction in URF, continued reporting to the Commission is unnecessary because competition is sufficient to protect consumers' interests." Citations omitted.

15. *Order Instituting Rulemaking on the Commission's Own Motion into the Service Quality Standards for All Telecommunications Carriers and Revisions to General Order 133-B*,.D.09-07-019, July 9, 2009, at 2-3, emphasis supplied, citations omitted..

declaration of state of emergency in twelve counties in Southern California. These rainstorms caused over 250,000 AT&T and Verizon customers to lose telecommunications service for various periods of time. The outage event attracted State Senator Alex Padilla's attention, and he requested that the Commission obtain additional information regarding the carriers' service restoration efforts. On February 4, 2011, the Senate Energy, Utilities and Commerce Committee chaired by Senator Padilla held a hearing because of the significant impact of the outages on customers.

From Senator Padilla's hearing inquiry, CD noted that, although approximately 50% of the affected customers had service restored within four days, many customers remained without service for ten days, and in some cases for as long as 30 days. CD observed in its March 2011 report that the December 2010 GO 133-C service quality report did not include outage information for the December 2010 rainstorm events in Southern California. This was due to the order's specific exclusion of data compiled during catastrophic events. CD also cited in its report that GO 133-C lacked specificity as to when a state of emergency ended, what information should be included in the raw data to support carriers' reported results, and in what format the raw data should be submitted to allow CD to reproduce carrier results. For example, one carrier provided raw data that included less than one half of the service tickets received for the First Quarter 2010, and in numerous other instances, carriers provided raw data in a PDF or picture format that did not show the formula for the underlying calculations.

In 2010, CD found that AT&T's first and second quarter supporting raw data files were truncated and required several re-runs and resubmissions of the data to provide a full reporting of Out-of-Service repair tickets. CD's staff recommended in its report that the Commission open an OII or OIR to review the service quality standards, and specifically address why some carriers consistently could not or did not meet the Out-of-Service Repair or Answer Time standards in 2010, and to consider whether to adopt new standards, modify current standards and adopt penalty mechanisms.[16]

Finally, in the *Assigned Commissioner's Scoping Memo and Ruling* issued on September 24, 2012 (which was subsequently affirmed by the Commission at D. 13-02-023), the ALJ summed up the various observations and concerns as expressed in the 2009 and 2010 CPUC rulings:

In D.09-07-019, the Commission found that competition in the California telecommunications market should provide an incentive for carriers to provide

16. R.11-12-001, at 7-8.

> high quality service to their customers. Specifically, the Commission stated that "URF carriers operate in competitive markets that provide greater external pressure to ensure service quality and customer satisfaction." This finding provided support for the Commission's determination in 2009 that only minimal service quality standards should be needed to meet the Commission's responsibility to ensure customers receive adequate service quality. *One possible conclusion that could be drawn from the service quality results contained in the March 2011 CD report is that existing competitive forces and minimal standards are not sufficient to provide the service quality the Commission is required to ensure, and the level of public safety the Commission is committed to upholding.*[17]

Notably, the level of competition for traditional legacy circuit-switched ILEC voice services – generally referred to as "Plain Old Telephone Service" or "POTS" – was relatively small at the time that the URF was adopted in 2006, when GO 133-C was adopted in 2009, or even when this OIR was initiated in 2011. But over the period under examination in this Study (2010-2017), the two URF ILECs have seen a massive erosion in the demand for their legacy services. Some of that demand has been replaced by other services offered by the same ILECs or their affiliates, including wireline Voice over Internet Protocol ("VoIP") and wireless Commercial Mobile Radio Services ("CMRS"). ILECs have also lost considerable market share to cable Multi-System Operators ("MSOs") such as Comcast and Charter.

Competition for basic voice services has seen much of the growth that the CPUC had anticipated when it adopted its Uniform Regulatory Framework ("URF") in 2006, the concurrent improvement in ILEC service quality that the Commission had also expected to result from this increased competition has failed to materialize.

Had the Commission's initial URF-related expectations that increasing competition would assure high service quality been borne out, continued improvement in service quality should have occurred. But this has not happened. Ongoing service quality monitoring by the Commission's Communications Division has confirmed the persistence of service quality shortcomings. In September 2014, CD released a staff report that discussed the service quality results of the principal California ILECs over the 2010-2013 period. CD's analysis, which was derived from the data submitted pursuant to the measures and standards established in GO 133-C,[18] found that:

17. R.11-12-001, Scoping Memorandum and Ruling, September 24, 2012, at 6, emphasis supplied, citations omitted.

18. CD's September 2014 Report ("CD 2014 Report") is available at http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M111/K579/111579788.PDF.

- For the period 2010 through 2013, AT&T CA and Verizon CA, who collectively operated 88% of the working lines reported in California, did not meet the minimum standard for the out of service repair interval,

- The length of time that both companies combined required to clear 90% of out-of-service conditions was 96 hours, i.e., four days, whereas the GO 133-C objective called for 90% cleared within 24 hours.[19]

- The specific remedial measures to improve service that had been proposed by each carrier did not result in noticeable improvements to GO 133-C reported service quality results.

- CD concluded that the ongoing failure of the carriers to meet the specified minimum standards of service quality measures warranted consideration of revising the current measures and adopting penalty/incentive methodologies to motivate the carriers to improve performance.[20]

As we discuss in detail in Chapter 4 of this Report, our analysis of the AT&T and Frontier data has confirmed that the two ILECs' performance with respect to the GO 133-C/D service quality measures has deteriorated with respect to legacy POTS services– precisely the opposite result that should, in theory, have occurred under competitive market conditions.

The ongoing failure of the carriers to meet the specified minimum GO 133-C/D service quality standards may warrant additional corrective measures, including revision of existing minimum standards and imposition of financial incentives and penalties.

The GO 133-C/D Service Quality measurements applicable to URF ILECs

GO 133-C/D differentiates between General Rate Case ("GRC") ILECs – those that are still subject to cost-plus rate-of-return type regulation – and the two large ILECs that are subject to the Uniform Regulatory Framework. GRC carriers are subject to five (5) GO 133-C/D service quality measures. However, only three (3) service quality measures apply to URF ILECs:

(1) Customer Trouble Reports – number of Trouble Reports per Hundred ("TRPH") access lines in service (§3.3);

19. *Id.*, at 16.

20. *Id.*, at 3.

(2) Out of Service Repair Intervals – percentage of Out-of-Service ("OOS") conditions that are cleared within 24 hours (§3.4); and

(3) Answer Time for trouble reports and billing and non-billing inquiries (§3.5).

GO 133-C/D has established a specific performance objective for each of these three measures:

(1) For Trouble Reports per Hundred access lines (TRPH), a maximum of six (6) trouble reports per 100 working lines for reporting units with 3,000 or more working lines, eight (8) reports per 100 working lines for reporting units with 1,001-2,999 working lines, and ten (10) reports per 100 working lines for reporting units with 1,000 or fewer working lines (§3.3(c));

(2) For out-of-service (OOS) repair interval, subject to certain adjustments and exclusions, the commitment is measured by taking the total number of the repair tickets restored within less than 24 hours divided by the total outage report tickets. 90% of all out of service trouble reports within 24 hours is the set minimum standard (§3.4(b), (c)); and

(3) For Answer Time, 80% answered within 60 seconds when speaking to a live agent or 80% answered within 60 seconds when speaking to a live agent after completing an IVR or ARU system (§3.5(c)).

The scope of this Study includes only measures (1) and (2) – i.e., Trouble Reports per Hundred access lines and out-of-service conditions cleared within 24 hours.

Trouble Reports per Hundred access lines ("TRPH")

The GO 133-C/D specification for TRPH – a maximum of 6, 8 or 10 per 100 access lines depending upon the size of the "reporting unit" (typically a wire center) – appears unduly generous. As will be detailed in Chapter 4, even the poorest performing wire centers for each of the two ILECs under examination here are consistently well below these limits. As a result, both AT&T-CA and Verizon/Frontier-CA have consistently met this standard. As will be discussed in greater detail in Chapter 11, ETI believes that the TRPH standards need to be revised downward. The incidence of just under 6%, 8% or 10% of all access lines in service experiencing failures that would result in the creation of a trouble ticket in any given month could not be considered to constitute "good" service quality. Under these standards, and assuming for the sake of discussion that no single customer experiences more than one trouble condition in any given year, these standards would allow failures of 72%, 96%, and 120% respectively each year.

For example, consider the case of AT&T's [redacted] wire center which, in 2017, had one of the highest Trouble Report counts among all AT&T wire centers. In that year, [redacted] had an average of [redacted] access lines in service, which puts it in the 1000-3000 line (mid-

size) category. For a wire center in this size range, the "standard" maximum number of Trouble Reports per Hundred access lines would be 8.0 *per month*, if the "per month" interpretation of this requirement is to be maintained. Over the full 2017 year, the average TRPH per month for the [redacted] wire center was [redacted]. While among the highest TRPH counts in AT&T territory and the highest TRPH in the 1000-3000 line size category, [redacted] was still below the maximum of 8.0 threshold that is being considered as acceptable for a wire center of this size.

But looking beyond a single month suggests a different picture. Over the full year 2017, there were [redacted] trouble reports in [redacted] or [redacted] trouble reports per hundred access lines. There were many instances where the same customer had experienced multiple trouble conditions. In 2017, a total of [redacted], i.e., [redacted]% of the [redacted] average number of access lines in the [redacted] wire center, had experienced at least one trouble condition at some point during the year. It is difficult to imagine that this high an incidence of service problems in a single wire center would still be considered as "acceptable."

In fact, ETI's reading of GO 133-C/D suggests the possibility that the TRPH standards set forth therein may well have been misinterpreted and misapplied. §3.0(c) reads as follows:

> Minimum Standard Reporting Level. Report number of trouble reports per 100 working lines (excluding terminal equipment reports). Six trouble reports per 100 working lines for reporting units with 3,000 or more working lines, eight reports per 100 working lines for reporting units with 1,001-2,999 working lines, and 10 reports per 100 working lines for reporting units with 1,000 or fewer working lines.

Note that no specific time frame (e.g., per month, per quarter, etc.) is specified – only the number of reports per 100 access lines. §3.3(e) may shed some light on this lack of specificity:

> Reporting Frequency. Compiled monthly, reported quarterly.

Thus, while the *compilations* are to be accomplished on a monthly basis, the "reporting" is to be done on a *quarterly* basis. The term "Reporting" (not compilation) also appears at §3.3(d), which refers to "Reporting unit" as an "Exchange or wire center, whichever is smaller."

The 6%, 8% and 10% minimum standard reporting levels make much more sense if interpreted as applying *quarterly* rather than monthly. Viewed on an annual basis, they would still consider as satisfactory trouble report rates for the three "reporting unit" sizes of just under 24%, 32% and 40%. It seems difficult to believe that annual trouble rates in excess of these levels could or would ever be deemed to be acceptable.

The GO 133 maximum Customer Trouble Report Rates of 6%, 8% or 10% of switched access lines per month (based on wire center size) are unduly generous because failure rates as high as these can hardly constitute acceptable service quality.

90% out-of-service conditions to be cleared within 24 hours

The apparently overly generous standard adopted at §3.3 for Trouble Reports per Hundred access lines is in stark contrast to the requirement, at §3.4, that 90% of all out-of-service conditions are to be cleared within 24 hours. In fact, with the exception of the unique situation extant during the months of February and March 2016, this requirement *has never been met* by either AT&T or by Verizon/Frontier either on a companywide or on an individual wire center basis. In its September 2014 report on "California Wireline Telephone Service Quality Pursuant to General Order 133-C Calendar Years 2010 through 2013," CD summarized the companywide percentages of OOS cleared within 24 hours for the years 2010 through 2013 as follows:

Table 2.1

PERCENT OUT-OF-SERVICE CLEARED WITHIN 24 HOURS

Year	Pct cleared within 24 hours – AT&T	Pct cleared within 24 hours – Verizon
2010	50%	75%
2011	67%	72%
2012	70%	71%
2013	67%	70%

Source: CPUC Communications Division, "California Wireline Telephone Service Quality Pursuant to General Order 133-C Calendar Years 2010 through 2013," Chart 2, at 14.

GO 133-C/D requires that this measure be reported on a companywide basis, but also requires that the raw data upon which the calculations have been based be provided. As discussed more fully in Chapter 4, ETI has analyzed approximately 6.1-million AT&T and 1.8-million Verizon/Frontier trouble report records and, from that raw data, we have calculated the required GO 133-C/D measures on an individual wire center basis. In reviewing all 96 months worth of data for AT&T, ETI has found no instance where the 90% OOS cleared within 24 hours standard had been met for any month either for the company as a whole or for any individual wire center.

Verizon had a similar track record with the exception of its performance during the last two months (February and March 2016) that immediately preceded the transfer of its ILEC

operations to Frontier. In D.15-12-005, the CPUC's Order approving the transfer, the Commission noted that:

> Verizon consistently failed to meet the Commission's standard for OOS repair intervals and its performance on this metric worsened over time. GO 133-C requires that a minimum of 90% of OOS repairs should be completed within 24 hours. Verizon's performance on this metric declined from 72% of repairs completed within 24 hours in 2010 to 68% in 2014, even though the number of Verizon's working landlines decreased by 43% during that period.
>
> Verizon had 146 outages that met the FCC's criteria for major outages (a loss of 900,000 or more user minutes) and 208 outages that met the E911 reporting criteria. Although the average number of such outages per year decreased during this period, the average impact of the outages, measured in lost user minutes, increased.[21]

Based upon this record, the Commission ordered that:

> In response to the continuing under performance of Verizon on critical OOS metrics, *we will require that in the interval between the issuance of this decision and the closing of the Transaction, Verizon shall fully comply with GO 133-C and complete a minimum of 90% of out of service repairs within 24-hours of receiving notice of the out of service condition*.[22]

Following the April 1, 2016 closing date, on May 13, 2016, Frontier California submitted the Company's General Order 133-C/D Quarterly Service Quality Standards Report for the first quarter of 2016, the last three-month period "between the issuance of [D.15-12-005] and the closing of the Transaction," According to that report, Verizon had actually cleared 91.58% and 92.64% of OOS conditions "within 24-hours of receiving notice of the out of service condition" for the months of February and March 2016, respectively, thus seemingly meeting the D.15-12-005 requirement as the Commission had directed to be achieved as a precondition for the closing. Faced with a powerful $10.5-billion financial incentive to do whatever was necessary to meet this condition, Verizon managed to make it happen – perhaps by importing personnel from some of its other ILEC operations outside of California. However, this two-month compliance as reported in the May 13, 2016 filing was clearly an anomaly. When Frontier filed its GO 133-C/D report for the second quarter of 2016 on August 15, 2016, it showed 24-hour completion percentages for April, May and June 2016 of only 42.92%, 20.85%, and 72.35%, respectively. And from subsequent filings for the remainder of 2016 and through the fourth quarter of 2017,

21. D.15-12-005, *Decision Granting Application Subject to Conditions and Approving Related Settlements*, December 9, 2015, at 66, citations omitted.

22. *Id.*, at 67, emphasis supplied.

Frontier never repeated Verizon's one-time surge and exceed the 90% of OOS cleared within 24 hours threshold.

The only time that either ILEC has met the GO 133-C/D requirement of 90% of out-of-service conditions cleared within 24 hours occurred during the last two months of Verizon's ownership, and only because the Commission required such compliance as a condition for approval of the sale of the ILEC to Frontier.

While it may be convenient to examine companywide results, companywide averages are of little comfort to customers being served out of poorly-performing wire centers (as economists sometimes put it, "it is still possible for one to drown in a lake that is on average only six inches deep"). It is thus appropriate *and necessary* that the GO 133-C/D standards be applied at the individual wire center level. As will be detailed in Chapter 4, there is a wide variation across each company's individual wire centers insofar as the GO 133-C/D measurements are concerned. ETI has examined both the absolute levels of performance for individual wire centers, but has also calculated long-term trends over the 8-year study period. For many individual wire centers, the trend lines indicate a deterioration in performance. For others, small improvements can be observed.

One particularly interesting finding is that in those wire centers where the ILEC has invested in upgrades to feeder and distribution plant to enable broadband services such as AT&T's *U-verse* branded or Verizon/Frontier's *FiOS* branded high-speed Internet access, VoIP telephone service, and IPTV, the various GO 133-C/D service quality measures perform better than for those wire centers where no fiber has been deployed.[23] Although the principal focus of this Network Examination is upon legacy circuit-switched voice services, the availability of broadband services provides an indication that the ILEC has invested capital in that location to upgrade its capabilities overall. These investments appear to have had the ancillary benefit of improving service quality and reliability even for legacy circuit-switched voice services that had not by themselves provided the impetus for the broadband upgrade. The GO 133-C/D data indicate that, for offices where no broadband services are offered, the trouble report rates are higher and the percentage of out-of-service conditions cleared within 24 hours is lower than for locations where *U-verse* or *FiOS* services are available. Moreover, while the service quality measures for broadband-capable wire centers have remained relatively constant over the study

23. *FiOS* is based upon a "Fiber-to-the-Premises" ("FTTP") network architecture. *U-verse* generally requires the availability of fiber to neighborhood "remote terminals" or "Nodes" where the fiber feeder plant is cross-connected to copper distribution cables. These Nodes must be placed relatively close to the end user customer so as to support reasonably high-speed Digital Subscriber Line ("DSL") service. In geographically concentrated wire centers where total distances to some customers are relatively short, AT&T appears to have been able to offer *U-verse* branded services without fiber upgrades, but likely with some upgrades to and replacement of older copper plant.

period, for offices where no such investment has been directed, there is a clear trend of service quality degradation.

In wire centers where the ILEC has invested in outside plant upgrades that enable it to offer broadband services, the GO 133-C/D legacy POTS service quality measures consistently perform better than where no such upgrades have occcurred.

Sources of data used in this Study

ETI has assembled and relied upon a broad range of data sources in conducting this Network Examination. Principal among these were the following:

- Reports and raw data that AT&T, Verizon (prior to the transfer of its California ILEC operations to Frontier on April 1, 2016), and Frontier have been required to provide to the CPUC on an ongoing basis pursuant to GO 133-C/D regarding customer trouble reports and the respective companies' responses thereto.

- AT&T and Frontier responses to data requests submitted by ETI and by CPUC Communications Division Staff.

- Annual financial reports filed by AT&T California, Verizon California, and Frontier California that conform to the FCC's Automated Regulatory Management Information System ("ARMIS") reporting requirements. While largely discontinued by the FCC after 2007, the CPUC has continued to require that these reports be filed on a confidential basis by the URF ILECs.

- Public financial data and disclosures obtained from annual, quarterly and special reports – 10-K, 10-Q and 8-K reports – as filed by the two ILECs' parent companies – AT&T Inc., Verizon Communications, Inc. and Frontier Communications, Inc. – with the Securities and Exchange Commission ("SEC"), as well as Annual Reports to Shareholders and other shareholder communications issued by the various parent companies.

- Industry data and reports published by the CPUC and FCC.

- Statewide and county-wide industry data for California published by the Federal Communications Commission.

- Other government data sources, including the US Census Bureau, the Bureau of Labor Statistics, various California state agencies, and the National Oceanographic and Atmospheric Administration (NOAA).

The AT&T and Verizon/Frontier GO 133-C/D submissions

One consequence of the April 1, 2016 transfer of control from Verizon to Frontier within the time period covered by this Network Examination was a disruption in both the form and content of the ILEC's GO 133-C/D data submissions over the transition. Some data for the January-March 2016 period – the last three months for which Verizon retained management responsibility for the ILEC's operations – is missing, and the data subsequently submitted by Frontier following its takeover on April 1, 2016 was in an entirely different format. Certain data elements that had routinely been submitted by Verizon were not present in the Frontier compliance filings. While ETI has attempted to reconcile the two disparate data sources, in some cases we have been compelled to provide separate results for the entity's operations under each of the two parent companies that controlled it over the study period. In this report, we may refer to the Frontier California ILEC entity as "Verizon/Frontier" in situations where the time period and the data under discussion extends across both parent companies' ownership.

Over the period January 2010 through and including December 31, 2017, AT&T provided the Commission with the required quarterly summary reports and the approximately 6.1-million individual Trouble Report records upon which these reports were based. Roughly 5.0-million of the AT&T Trouble Report records were associated with Out-of Service ("OOS") conditions of varying lengths. Frontier California and its predecessor Verizon California provided a corresponding set of quarterly summary reports and the raw underlying Trouble Report data. The Verizon submissions covered the period from January 2010 through March 2016, when the ILEC was acquired by Frontier and was renamed Frontier California. ETI was provided with approximately 1.6-million Trouble Report records covering the Verizon period, and another 0.2-million records for the post-acquisition period from April 2016 through December 2017.

There was considerable variation both in format and content both within and across the AT&T and the two Verizon/Frontier datasets, making it difficult to achieve direct comparability of results across all three ILEC entities. Individual data elements were present in some time periods and missing in others. The scope and even the definitions of seemingly corresponding data elements also differed among the three individual datasets. ETI was thus required to analyze and refine the data as submitted and, in some instances, to perform certain calculations that were present in some records but missing in others. In some cases, ETI was required to generate missing data elements from others present in a particular dataset, either by computation, transformation, or inference. While different naming conventions and designations had been used, all three datasets included, or were refined so as to include, similar data elements, as summarized in Table 2.2.

Table 2.2

PRINCIPAL GO133-C/D TROUBLE REPORT DATA ELEMENTS

Element	Description
Trouble Ticket	Serial number assigned to Trouble Ticket
Billing Telephone Number	The 10-digit number designating the customer account
Circuit ID	Generally the same as the Billing Telephone Number except for multiline customers
Wire Center	For AT&T, a 6-digit wire center code; for Verizon and Frontier, the "Common Language Location Identifier" ("CLLI") code. AT&T 6-digit wire center codes were mapped into their corresponding industry-standard CLLI codes.
Class of Service Name	To identify a customer as Residential or Business
Out of Service Indicator	=1 if a service interruption had been involved; otherwise =0
Receive Date Time	Date/Time that the trouble report was received by the ILEC
Receive Day of Week Number	Day of week that the trouble report was received by the ILEC
Restored Date Time	Date/Time when service was restored
Closed Date Time	Date/Time when the trouble ticket was closed
Cause Code	A code designating the cause or source of the trouble condition
Disposition Code	A code designating the type of action that was taken in response to the trouble report
CPUC Duration adjusted for weekends/holidays	An adjusted length of the out-of-service conditions where a weekend or holiday intervened between the customer trouble report and the date/time of service restoration
Request Flag	An adjustment to the out-of-service duration where the customer had requested a specific data/time for a service technician visit
"Excluded" indicator	An indication that the source of the outage was beyond the ILEC's control – e.g., a fire or earthquake
Computed actual duration	The actual elapsed time between the date/time receipt of a Trouble Report involving an out-of-service condition and the date/time when cleared
Computed adjusted duration	The elapsed time between the date/time receipt of a Trouble Report involving an out-of-service condition and the date/time when cleared adjusted to exclude weekend/holiday hours or other conditions for exclusion

Financial data

ETI relied upon a number of public and proprietary sources of financial data in the course of this study. Up until 2007, the FCC required large ILECs to provide detailed financial and operational data on an annual basis, much of which was available for public examination through the FCC's Automated Regulatory Management Information System ("ARMIS"). While ARMIS

reporting requirements were discontinued by the FCC after 2007,[24] the CPUC has continued to require them,[25] although most of these submissions are treated as proprietary and not available for public inspection.

The AT&T and Verizon/Frontier CPUC ARMIS-type filings provide an overview of the ILECs' network investment and plant retirement policies and practices, but only on an aggregate, company-wide basis. To supplement this data, ETI requested additional accounting data at the individual wire center level in order to ascertain not only what types of network plant were being acquired and retired, but where these plant additions and retirements were located.

We also examined public financial data as submitted by the ILECs' parent companies to the Securities and Exchange Commission ("SEC") and to their respective shareholders. However, these data were of limited use because they generally failed to disclose information at the individual operating entity level.

Supplementing the California-specific CPUC financial data, various trade publications and financial analyst reports were reviewed for background and corroborative material. State and federal census and economic data was also compiled. For our examination of a potential relationship between environmental (weather) conditions and the incidence of service interruptions, we relied upon precipitation data obtained from the National Oceanographic and Atmospheric Administration (NOAA).

Data analysis

In performing the required analysis and integration of the various sources of data that were compiled in the course of this Study, ETI's work benefitted from a widely used data management and statistical analysis software package known as STATA.[26] STATA is commercially available (for sale) to all researchers who conduct statistical analysis, and is widely used in the profession: "STATA is distributed in more than 200 countries and is used by hundreds of thousands of professional researchers in many fields of research."[27] STATA combines highly sophisticated data management tools with a full range of statistical analysis

24. *Petition of AT&T Inc. for Forbearance Under 47 U.S.C. § 160(c) From Enforcement of Certain of the Commission's ARMIS Reporting Requirements; Petition of Qwest Corporation for Forbearance from Enforcement of the Commission's ARMIS and 492A Reporting Requirements Pursuant to 47 U.S.C. § 160(c)*, WC Docket No. 07-139 et al. *Memorandum Opinion and Order and Notice of Proposed Rulemaking*, Rel. September 6, 2008, FCC 08-203: (2008).

25. GO 104-A; D. 93-02-019.

26. STATA is published by StataCorp LLC, College Station, Texas 77845.

27. http://www.stata.com/why-use-stata/

capabilities. The system is widely used and accepted in academic institutions worldwide in a variety of industrial data management and analysis applications.

Using STATA, ETI assembled an integrated database consisting of nearly 8-million individual trouble report records submitted by AT&T California and by Verizon/Frontier California over the 2010-2017 study period. These were combined with a range of data on the nearly 900 individual telephone central offices (wire centers) operated by the two companies, and augmented by the various financial and other data that we were able to collect and organize. STATA's statistical analysis tools were used to develop linear regression and trend analyses between and among various data series and to prepare and produce numerous data tabulations and graphs. These datasets and the associated STATA analysis scripts (programs) will provide a useful and ongoing analytical tool that the Commission can maintain and expand into future periods.

In conducting this Study, ETI has employed widely accepted data management and statistical analysis tools that will be available to CPUC Staff to support ongoing monitoring and analysis of ILEC service quality performance.

Consistency among the various sources of data

While our work has benefitted from access to a broad range of data and data sources, we have encountered numerous inconsistencies and disparities with respect to datasets that should, in principle, be consistent. In some cases, the lack of direct, one-for-one correspondence may have arisen due to different data collection and analysis methods employed by each of these sources; in others, methodological revisions that had occurred from time to time appear to have been responsible for at least some of the disparities. For example, AT&T furnished a number of different tabulations of its California wire centers that differed from one another both with respect to the identities of the individual wire centers as well as their total number. There was a total of [redacted] wire centers included in AT&T's quarterly service quality data submissions made to the CPUC pursuant to the requirements of GO 133-C/D. But elsewhere, AT&T had identified [redacted] California wire centers in its response to Data Request 01A, Item 3, Attachment 4; [redacted] wire centers in its response to DR-03A, Items 1, 2 and 6, Corrected Attachment 1; [redacted] wire centers in its response to DR-03A, Corrected Attachment 2; and [redacted] wire centers in its response to DR-03A, Corrected Attachment 2 and DR-03A, Corrected Attachment 4. We may thus refer to different numbers of AT&T wire centers based upon the data source pertinent to the matter being discussed at various points in this report."

Verizon's GO 133-C/D service quality submissions had identified [redacted] individual wire centers within the Verizon California operating area. Upon acquiring control of the company in April 2016, Frontier implemented what can best be described as an administrative consolidation

of a number of these wire centers for certain purposes, reducing the total count from the pre-acquisition [redacted] to only [redacted]. These were in no sense physical consolidations of multiple buildings, and it has never been made clear to us as to what purpose was being served by the change. However, as a result of this change, we were not able to trace the numbers of access lines in service for each of the [redacted] individual wire centers in the Frontier California service area over the entire 8-year study period. Notably, in our data request 02-F, Frontier was asked to provide a variety of statistics at the individual wire center level as well as maps showing the types of distribution technologies being employed within each wire center serving area. The requested statistics included such items as descriptions of the principal geographic characteristics of the area being served (urban, suburban or rural), the primary customer base (residential or commercial), certain physical properties of the area being served by the central office building (flat, mountainous, rivers, lakes, wetlands), a list of all census tracts served by the central office building, and the area (in square miles) of the territory served by the central office building. In this response, Frontier had provided the requested data, and maps, for the same full set of [redacted] wire centers that it had acquired from Verizon.

These discrepancies in the data supplied by each of the two ILECs has created certain analytical challenges that we have attempted to resolve as best we can. However, where we have been unable to reconcile the disparate data sources, we have utilized the one(s) most directly applicable to the specific subject being addressed. Consequently, the reader may encounter different figures for what should be the same information – e.g., [redacted] vs. [redacted] AT&T California wire centers. These are not mistakes or typographical errors, but were necessitated by the nature of the data that has been supplied to us.