3 CALIFORNIA ILEC NETWORK OVERVIEW

Principal observations and takeaways

- AT&T California's decision to retain its decades-old central office switches in service may be a practical strategy in light of the formidable economic, technology and regulatory challenges to any wholesale involuntary migration of its legacy voice service customers to current packet switched VoIP technology.
- Most of AT&T's recent central office plant additions have been for packet switches that are not used to provide legacy POTS services.
- Frontier's central office switches were all acquired before Frontier's 2016 purchase of Verizon, with the majority pre-dating the 2000 merger of Bell Atlantic and GTE. Many of the switches that are still in service were installed more than three decades ago.
- As of the April 2016 date when Frontier took over the company, FTTP plant deployed by Verizon was available to roughly [redacted] – or about [redacted]% – of the population in areas Verizon served. Since the acquisition, Frontier has added [redacted] wire centers serving areas with another [redacted] people to its FTTP network and, by the end of 2017, FTTP was available to slightly more than [redacted] of all people living in Frontier-served areas.
- AT&T has never committed to deploying FTTP on a large scale, although the company has constructed FTTP at a small number of customer locations in the state. Overall, only [redacted]% of homes passed by AT&T California have been upgraded with FTTP.
- Broadband upgrades provide service quality benefits to basic POTS customers, but a carrier's decision to invest in broadband is driven mainly by factors that have little direct bearing upon improving service to legacy POTS customers. California ILECs are under no legal obligation to invest in broadband, but fines imposed pursuant to GO 133-D, if scaled correctly with respect to the extent of the shortcoming, have the potential to provide the necessary incentives to encourage such investments.

CALIFORNIA ILEC NETWORK OVERVIEW

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Tables and Figures

The relationships between the two largest California ILECs and their respective corporate parents: A brief history.

Each of the two ILECs that are the subject of this Study are wholly-owned subsidiaries of parent corporations with extensive multi-state operations. While the nature and identities of both corporate parents have changed several times over the past four decades, AT&T's California ILEC – Pacific Bell d/b/a AT&T California – has seen fewer disruptions to its corporate structure and ownership in recent years than what is now Frontier California. The parent company AT&T Inc. has diversified its overall business activities beyond local telephone company ILEC operations and AT&T's ILECs have become an increasingly smaller component of AT&T's overall business.

Verizon's corporate evolution has been similar. This has not, however, been the case with Frontier Communications, Inc., which acquired Verizon's California ILEC business in 2016. Unlike AT&T and Verizon, Frontier's business is primarily that of operating incumbent local exchange carrier (ILEC) affiliates. Unlike AT&T and Verizon, Frontier does not have any consequential interest in any mobile wireless, video content, Internet content, long distance, or video distribution businesses except, in the case of video distribution, as an adjunct to its ILEC operations. From the perspective of the ILEC and its customers, the 2016 transaction brought the third parent company owner of the company in less than two decades – from GTE to Verizon in 2000, and from Verizon to Frontier in 2016.

AT&T California

AT&T California and Frontier California are the two largest ILECs in the state. As of December 31, 2017, AT&T operated [redacted][28] wire centers across [redacted] of the state's 58 counties, and served approximately 2,245,171 residential and small business legacy circuit-switched (POTS) access lines. AT&T California is a wholly-owned subsidiary of AT&T Inc., a company that was formed in 2005 as a result of acquisition of AT&T Corp. by SBC Communications.[29] The parent AT&T Inc. is headquartered in Dallas, Texas. AT&T California also provides several types of broadband digital services to the residential and small business market, including high-speed Internet access, video services, and VoIP-based digital residential telephone service, under the *U-verse* brand name (offered individually and in bundles). AT&T also offers wireless Commercial Mobile Radio Services (CMRS) through its AT&T Mobility affiliate, satellite

28. AT&T furnished several tabulations of its California wire centers, with differing numbers of wire centers, over the course of the study ([redacted] in its response to DR-01A,Data Request 3, Attachment 4; [redacted] in response to DR-03A, Data Requests 1,2, and 6 , Corrected Attachment 1; [redacted] in DR-03A, Corrected Attachment 2; [redacted] in DR-03A, Corrected Attachment 2, DR-03A, Corrected Attachment 4). The GO 133-C/D service quality data covers only [redacted] wire centers.

29. *In the Matter of SBC Communications Inc. and AT&T Corp. Applications for Approval of Transfer of Control*, WC Docket No. 05-65, 20 FCC Rcd 18290, 2005 FCC LEXIS 6385, 37 Comm. Reg. (P & F) 321, November 17, 2005.

television service through its DirecTV affiliate acquired in 2015, and a range of video content through its recent (2018) acquisition of Time Warner. AT&T Inc.'s consolidated gross revenues for 2017 were $165.5-billion.[30] Total revenues derived from all of its "legacy voice and data services" were $17.85-billion, of which only about $3.92-billion came from legacy residential and small business POTS-type services.[31] Only about 10.8% of all AT&T Inc. 2017 revenues were derived from the services that are the principal focus of this study.

Frontier California

As of December 31, 2017, Frontier California operated [redacted] wire centers across [redacted] of the state's 58 counties, and served 857,467 residential and small business legacy circuit-switched (POTS) access lines. The Company was acquired by Frontier Communications Inc. as part of a three-state purchase that also included Verizon ILEC operations in Texas and Florida.[32] All of these ILEC operations had been owned by GTE prior to its 2000 merger with Bell Atlantic to form Verizon. Frontier had its genesis as Rochester Telephone Corporation[33] ("RTC"), an ILEC whose service area consisted of the Rochester, New York metropolitan area. RTC was at the time the largest Independent telephone company not affiliated with any other ILEC system or holding company.[34]

30. AT&T Inc. 2017 Annual Report, Selected Financial and Operating Data, at 14.

31. *Id.*, at 18, 20. AT&T Inc. breaks down its operations into several business segments. The "Business Solutions Segment" provides services to business customers; the "Entertainment Group Segment" provides services to consumers. Business Segment "Legacy Voice and Data Services" revenues for 2017 were $13.93-billion; the Entertainment Group Segment "Legacy Voice and Data Services" revenues for 2017 were $3.92-billion.

32. Two other Frontier ILEC affiliates, Frontier Citizens Telecommunications Company (U-1024-C) and Frontier Communications of the South West (U-1026-C), operate [redacted] and [redacted] wire centers, respectfully, in [redacted] California counties and served approximately 82,047 access lines as of the end of 2017. Both of these Frontier ILECs' existence pre-dates the parent company's 2016 acquisition of Verizon California, and is not included within the scope of this Study.

33. Frontier Corporation 8-K filing, April 2, 1996, at 1.

34. As far back as 1993, RTC had proposed an innovative restructuring arrangement to accommodate the then-emerging competition in the local exchange market. It proposed to split itself into separate "retail" and a "wholesale" entities, with the latter providing underlying network services to RTC's retail operation as well as to competing local carriers. The retail entity would compete with other potential providers, buying service in bulk and as a reseller would not be subjected to full regulatory oversight as would the wholesale entity. Rochester Telephone Corporation, Form 8-K, November 18, 1994, at 2. Although the specific RTC plan was never implemented as envisioned, it is noteworthy that the wholesale/retail structure ultimately adopted by the UK Office of Communications ("Ofcom") for British Telecom bears a striking resemblance to the original RTC plan. "[British] Telecom splits retail and wholesale," http://www.nbr.co.nz/article/telecom-splits-retail-and-wholesale [accessed on July 15, 2015]

With the GTE acquisition, Bell Atlantic (Verizon) expanded its ILEC footprint across 28 states,[35] from Maine to Hawaii. Within a few years following the merger, Verizon initiated the process of shedding large portions of its wireline operations. Although most of these divestitures were of former-GTE operating companies, Verizon also sold off four legacy Bell territories in Maine, New Hampshire, Vermont and West Virginia. The bulk of the GTE divestitures were sold to Frontier. Nearly all of Frontier's investments over the past 20 years have been in wireline operations, which have included the acquisition of a number of former-GTE territories from Verizon. In 1993 RTC acquired half a million access lines from pre-Verizon GTE. Just six years later, the company made a series of acquisitions from pre-Verizon GTE in Arizona, California, Minnesota, Nebraska, and Illinois that amounted to 361,000 additional access lines.[36] In 2007, the company acquired nearly half a million access lines in Pennsylvania from Commonwealth Telephone Enterprises, Inc. In that same year, Frontier acquired small ILEC properties in California from Global Valley Networks, Inc. Frontier's largest acquisition was in 2010 when it acquired roughly half of the former GTE ILEC properties from Verizon. Frontier's most recent acquisition was from AT&T, adding nearly one million access lines in Connecticut. Its most recent major acquisition was the California/Texas/Florida deal with Verizon. As of the April 1, 2016 date when that 3-state deal closed, Frontier served 5.77-million voice access lines in 29 states nationwide.[37] Frontier is today the nation's fourth largest ILEC with roughly 4.9-million residential and business customers across 29 states.[38]

The transition of the three states acquired in 2016 from Verizon to Frontier experienced complications. There were numerous service interruptions and protracted technical and operational issues.[39] Frontier hemorrhaged access lines from the outset. Between April 1, 2016 and December 31, 2017, the Company's California access lines dropped by 29.4%, from 1.25-million to 883,000. On the date that Frontier announced its deal with Verizon (February 5, 2015), Frontier common stock closed at $7.71, which was equivalent to a post- 1-for-15 share reverse split price of) 115.65.[40] By the end of 2017, the equivalent post-reverse split share price

35. GTE Corporation, 1999 Form 10-K, March 30, 2000, at 2.

36. Application, at 33, fn. 55.

37. "Frontier Communications Completes Acquisition of Verizon Wireline Operations in California, Texas and Florida," Press Release, April 1, 2016 http://investor.frontier.com/static-files/ce1429d7-39d8-4e7f-aae3-63f5a24eb1e1 [accessed on October 3, 2018].

38. Frontier, 2018 Form 10-K, March 1, 2018, at 2.

39. Frontier Communications, Inc. Forms 10-Q, Second Quarter 2016. See also Table 8.1 *infra*.

40. On July 10, 2017, Frontier announced a 1-for-15 "reverse split" of its common stock – i.e., shareholders would receive one 1 new share for each 15 shares owned. The pre-reverse split shares closed at $7.71 on February 5, 2015. "Frontier Communications to Implement Reverse Stock Split on July 10, 2017" Press Release, July 7, 2017 http://investor.frontier.com/news-releases/news-release-details/frontier-communications-implement-reverse-stock-split-july-10 [accessed on October 9, 2018].

had dropped by 94.02%, to 6.92. As of January 14, 2019, Frontier (post reverse-split) stock closed at 2.58, down 97.8% from its February 2015 level. To put all of this in context, Frontier paid Verizon a total of $10.54-billion in cash for the California/Texas/Florida ILEC operations, and financed that purchase through a combination of $2.75-, $1.5- and $6.6-billion in new debt.[41] Based upon its January 14, 2019 closing stock price, Frontier market cap is currently about $271-million.

Unlike AT&T, where legacy wireline operations represent a tiny fraction of the Company's total business, for Frontier, legacy ILEC operations *are its principal business*. Although Frontier does provide video services under the "Vantage TV by Frontier" and *FiOS* brands using the same types of digital transport facilities that also provide high-speed Internet access, the Company has no wireless affiliate, no content affiliate, and no cable TV affiliate.[42] Just ILECs. With the 2016 Verizon deal, Frontier acquired approximately 1.26-million revenue-producing access lines. Frontier California facilities passed some 2.63-million households within the former Verizon California operating footprint. Approximately 1.52-million of these were passed by fiber-to-the-premises ("FTTP") facilities, capable of providing broadband digital voice, Internet access, and TV under the *FiOS* brand name.[43] The three-state Verizon acquisition enabled Frontier to offer high-speed Internet access and video in these markets, and perhaps to use this as a springboard for a wider broadband buildout. But its financial collapse subsequent to that 2016 purchase has made any major expansion not financially viable.

Prior to its Verizon California acquisition, Frontier had already acquired two other small ILECs in California – Frontier Citizens Telecommunications Company (U-1024-C) and Frontier Communications of the South West (U-1026-C).[44] This study is limited solely to those Frontier exchanges that were acquired from Verizon (U-1002-C).

The ILECs' service areas in California

Figures 3.1 and 3.2 provide maps of the areas served by AT&T California and Frontier California, respectively. The two companies together serve approximately 95.7% of all ILEC access lines in California; including CLECs, they serve 51.77% of all voice access lines in the

41. Frontier, 2016 Form 10-K, February 25, 2016, at 2.

42. Frontier Communications Corporation, 2017 Form 10-K, March 30, 2000, at 3.

43. Data derived from CPUC Broadband Availability Database. See Reply Testimony of Lee L. Selwyn (redacted) on behalf of ORA, A.15-03-005, July 28, 2015, at 53.

44. CPUC *Total Number of Working Telephone Lines from 27 Carriers Reporting Under General Order 133-D*, as of June 2017. available at (accessed 10/3/18): ftp://ftp.cpuc.ca.gov/Telco/ServiceQualityReports/2017/CARRIER%20LINE%20COUNTS%20FOR%20JUNE%2030%202017.pdf

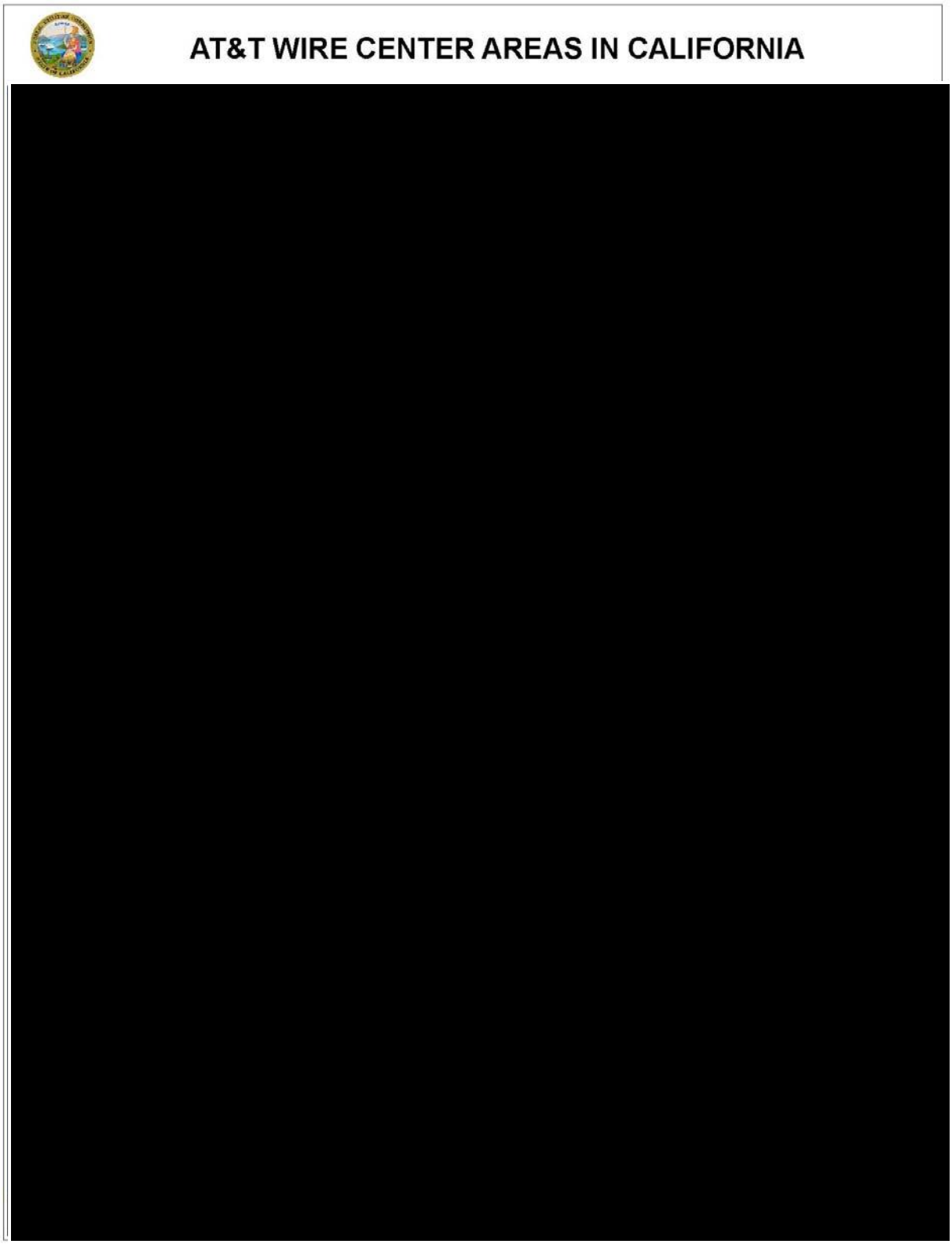


Figure 3.1. AT&T California ILEC service areas.

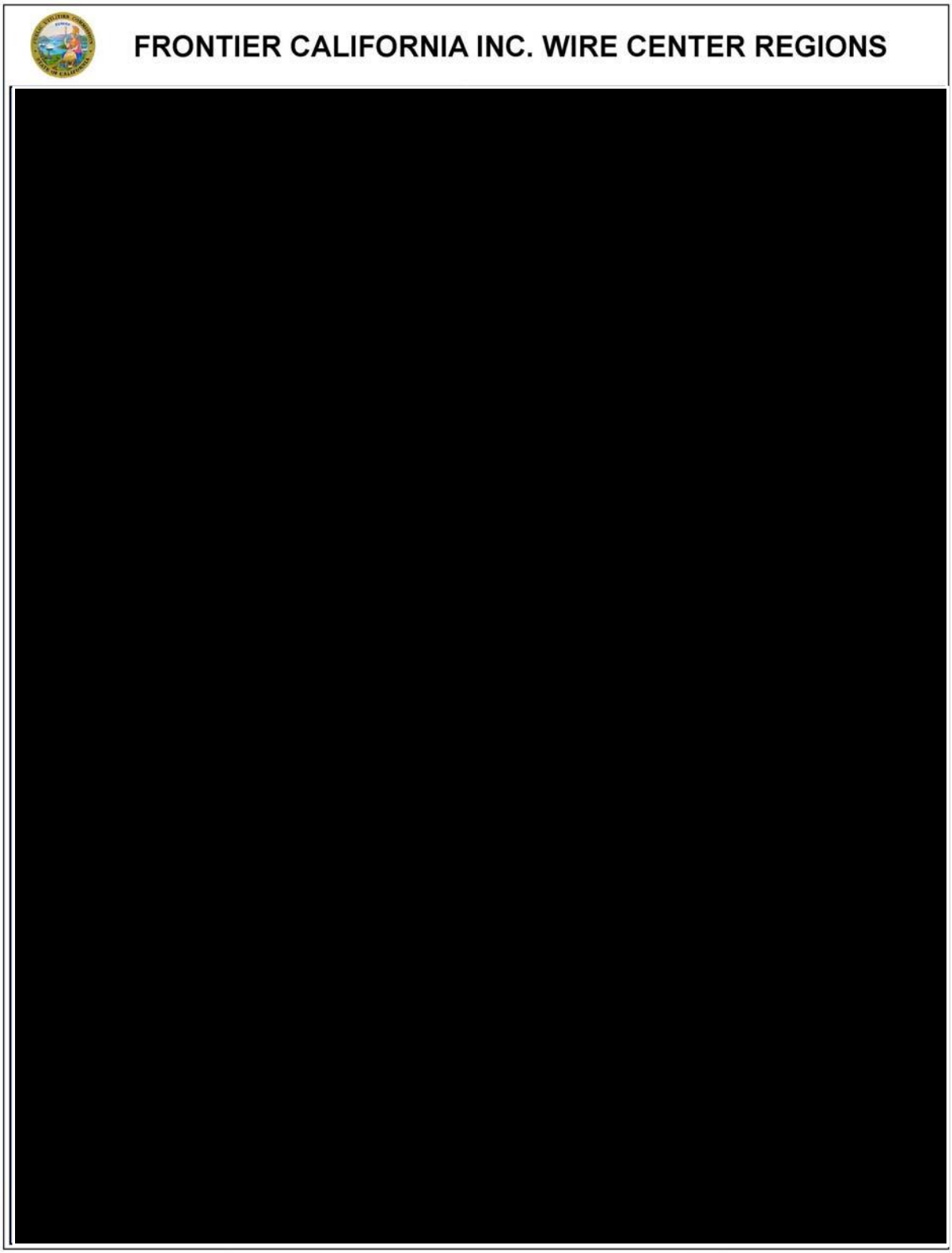


Figure 3.2. Frontier California ILEC service areas.

state. Two other Frontier operating affiliates, not included within the scope of this study, bring the total for both AT&T and Frontier to 56.99%. Most of the other legacy voice service access lines are provided by CLECS (41.8%), with a small number (0.83%) furnished by small, non-URF ILECs.[45]

AT&T California

AT&T California maintains extensive operations across all portions of the state. It is the largest ILEC both statewide and in all major metropolitan centers. The Company has [redacted] exchanges spread across [redacted] of the state's 58 counties. It serves all of the state principal metropolitan centers – Los Angeles, San Francisco/East Bay, San Jose, San Diego and Sacramento – and most of their suburbs. The AT&T California ILEC also provides service (under the AT&T Nevada brand) to northern Nevada, mainly in the Reno/Tahoe/Carson City area.

AT&T California is organized into [redacted] "Technical Field Services" ("TFS") districts for purposes of network maintenance, and [redacted] "Construction & Engineering" ("C&E") districts that are responsible for plant upgrades and expansions. TFS projects are generally booked as maintenance expenses, whereas C&E projects are recorded as gross plant additions. The TFS districts are summarized on Table 3.1, and the C&E districts are summarized in Table 3.2, below. Figure 3.3 and 3.4 provide maps indicating the geographic responsibilities of the TFS and C&E districts, respectively.

Table 3.1

AT&T CALIFORNIA
TECHNICAL FIELD SERVICES DISTRICTS

TFS District	No. of Wire Centers
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

Source: AT&T California response to CD Data Request 01A.

45. *Id.*

Table 3.2

AT&T CALIFORNIA
CONSTRUCTION & ENGINEERING (C&E)
DISTRICTS

C&E District	No. of Wire Centers
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

Source: AT&T California response to CD Data Request 01A.

Table 4A.12 identifies the TFS districts associated with each AT&T wire center.

Figure 3.3. AT&T California Technical Field Services ("TFS") Districts.

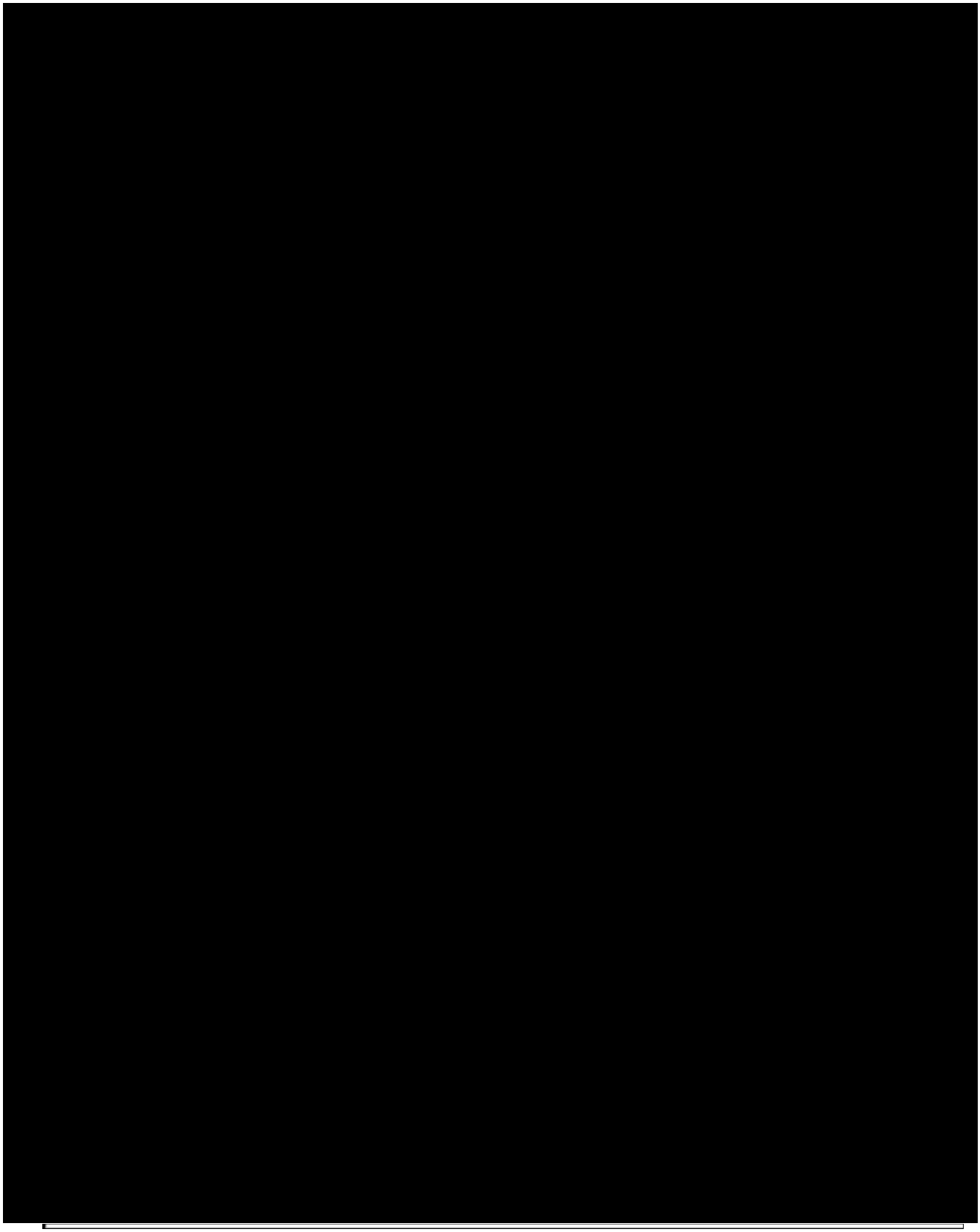


Figure 3.4. AT&T California Construction & Engineering ("C&E") Districts.

Frontier California

Frontier California's footprint embraces large areas of the state, including a number of rural areas in addition to its presence in several major metropolitan markets. The company has exchanges in 35 of the state's 58 counties. Frontier's largest concentration is in southern California, and covers large portions of Los Angeles County, where its territory includes Santa Monica, parts of West LA, and portions of the San Fernando Valley. Some [redacted]% of Frontier California's customers are in Los Angeles County. Frontier also serves large portions of Ventura, Orange, Riverside and San Bernardino Counties. The Company's presence in northern California is more limited, serving several isolated Bay Area exchanges in Marin and Santa Clara Counties. The remainder of Frontier California's operations are mainly in low-density rural areas; its largest market outside of southern California and the Bay Area is in Fresno.

Frontier has organized its operations into six geographic areas, as follows:

Table 3.3

FRONTIER CALIFORNIA
GEOGRAPHIC OPERATING AREAS

Operating Area	No. of Wire Centers
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
TOTAL	[redacted]

Source: Frontier California response to CD Data Request 01F.

Figure 3.5 provides a map indicating the geographic regions that are the responsibility of each of Frontier's six Operating Areas, respectively. Table 4F.12 identifies the Operating Area associated with each Frontier wire center.

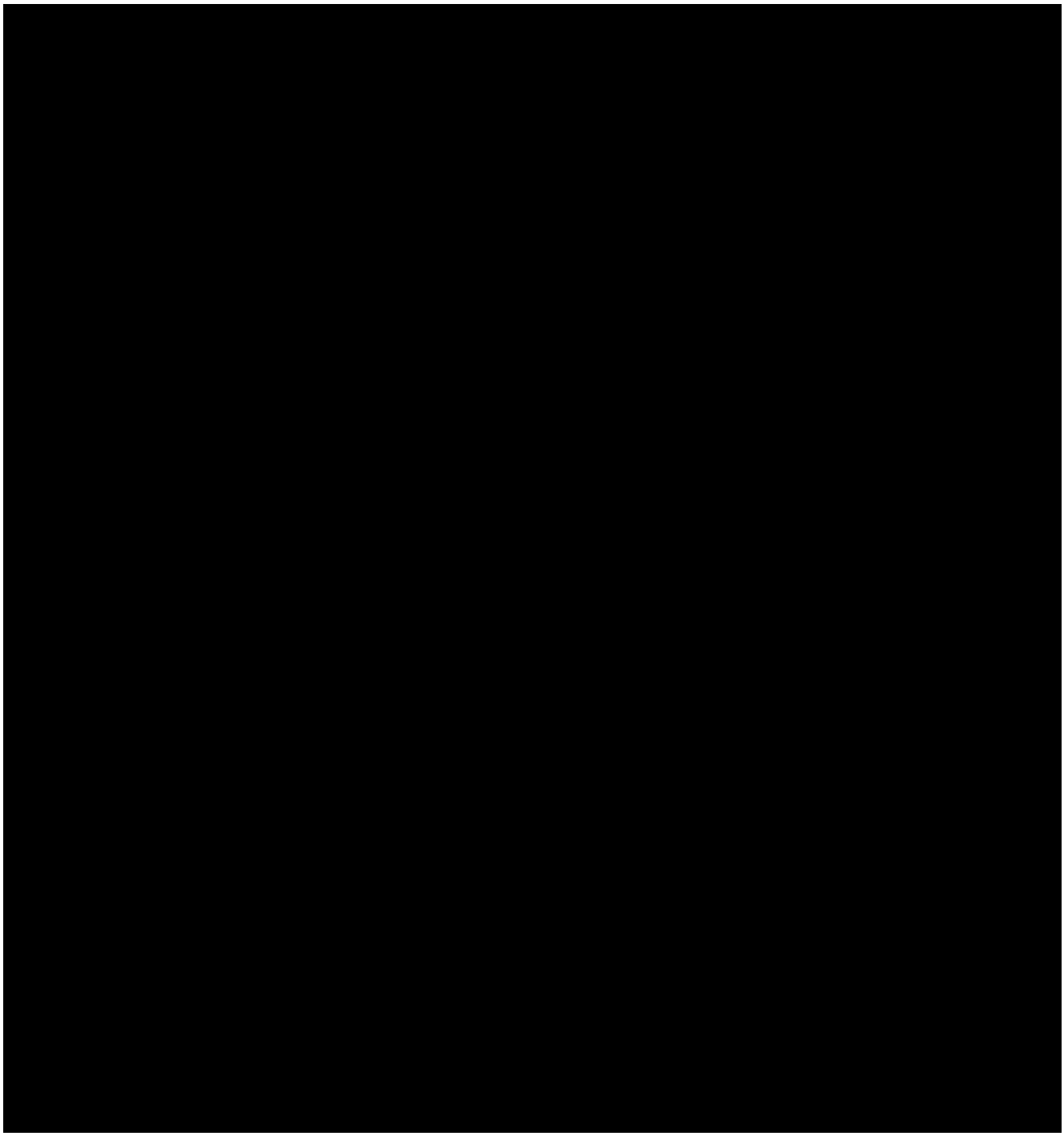


Figure 3.5. Frontier California Operating Areas ("OPAs").

Central Office Switch Technology

AT&T California

AT&T has a total of [redacted] central offices, some of which have more than one switching entity in the building. AT&T's CO switch entities cover a broad mix of switch types. In total, these entities have a combined capacity of [redacted] voice dial connections. Many of the switches still in service were initially acquired and installed more than three decades ago – some as early as 1983 – and most even pre-date the 1997 merger of Pacific Telesis Group and SBC Communications; all but [redacted] switch acquisition pre-date the 2006 AT&T Corp./SBC merger.[46] These machines are, for the most part, second generation stored program digital electronic switches built in the mid-1980s and 1990s utilizing computer technology extant at that time. In almost any other communications application, this type of vintage hardware would have been replaced years or even decades ago. The most recent switch acquisition identified by AT&T occurred in 2008.[47] Table 3.4 below summarizes the number of entities and total capacity of each type of switch.

Table 3.4

AT&T CALIFORNIA
CENTRAL OFFICE SWITCHES AND CAPACITIES

Switch type	Description	Installation dates	No. of switches	Total capacity (access lines)
5ESS	No. 5 ESS digital host	[redacted]	[redacted]	[redacted]1
NT DMS 100 (all types)	Northern Telecom DMS 100 host switch	[redacted]	[redacted]	[redacted]
DRSCS	Dual Remote Switching Center - SONET	[redacted]	[redacted]	[redacted]
TSCS	Remote Switching Center - SONET	[redacted]	[redacted]	[redacted]
Remotes (other types)	Includes remote switch modules, line multiplexers/concentrators	[redacted]	[redacted]	[redacted]
COs with multiple switches	Multiple host switches, combination of host and remote switches (individual capacities not provided)	[redacted]	[redacted]	[redacted]
Misc (other types)	MG9000-ABI VoIP Gateway, NT DMS 100/200	[redacted]	[redacted]	[redacted]
TOTALS			[redacted]	[redacted]

Source: AT&T response to DR 01-A.

46. AT&T Response to DR-01-A, "05 - Attachment 4 - Network Evaluation DR 1 - Question 3.xlsx"

47. *Id.*

Most AT&T central office switches are at least fifteen years old, and some switches still in service were first installed in the mid-1980s.

Despite their advanced age, the combined capacities of AT&T California's central office switch inventory – [redacted] legacy circuit-switched voice (POTS) telephone lines – grossly exceeds – by a factor of more than [redacted] times – AT&T California's current demand which, as of the end of 2017, was under 2.3-million POTS lines. This huge gap between capacity and demand may not be easily resolved. Circuit-switched technology is outdated, and there is no current vintage of these switches currently being manufactured. Switches can be consolidated, but relocating existing wire centers is typically not a practical measure because this would necessitate reconstruction of existing feeder and distribution cables to re-home them at the new wire center site. When switches are consolidated, buildings that had previously hosted both a switch and loop terminations will typically retain the latter function, with a high capacity umbilical cable linking that building to the new switch location. AT&T's current switch inventory includes multiple remote switches whose presence may already reflect prior switch consolidations.

AT&T has been migrating customers served by circuit switches to packet switches utilizing Voice over Internet Protocol (VoIP) technology as part of its overall marketing program that includes bundles of Internet access and/or video, in addition to voice telephone service. In the past, migration of customers from an older to a newer technology – e.g., from electromechanical to electronic switching, or from analog electronic switching to digital – has been both involuntary and largely transparent from the customers' perspective. The newer technology may have made certain additional service features (e.g., call waiting, caller ID, voice mail) available, but all were offered on an entirely optional basis. With few exceptions, customers were not forced to purchase services and features that they did not want.[48] This has not been the case for migrations from circuit-switched to packet-switched technology primarily due to the different regulatory regimes governing the legacy vs. the newer services.

Additionally, a complete circuit-switching to VoIP migration is practical only in wire centers capable of supporting geographically ubiquitous DSL services such as those being marketed by AT&T under its *U-verse* brand. As of the end of 2017, only [redacted] of AT&T's [redacted] California wire centers have been upgraded with the capability to provide these services. Packet switches could be adapted to provide analog circuit-switched type services by equipping them with customer-facing equipment capable of translating VoIP to POTS (and *vice versa*), thus enabling the packet

48. One exception to this was in the case of Touch Tone dialing. When first introduced, Touch Tone was available for an additional charge. However, in 1989, the CPUC ordered that Touch Tone be bundled into basic dial tone service, and increased basic rates on a revenue-neutral basis. *I/M/O Alternative Regulatory Frameworks for Local Exchange Carriers.; 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 P.U.R.4th 1, at FOF 8; Ordering Paragraph 1. Customers who had been paying the surcharge got a small decrease in their total monthly bill, while those who had retained rotary dial service saw an increase in their basic service rate.

switch to provide analog type services over legacy copper plant to POTS customers. However, this would require additional investment in transition technology hardware, investment that could be avoided by simply retaining the functioning legacy circuit-switch central offices in place.

Finally, even if these economic and technical challenges were not present, PU Code §710, enacted by the California legislature in 2013, summarily deregulated all VoIP services, effectively creating a regulatory impediment to any involuntary circuit switched-to-VoIP migration that has the potential to subject affected customers to large rate increases for what is then a deregulated service.

AT&T California's decision to retain its decades-old central office switches in service may be a practical strategy in light of the formidable economic, technology and regulatory challenges to any wholesale involuntary migration of its legacy voice service customers to current packet switched VoIP technology.

It remains unclear whether AT&T's decision to retain these machines in service is driven by the obvious extent of excess capacity or simply by a corporate-level capital budgeting decision to channel its investment dollars toward lines of business other than legacy circuit-switched voice services.

In fact, AT&T Uniform System of Accounts (USOA) regulatory accounting data for the 2010-2017 period shows Gross Plan Additions in Account 2212 – Digital Electronic Switching equipment – at [redacted] for the full 8-year period.[49] However, Account 2212 is divided into two subaccounts – 2212.1 (legacy circuit-switched central office switches such as the No. 5 ESS or DMS 100), and 2212.2 (packet switches that support a variety of advanced consumer and commercial services that do not include legacy circuit-switched residential and small business access lines). Notably, of the roughly [redacted] that was invested in both Account 2212 subaccounts over the study period, [redacted] of those Gross Plant Additions were identified as packet switches, with only [redacted] falling into the legacy circuit-switch category. Additionally, in 2010, AT&T transferred approximately [redacted] of Gross Plant out of Subaccount 2212.1 (circuit switching) and over to Subaccount 2212.2 (packet switching). Including this one-time transfer, total Gross Additions for circuit switching over the 2010-2017 period was a *negative* [redacted], with Gross packet switching additions over that same period amounting to about [redacted]. *There is thus no evidence that any significant additional investment was directed toward legacy services during the study period.*

49. Analysis of AT&T Response to DR 03-A, Request 1, "Attachment 1_Data Request Number 03-A.xlsx".

Most of AT&T's recent central office plant additions have been for packet switches that are not used to provide legacy POTS services.

Frontier California

Frontier has a total of [redacted] switching entities that also includes a broad mix of switch types.[50] However, as a legacy GTE operating company, Frontier's switch inventory includes many units that were manufactured by GTE's manufacturing affiliate, Automatic Electric. In total, Frontier California's switch entities have a combined capacity of [redacted] voice dial connections. All of Frontier California's central office switches pre-date its 2016 acquisition from Verizon; the majority pre-date the 2000 merger of Bell Atlantic and GTE. Many of the switches still in service were initially acquired and installed more than three decades ago – in the mid-1980s and 1990s. As with AT&T, Frontier's switches are, for the most part, second generation stored program digital electronic units that utilize 1980s and 1990s computer technology. The most recent switch acquisitions identified by Frontier – [redacted] in all – occurred in 2007. Table 3.5 below summarizes the number of entities and total capacity of each type of switch.

Frontier's central office switches were all acquired before Frontier's 2016 purchase of Verizon, with the majority pre-dating the 2000 merger of Bell Atlantic and GTE. Many of the switches that are still in service were installed more than three decades ago.

50. Frontier Response to DR-01-F, Frontier COs and equipment.xlsx

Table 3.5

FRONTIER CALIFORNIA
CENTRAL OFFICE SWITCHES AND CAPACITIES

Switch type	Description	Installation dates	No. of switches	Total capacity (access lines)
5ESS	No. 5 ESS digital host	[redacted]	[redacted]	[redacted]
5ESSRSM	No. 5 ESS Remote Service Module	[redacted]	[redacted]	[redacted]
GTD5 EAX	GTE (AE) No. 5 digital host switch	[redacted]	[redacted]	[redacted]
AE RSU	GTE (AE) No. 5 Remote Service Unit	[redacted]	[redacted]	[redacted]
NT DMS 10, DMS10 SSO	Northern Telecom DMS 10 (all types)	[redacted]	[redacted]	[redacted]
NT DMS 100 (all types)	Northern Telecom DMS 100 host switch	[redacted]	[redacted]	[redacted]
NT DMS Remotes (all types)	Northern Telecom DMS 100 Remote Service Units (various types)	[redacted]	[redacted]	[redacted]
NT SLOA	Northern Telecom	[redacted]	[redacted]	[redacted]
NT AAL1S		[redacted]	[redacted]	[redacted]
TOTALS			[redacted]	[redacted]

Source: Frontier response to DR 01-F.

As with AT&T, the combined capacities of Frontier's central office switch inventory – [redacted] legacy circuit-switched voice (POTS) telephone lines – grossly exceeds – by a factor of nearly [redacted] times – Frontier's current demand which, as of the end of 2017, was under 900,000 POTS lines. As long as these switches remain serviceable and functionally viable for their current uses, Frontier's (and its predecessors') policy of keeping these switches in active service may well be the most prudent strategy.

Outside Plant Distribution Area Technology

OSP Architecture in general

Local telephone service is typically furnished by means of a hierarchical distribution network with the serving wire center at its center. The principal components of an ILEC local distribution network are illustrated in Figure 3.6 below. These consist of the following elements:

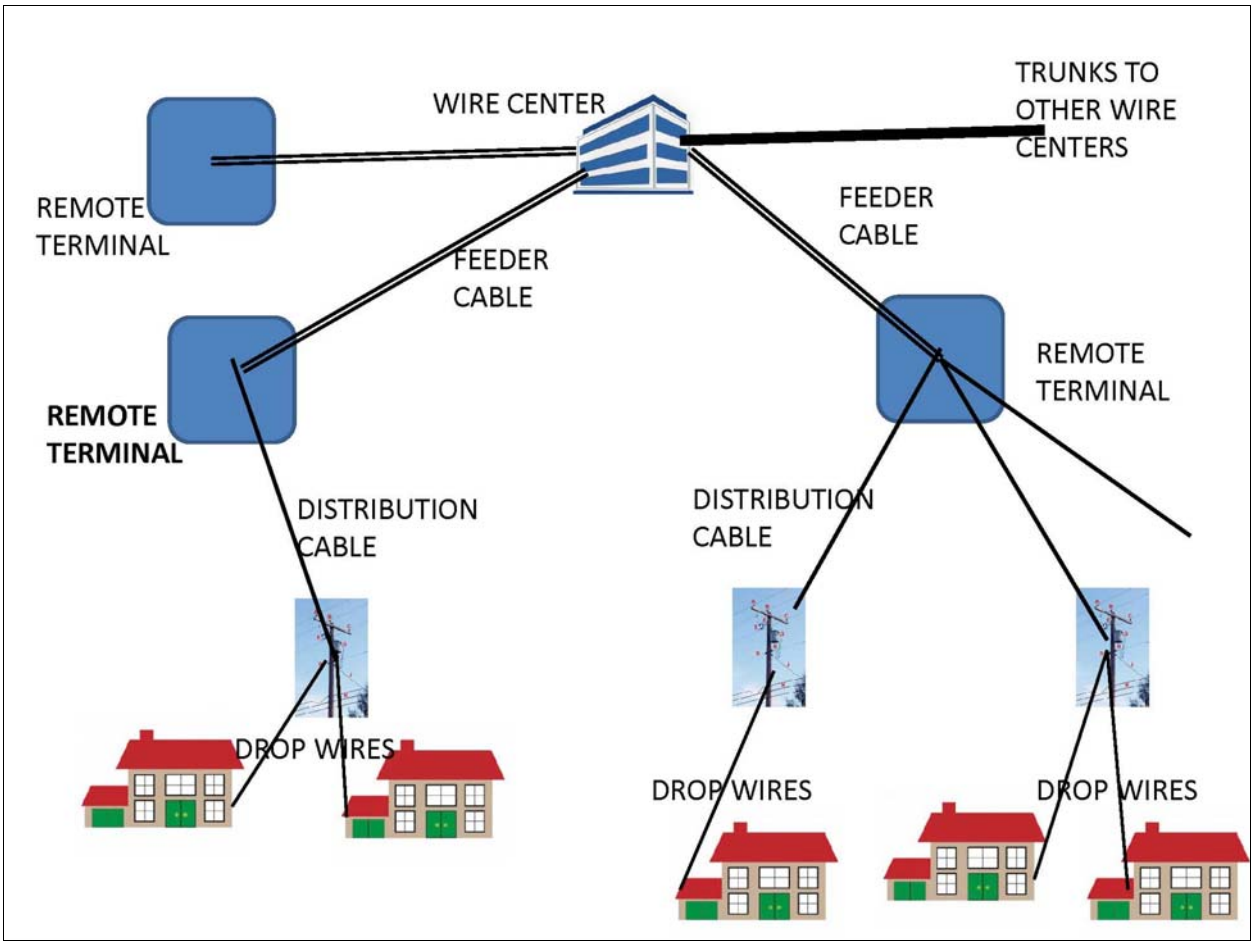


Figure 3.6. Principal components of an ILEC local distribution network.

(1) *Wire Center* A building where central office switches, feeder cables, and interoffice trunks to other wire centers terminate and interconnect to one another.

(2) *Interoffice Trunks*. High capacity digitally multiplexed transmission cables that connect the wire center with other locations on the public switched network.

(3) *Feeder plant.* These are typically high-capacity facilities connecting the wire center to the "Distribution Area." The feeder cables are cross-connected at a "Service Area Interface" ("SAI") through a Feeder/Distribution Interface or "cross-box") to distribution facilities that run along individual streets and roads so as to pass directly in front of individual customer premises. In the past, feeder cables would consist of large capacity sheaths of twisted-pair copper cables, usually in the range of 300 to 1200 pairs, sometimes less, sometimes more, depending upon the service demands of the area served. In urban centers, feeder plant is typically carried in underground conduit pipes. However, in suburban and rural areas, feeder plant is usually carried on pole lines, making them more

vulnerable to adverse weather and other environmental conditions. Where large concentrations of customers are to be served (e.g., in a large office complex or a large multi-unit residential building), feeder cable might be deployed directly to that location. As technology developed over time, these large, heavy copper cables were replaced by fiber optic cables connecting the wire center to the various remote terminals. Such fiber facilities support many multiples of the capacity typical of copper cables. They carry voice and data signals in digital form. For traditional voice (POTS) services, these digital signals have to be converted back to analog for transport over the twisted-pair copper distribution facilities to individual customers.

(4) *Remote Terminal.* Remote Terminals are the point of intersection of the high-capacity feeder plant and relatively low-capacity distribution plant. Where feeder cables utilize fiber optic technology, so-called "optronic" equipment at the Remote Terminal converts the optical signals carried on the fiber into electronic form for transmission over the copper distribution facilities to the end user. Multiple distribution routes are typically served out of a single Remote Terminal. Where required, e.g., for relatively long distribution segments, pair-gain equipment is also housed within the Remote Terminal to provide signal amplification. Pair-gain can extend the distance range for voice signals, but cannot generally be used for DSL type data signals.

(5) *Distribution cables.* These typically consist of relatively low-capacity twisted-pair copper sheaths that are run along individual streets, most commonly on telephone poles but in some cases buried underground. Where the serving area of a wire center involves large distances, such as in rural exchanges, signal amplification is sometimes required where distances are particularly long. The introduction of Internet access services in the mid-1990s brought with it an additional challenge for distribution network architecture. The data transmission rate (bits per second or "bps") of Digital Subscriber Line (DSL) drops off precipitously as the length of the copper connection between the customer and the central office increases. The use of DSL is not even feasible where the route distance of the copper segment exceeds about 18,000 feet,[51] which translates roughly into about three miles from the central office. The use of fiber optic feeder facilities reduces this effect, because the relevant distance for this purpose is limited to the copper segment – i.e., the portion that is between the customer and the Remote Terminal where the copper pair is cross-connected to the fiber-fed equipment. By extending fiber optic feeder runs more deeply into local neighborhoods, the ability to provide DSL across larger areas is increased. This combination of fiber optic feeder and copper distribution is known as "Fiber-to-the-Node" ("FTTN") architecture. The closer that the carrier can bring fiber to

51. Goleniewski, Lillian, *Telecommunications Essentials, Second Edition: The Complete Global Source*, Addison-Wesley, 2007, at 49-50.

its customers, the higher the data rate ("bandwidth") that it can offer its customers.[52] A variant of FTTN is referred to as "fiber-to-the-curb" ("FTTC"). In an FTTC architecture, fiber cable is extended much closer to the end user – generally within 1000 feet – and is then connected by twisted-pair copper (in the case of ILECs) or coaxial cable (in the case of cable TV infrastructure).

(6) *Drop wire.* The "drop wire" is the final connection between the telco distribution network and the customer's premises. It typically connects the customer's premises to a twisted pair assigned to the customer at a telephone pole in close proximity to the customer's location. In the case of fiber-to-the-premises ("FTTP") distribution architectures (sometimes referred to as "Fiber-to-the-Home" ("FTTH")), the drop is also fiber optic cable.

"Fiber-to-the-Node" ("FTTN") vs. "Fiber-to-the-Premises" ("FTTP"). DSL technology can be supported entirely over copper facilities, but at relatively slow data rates. Where fiber feeder plant is available, DSL is provided utilizing a hybrid of those fiber optic cables connected to copper distribution cables at a Remote Terminal (a "Node"). FTTP extends fiber all the way to the customer's premises. Under Verizon's *FiOS* architecture, for example, a fiber cable pair capable of serving up to [redacted] customers is extended into a neighborhood, where individual fiber drop facilities are then connected to individual customer locations. In general, when Verizon selected a wire center for *FiOS* deployment, it built-out virtually all of the serving area, providing near-ubiquitous *FiOS* availability to all customers served from that wire center.

The outside plant distribution infrastructures of both AT&T California and Frontier California employ a mix of distribution technologies, ranging from legacy twisted pair copper to fiber-to-the-home. However, the deployment strategies of the two companies have been dramatically different.

Frontier California

In 2006, Verizon Communications, the parent company, announced plans for an ambitious investment program to deploy FTTP broadband to 18-million of its (then) 25.1-million residential wireline subscribers.[53] By 2010, Verizon had deployed its *FiOS*-branded FTTP distribution facilities to some 15.2-million homes. But then, in March of that year, Verizon announced that it was suspending further deployment of *FiOS* plant, committing only to complete construction in

52. Cable TV distribution confronts a similar issue. The longer the coaxial cable segment, the slower the data rate available to end user customers. Like ILECs, cable MSOs have also been extending their fiber runs deeper in individual neighborhoods and closer to customers so as to provide the highest possible bandwidth.

53. Verizon Communications Inc. 2010 Annual Report, at 2.

locations where *FiOS* deployment was already underway.[54] While the bulk of Verizon's *FiOS* investment was directed at its legacy Bell Atlantic markets in the northeast, certain former GTE-served areas, including portions of the former GTE California, Texas, Florida and Washington State markets, had also been upgraded with FTTP distribution facilities. As of the April 1, 2016 date when Frontier acquired Verizon California, FTTP plant deployed by Verizon was available in [redacted] wire centers[55] serving areas with a population of roughly [redacted] – or about [redacted]% – of the total population in areas served by the company. Since the acquisition, Frontier has added [redacted] wire centers, serving areas with another [redacted] people to its FTTP network and, by the end of 2017, some [redacted]% of the population in Frontier California exchanges were capable of being served via FTTP distribution facilities; in the non-FTTP portions of Frontier's operating territory, about [redacted] people [redacted]%) live in areas where Frontier offers some form of (relatively slow data rate) broadband, and the remaining roughly [redacted], have no broadband service available at all.

The CPUC's approval of the transfer of Verizon's California ILEC to Frontier included the Commission's acceptance of a "partial settlement" between Frontier and several protesting parties under which Frontier had make certain commitments to expand the availability of broadband services within its operating footprint beyond those wire centers in which Verizon had built out FTTP plant.[56] And, since acquiring the ILEC, Frontier California has expanded its broadband footprint. In a tabulation provided to the Communications Division dated January 24, 2018, Frontier identified a total of [redacted] "Broadband Equipped Central Offices,"[57] seemingly indicating that [redacted] additional central offices beyond the initial [redacted] were now capable of offering broadband service. In its response to CD Data Request 02-F, Frontier provided a total of [redacted] detailed maps showing, for each of its wire centers, the distribution area technology at each geographic location within the wire center serving area.[58] Frontier also provided the total population within the areas served by each of its wire centers. Based upon ETI's examination of these maps, it appears that, in wire centers where FTTP has been deployed, FTTP is provided almost ubiquitously throughout

54. "Verizon to End Rollout of FiOS," *The Wall Street Journal*, March 30, 2010. http://www.wsj.com/articles/SB10001424052702303410404575151773432729614 [accessed on July 16, 2015].

55. CPUC Communications Division Staff.

56. A.15-03-005, D.15-12-005 (December 3, 2015), 2015 Cal. PUC LEXIS 762, 326 P.U.R.4th 367 (Cal. P.U.C. December 3, 2015), *slip. op.* at 57-59 (§3.2.4. *The Joint Protesters Settlement*; 71 (Conclusion 10); 77-78 (COL 5, 6, 7); and Appendix F (*Joint Motion of Frontier Communications Corporation, Frontier Communications of America, inc., the Utility Reform Net\ryork, the Office of Ratepayer Advocates and the Center for Accessible Technology for Approval of Partial Settlement*).

57. Frontier Response to DR-01F, "Frontier COs and equipment - added reconciliation to wirecenters on go 133d final.xlsx"

58. Frontier Response to DR-05F, Attachment 4.

the wire center serving area.[59] Frontier has identified a total of [redacted] central offices as "FiOS Capable," i.e., where FTTP plant had been deployed.[60] From the data provided by Frontier, we have calculated the percentage of the total population in areas served by Frontier California where *FiOS*-capable FTTP facilities are in place, as summarized on Table 3.6 below:

Table 3.6

FRONTIER CALIFORNIA
POPULATION AT LOCATIONS WHERE *FiOS*-CAPABLE FTTP PLANT HAS BEEN DEPLOYED

Download Speed	Population Passed by Frontier	Pct of Total Passed by Frontier
No Broadband	[redacted]	[redacted]
Non FTTP Broadband / DSL	[redacted]	[redacted]
FTTP / *FiOS*	[redacted]	[redacted]
Total	[redacted]	[redacted]

Source: Frontier Responses to DR-02F, DR-05F

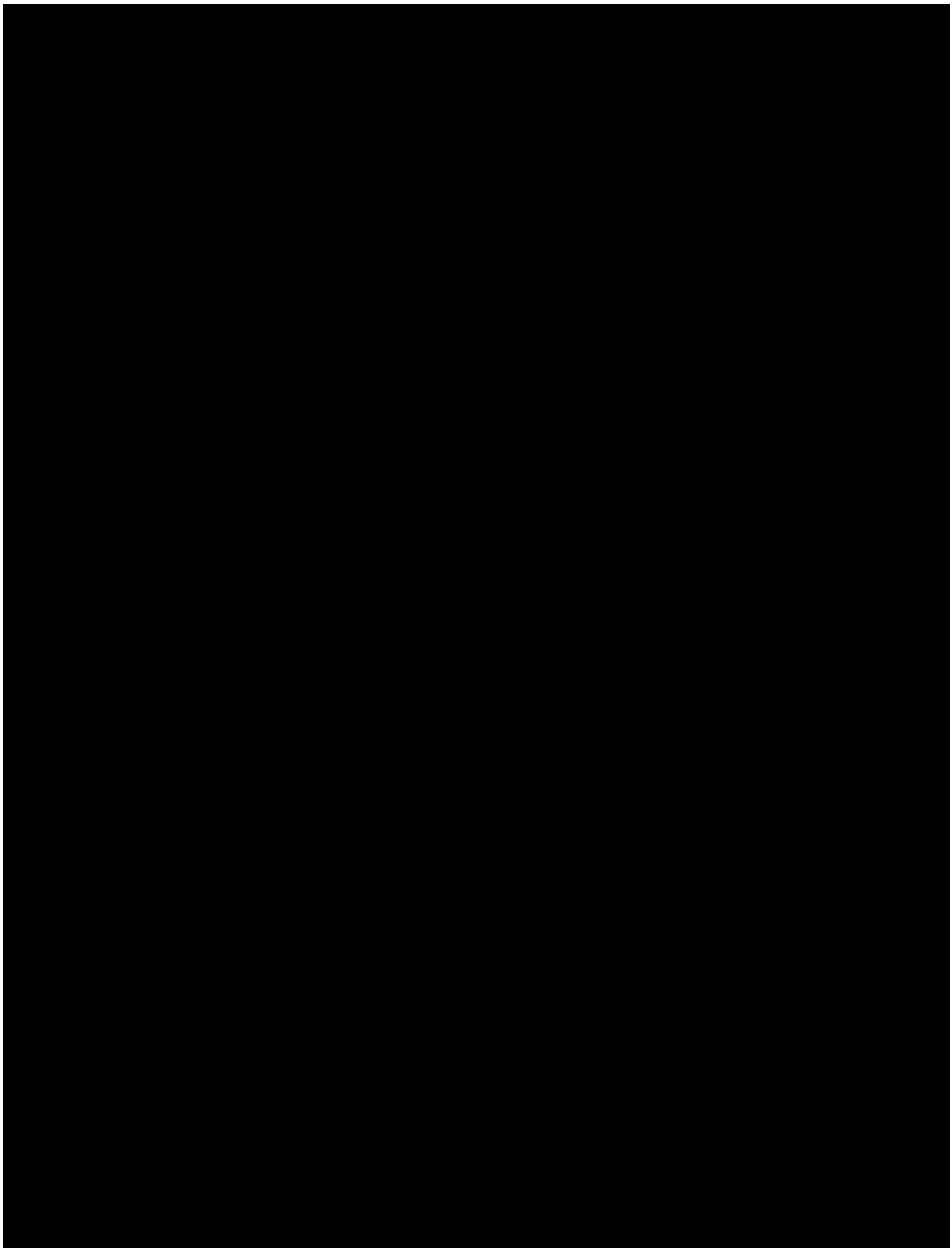
As Table 3.6 indicates, some [redacted]% of the population residing in areas served by Frontier have no form of broadband service available; [redacted]% have what is likely some form of DSL available, while [redacted]% are being served via fiber-to-the-premises, *FiOS*-capable facilities. This is in stark contrast to the situation for AT&T, where only [redacted]% of the households passed by AT&T's network are served with FTTP plant.

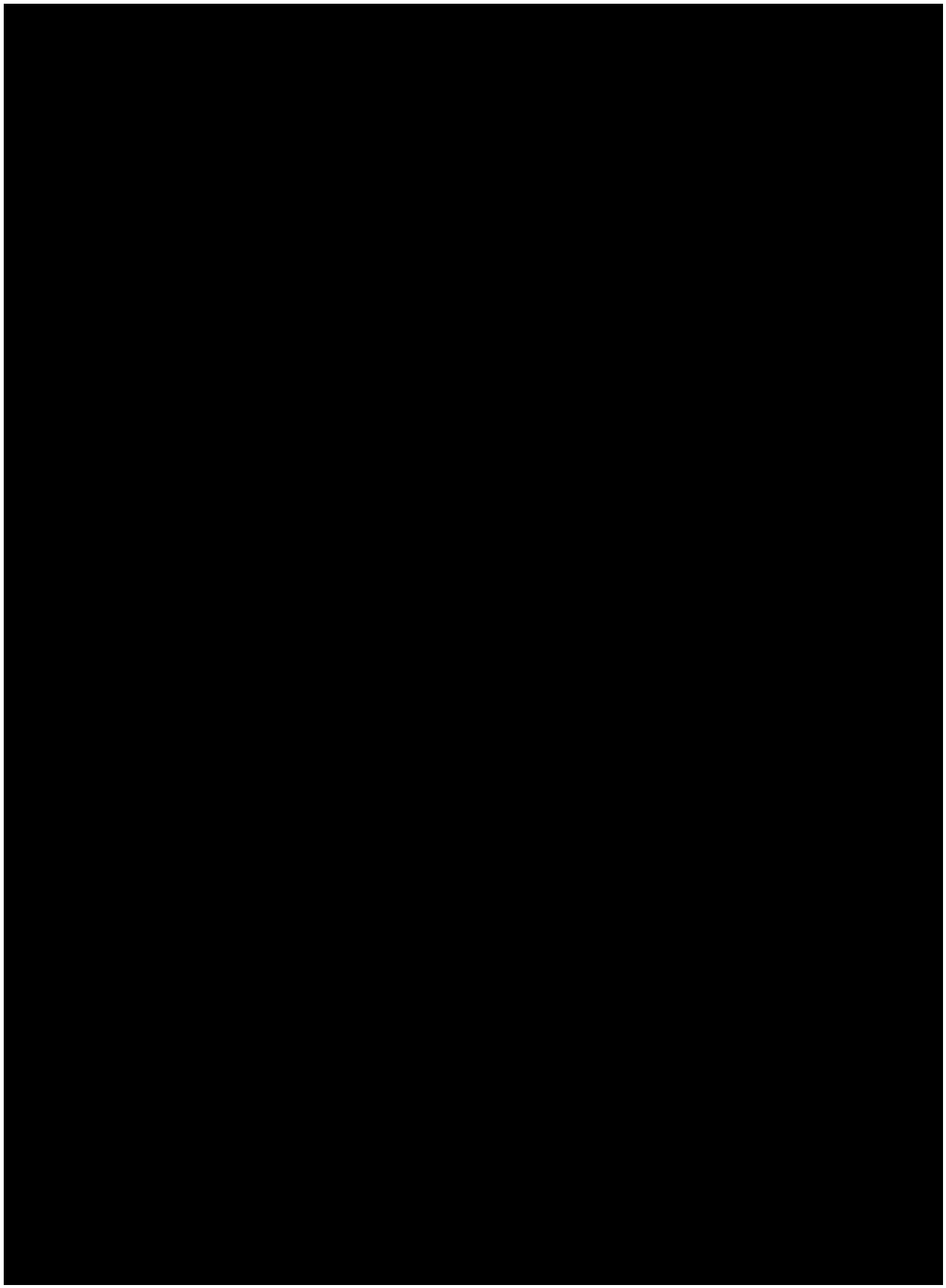
As of the April 2016 date when Frontier took over the company, FTTP plant deployed by Verizon was available to roughly [redacted] – or about [redacted]% – of the population in areas Verizon served. Since the acquisition, Frontier has added [redacted] wire centers serving areas with another [redacted] people to its FTTP network and, by the end of 2017, FTTP was available to slightly more than [redacted] of all people living in Frontier-served areas.

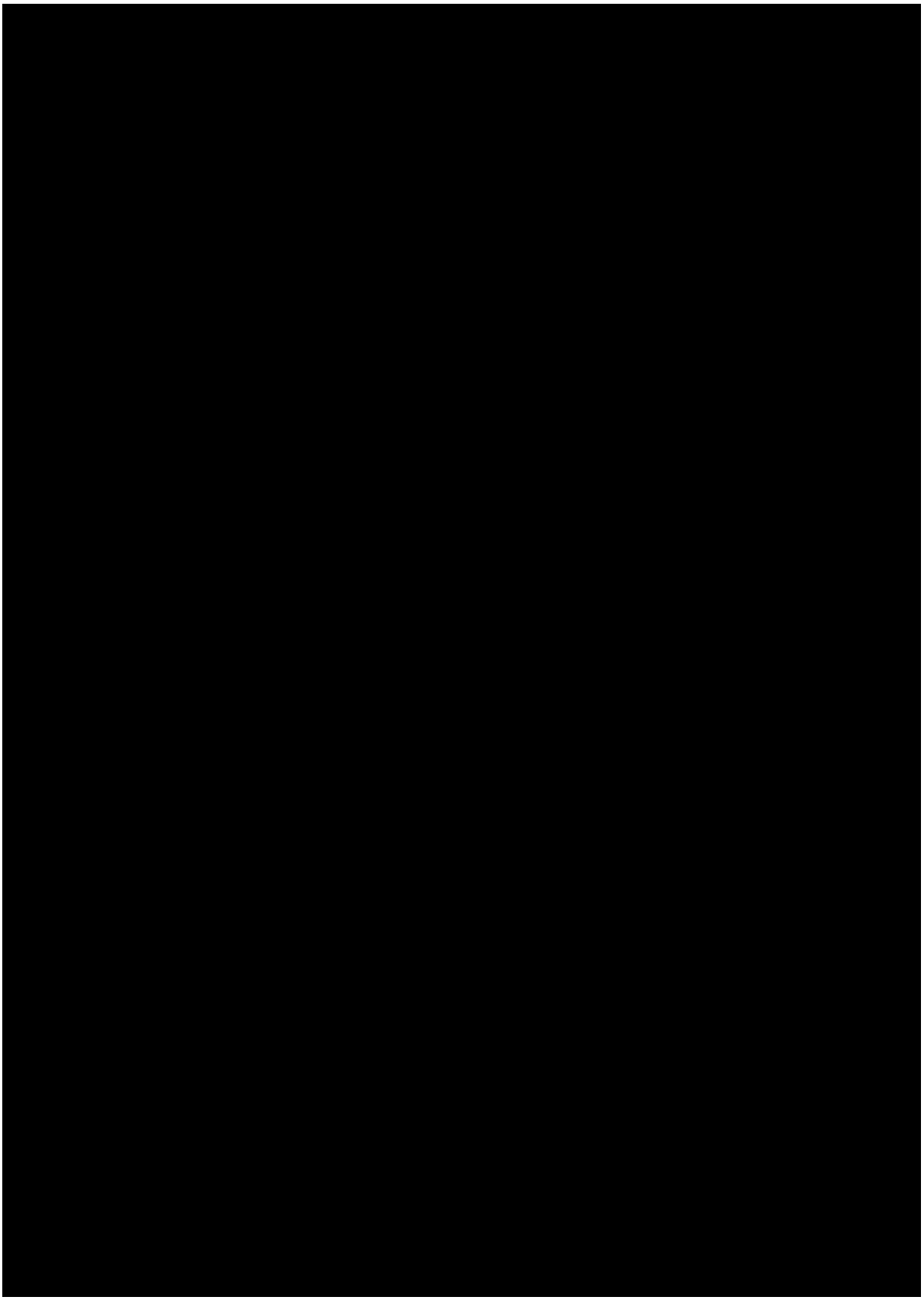
59. Frontier Response to DR-02-F, Request no. 1.

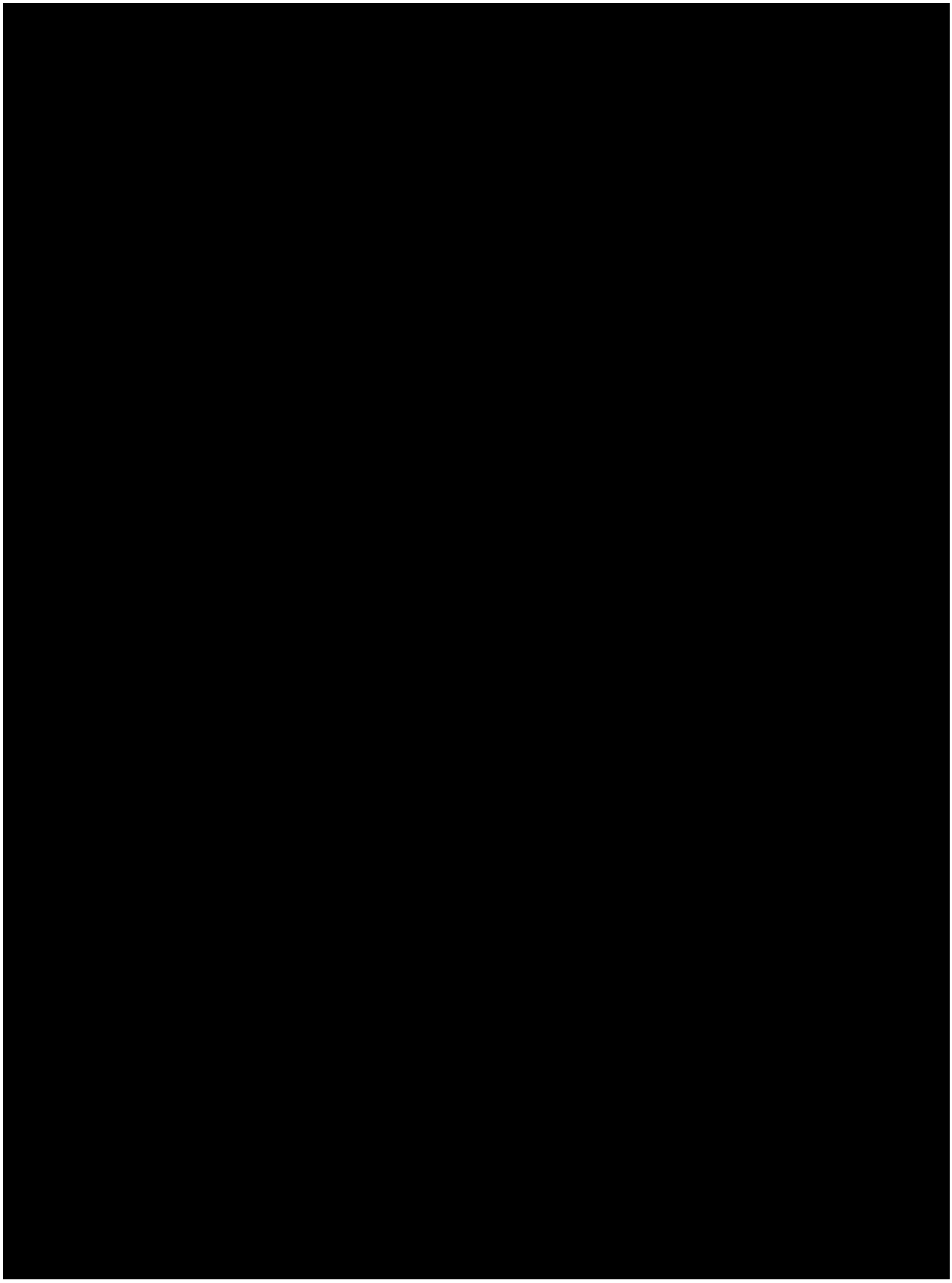
60. Frontier Response to DR-05F, Request 5 dated June 22, 2018. Frontier was asked to "Provide a list (spreadsheet) of all Central Offices/Wire Centers in the former Verizon territory (U-1002-C) that are capable of providing *FiOS* service to customers (FiOS enabled COs) ..." The original response identified [redacted] *FiOS*-capable central offices. In subsequent discussions with Frontier, it was determined that [redacted] central offices previously identified by Verizon as *FiOS*-capable as of the date of the transfer (April 1, 2015) had been omitted from Frontier's response to DR-05F, bringing the total of Frontier California *FiOS*-capable central offices to [redacted].

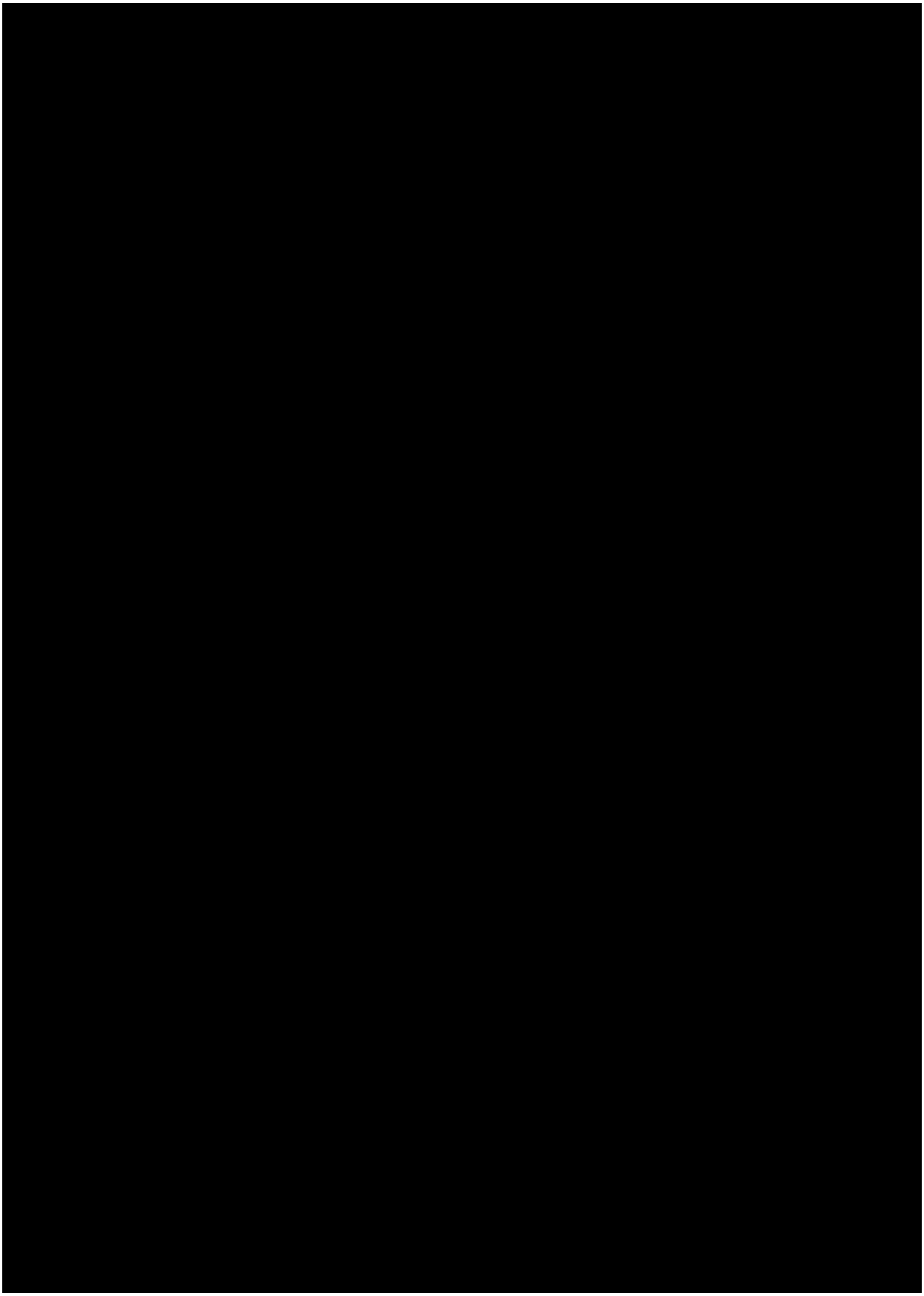
Where some type of "broadband" service is available, there is considerable variation in its capability and functionality. Table 3.7 identifies, for each Frontier California wire center, the type of broadband service (or no broadband service) available to customers served. We distinguish between "FTTP" and "non-FTTP" broadband. "FTTP" (Fiber-to-the-Premises) provides very high data rates (download and upload speeds) potentially reaching and exceeding 1 Gbps. Frontier's FTTP service was originally deployed by Verizon and marketed under Verizon's *FiOS* brand, which Frontier has retained under the 2016 acquisition. "Non-FTTP" broadband is furnished primarily via Digital Subscriber Line (DSL) service over copper or by a hybrid fiber/copper architecture ("Fiber-to-the-Node" ("FTTN")). Depending upon the specific technology available, data rates are considerably slower than with FTTP/*FiOS*.

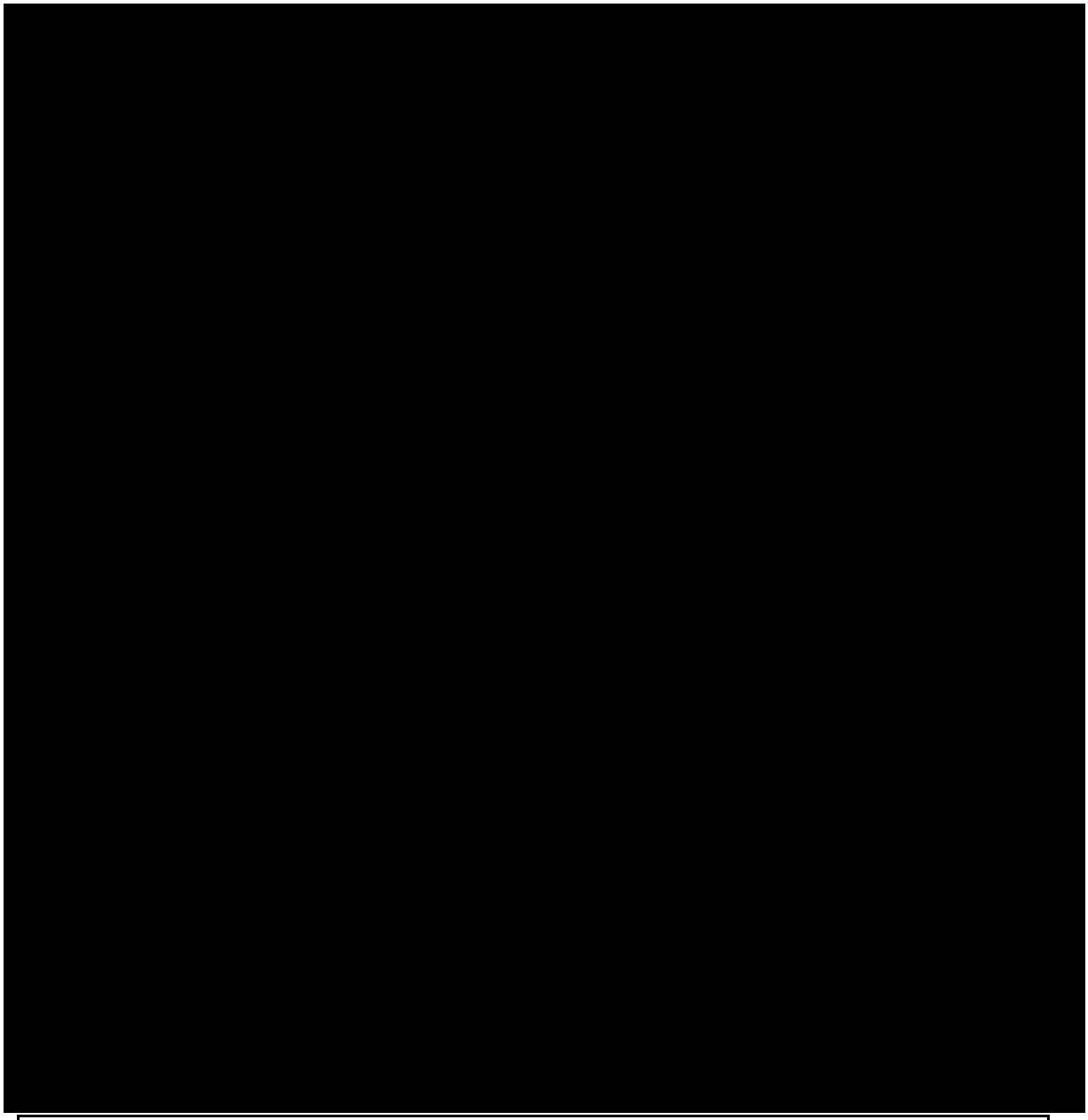












Source: Frontier Responses to DR-02F, DR-05F

For most of the [redacted] Frontier wire centers that have been substantially upgraded to FTTP, the FTTP deployment generally covers all, or nearly all, of the area served by each wire center. Figure 3.7 provides an example of this approach for the [redacted] exchange, which consists of [redacted] wire centers. Only one of these – [redacted] was included among the [redacted] Verizon wire centers identified as having been equipped to provide *FiOS*. Therefore, it would appear that the other [redacted] wire centers have been upgraded in the 2-1/2 years following the Frontier takeover of the company.

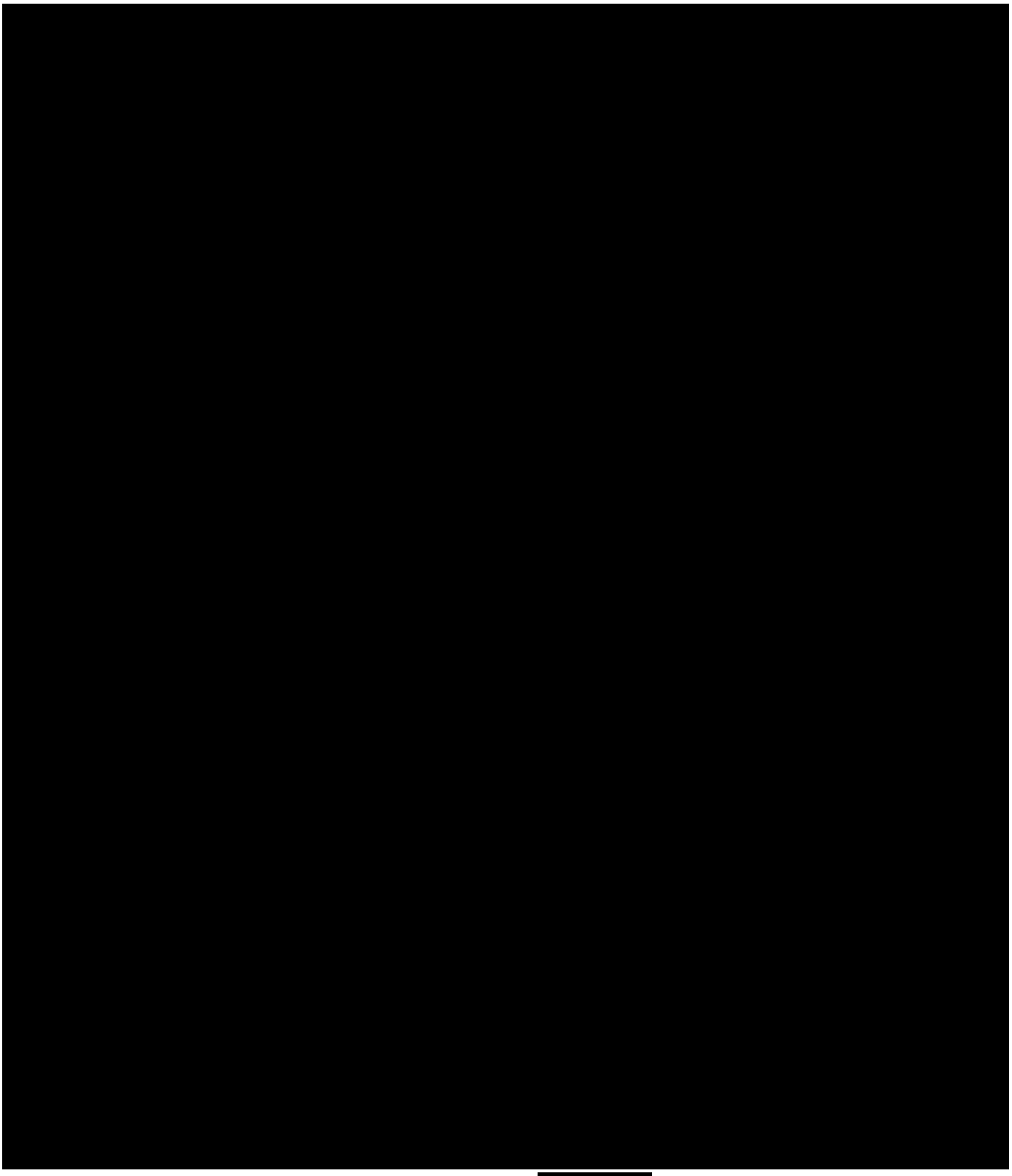


Figure 3.7. Frontier Distribution Area Technology – [redacted] wire centers

AT&T California

Unlike Verizon, AT&T has never committed to a massive FTTP deployment, although some FTTP plant has been constructed in limited portions of a small number of AT&T California wire centers. "Broadband Availability" data compiled by the CPUC's Communications Division indicates the extent to which each category of broadband technology is available to households served by AT&T, as summarized in Table 3.8 below:

Table 3.8

AT&T CALIFORNIA
HOUSEHOLDS AT WHICH SOME FORM OF "BROADBAND" SERVICE IS CURRENTLY AVAILABLE

Technology category	Maximum Download data rate	HHs Passed by AT&T	Pct of HHs Passed by AT&T
10-Asymmetric xDSL	8 mbps, slower at longer distances	[redacted]	[redacted] %
11-ADSL2, ADSL2+	Less than 20 mbps at 600 meters from CO or RT with FTTN, much slower at longer distances		%
12-VDSL Mbps	>50 mbps at less than 300 meters from CO or RT with FTTN, much slower at longer distances		%
50-Optical Carrier/Fiber to the end user	> 1 gbps		%
Total homes passed by AT&T			%

Source: California PUC Broadband Availability Database, as of December 31, 2016.

Note that out of nearly [redacted] homes passed within AT&T California's operating areas, only about [redacted], or [redacted]%, are currently served with fiber-to-the-premises technology. *U-verse* branded services (digital voice, Internet access, and IPTV) are available in wire centers that have been upgraded to support download datarates in Technology Categories 11 (ADSL2, ADSL2+), 12 (VDSL Mbps) and 50 (Optical Carrier). Due to the relatively short distance limits associated with categories 11 and 12, these services generally require deployment of FTTN so as to keep the lengths of the copper distribution segment relatively short. Figure 3.8 illustrates how distance between the CO or Node and the end user affects the download speeds that ADSL2, ADLS2+ and VDSL are capable of supporting:

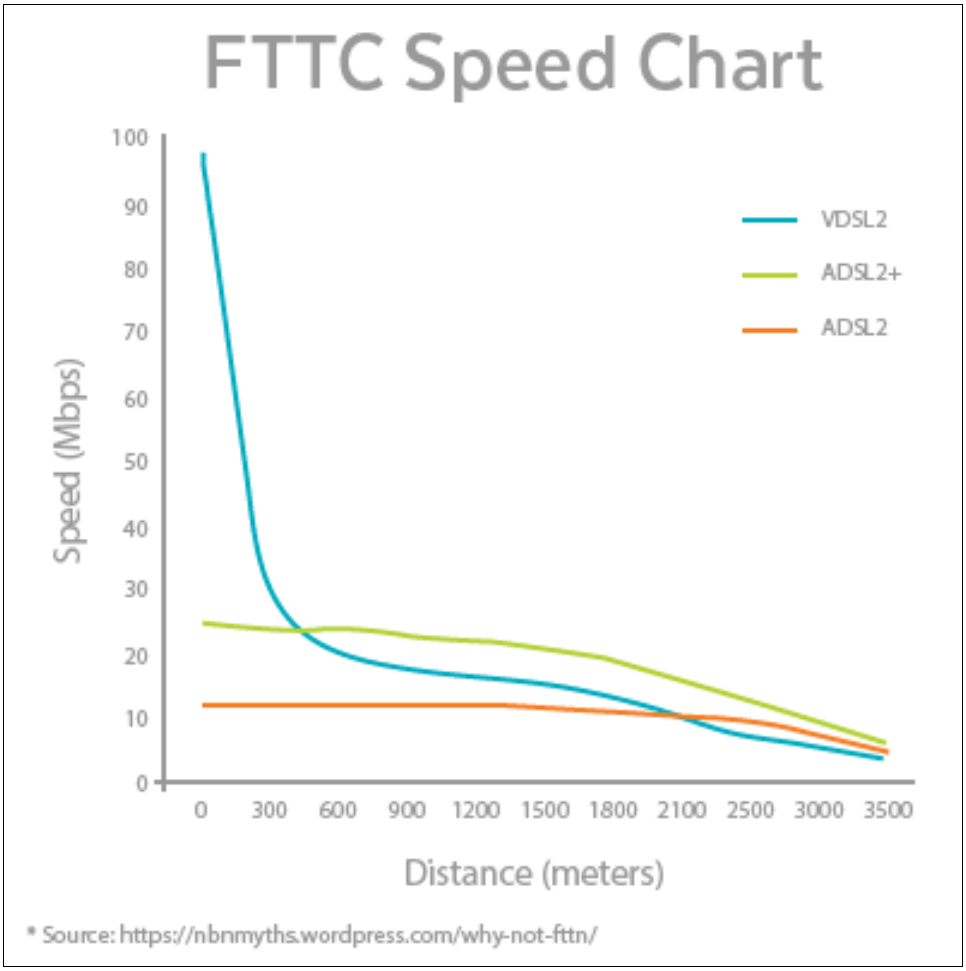


Figure 3.8. Relationship between the maximum download data rate and the length of the copper distribution segment of a subscriber line between the Central Office or Node and the end user.

The distribution of broadband technology and service availability is highly variable across the state, with Asymmetric DSL having the greatest availability ([redacted]%) and FTTP having the least availability ([redacted]%). Table 3.9 summarizes the availability of broadband to households within each California county in which AT&T provides service. Notably, the county with the highest FTTP penetration – [redacted] – is still at only [redacted]%, while its neighbor in [redacted] – [redacted] – shows FTTP penetration at [redacted]%.

Table 3.9

AT&T CALIFORNIA
AVAILABILITY OF BROADBAND BY TECHNOLOGY CATEGORY

		Percent of Households Served			
County	Households Passed by AT&T	Cat. 10 Asym DSL	Cat. 11 ADSL2/2+	Ca. 12 VDSL	Cat. 50 FTTP
[redacted]					

Figure 3.9 contains a series of maps showing the deployment of FTTP and other broadband technologies in selected AT&T California wire centers. Figure 3.9a below provides the legend common to all of these maps. Figures 3.9b and 3.9c illustrate the spotty deployment of FTTP in [redacted] A number of distribution areas (pink coloring) in the [redacted] wire center (where [redacted] headquarters is located), have been upgraded to FTTP. Most other parts of the [redacted] wire center serving area employ FTTN technology (yellow) involving fiber optic feeder cables deployed to Remote Terminals in various distribution areas, then connected to individual customer premises by traditional twisted pair copper, or copper feeder and distribution technology (green and blue).

AT&T has never committed to deploying FTTP on a large scale, although the company has constructed FTTP at a small number of customer locations in the state. Overall, only [redacted]% of homes passed by AT&T California have been upgraded with FTTP.

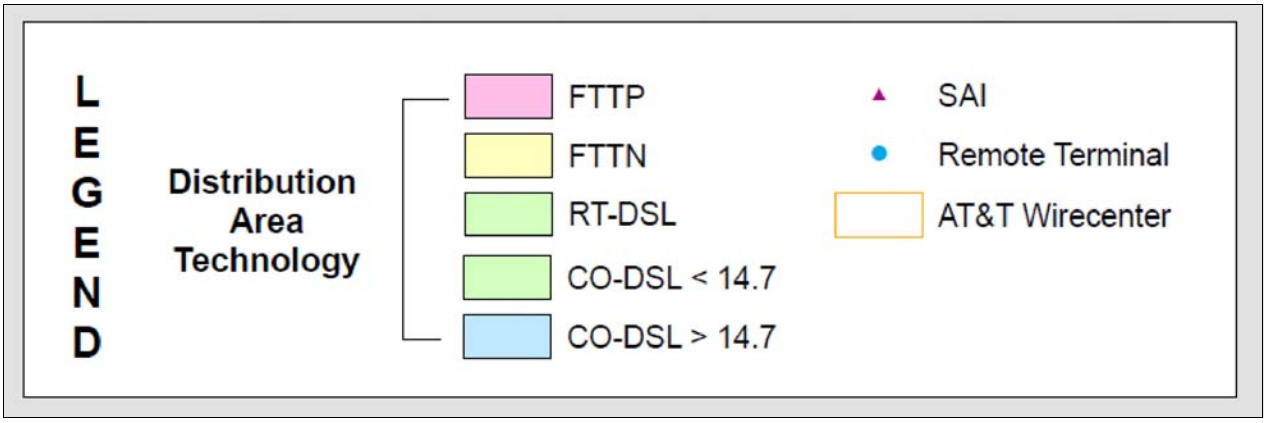


Figure 3.9a. AT&T distribution area technology map legend

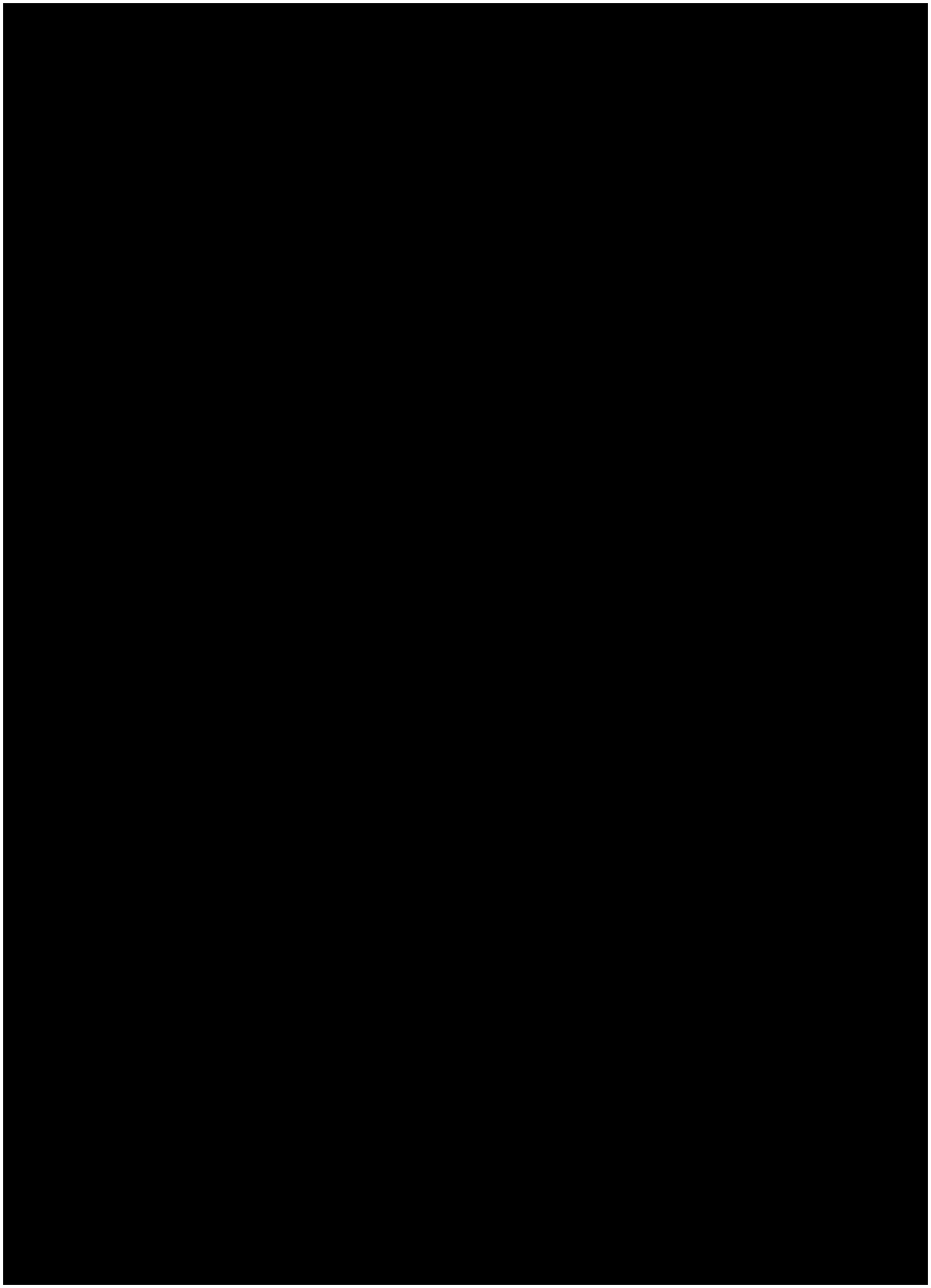


Figure 3.9b. AT&T Distribution Area Technology –

Figure 3.9c.. AT&T Distribution Area Technology – [redacted]

AT&T's FTTP deployment is spotty at best. In some areas, e.g., [redacted] and [redacted], there is a fair amount of FTTP in place (see Figures 3.9d and 3.9e). There is FTTP available in portions of the [redacted] area (see Figure 3.9f) but still larger areas remain served by copper distribution and in many cases copper feeder as well. FTTP deployment in [redacted] and the [redacted] (Figure 3.9g) and in [redacted] (Figure 3.9h) has been minimal, even in central business areas.

Figure 3.9d. AT&T Distribution Area Technology – [redacted]

Figure 3.9e. AT&T Distribution Area Technology – [redacted]

Figure 3.9f. AT&T Distribution Area Technology –

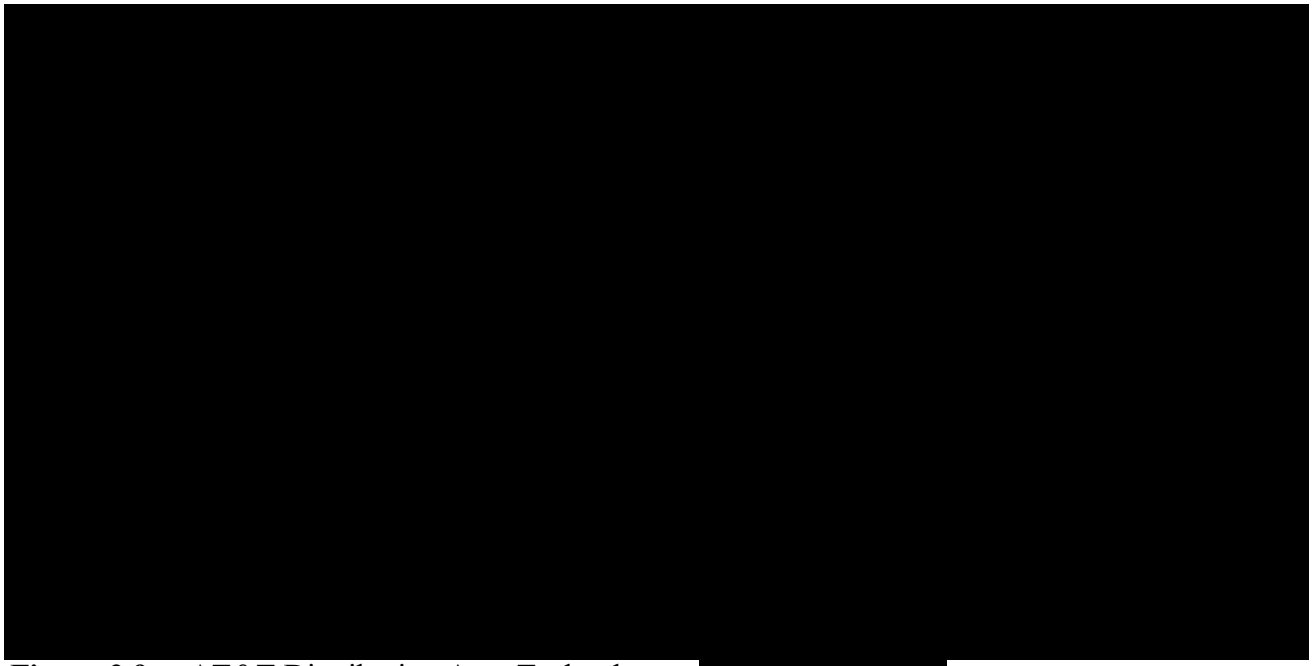


Figure 3.9g. AT&T Distribution Area Technology –

Figure 3.9h. AT&T Distribution Area Technology – [redacted]

Summary and Conclusions

While this Study's primary focus is infrastructure and service quality associated with legacy basic analog voice residential telephone service ("POTS"), broadband facilities, where present, are used to provide POTS services. As we discuss in Chapters 4A and 4F below, ETI has determined that wire centers that have been upgraded with fiber optic faciliites – either FTTN (as is primarily the case with AT&T) or FTTP (as Verizon/Frontier has done) – offering the capability to provide some type of high-speed broadband service, are achieving better POTS service quality performance scores in virtually every category – lower numbers of Trouble Reports, higher percentages of out-of-service conditions that are being resolved within 24 hours – a key performance standard identified in General Order 133-C/D – and where out-of-service situations arise, their average durations are in all cases decidedly shorter.

Table 3.10 below summarizes the availability of fiber optic facilities capable of supporting high-speed broadband services and other types of lower-speed DSL broadband services to existing POTS customers as of the end of the study period in December 2017.

Table 3.10

FIBER-EQUIPPED AND LOW-SPEED DSL AVAILABILITY
ILEC CENTRAL OFFICES AND LINES IN SERVICE AS OF DECEMBER 2017

	AT&T	Frontier	Both
Total Central Offices	[redacted]	[redacted]	[redacted]
Central Offices with fiber broadband (FTTN or FTTP)	[redacted]	[redacted]	[redacted]
Central Offices with DSL	[redacted]	[redacted]	[redacted]
Central Offices with no fiber broadband or DSL	[redacted]	[redacted]	[redacted]
Total Lines in Service	2,245,171	824,079	3,069,250
Lines in Central Offices with fiber broadband	[redacted]	[redacted]	[redacted]
Lines in Central Offices with DSL	[redacted]	[redacted]	[redacted]
Lines in Central Offices with no fiber broadband or DSL	[redacted]	[redacted]	[redacted]
Pct of Central Offices with fiber broadband	[redacted]	[redacted]	[redacted]
Pct of Central Offices with DSL	[redacted]	[redacted]	[redacted]
Pct of Central Offices with no fiber broadband or DSL	[redacted]	[redacted]	[redacted]
Pct of Lines in Central Offices with fiber broadband	[redacted]	[redacted]	[redacted]
Pct of Lines in Central Offices with DSL	[redacted]	[redacted]	[redacted]
Pct of Lines in Central Offices with no fiber broadband or DSL	[redacted]	[redacted]	[redacted]

Sources: AT&T CA Response to Data Request GR1_1.1_ATT_Fiber; CD Staff compilation of AT&T COs with Broadband (DSL) availability; Frontier CA Responses to DR-02F, DR-05F Attachment 4. Note: Most AT&T fiber-equipped central offices are Fiber-to-the-Node ("FTTN"); all Frontier fiber-equipped central offices are Fiber-to-the-Premises ("FTTP").

As shown, some[redacted]% of AT&T California POTS customers as of December 2017 had access to some form of broadband service, either fiber-to-the-node (FTTN) broadband or DSK; for Frontier, the percentage of POTS lines with access to some form of broadband, either fiber-to-the-premises (FTTP) or DSL, was lower, at [redacted]%. Note that the quantities and percentages shown in Table 3.10 refer to *POTS lines in service* as of the end of 2017, and do not include customers who had already migrated to other non-POTS ILEC offerings that included both voice and broadband (Internet access and/or IPTV). A higher proportion of AT&T California customers [redacted]% vs. [redacted]% for Frontier)) had access to services furnished via fiber optic facilities, although the vast majority of these (for AT&T) were FTTN, vs. FTTP for Frontier. Only [redacted]% of AT&T California customers had no broadband access at all, whereas [redacted]% of Frontier customers were not being afforded access to any type of ILEC-provided broadband, even at very low speeds.

As noted, fiber upgrades also provide ancillary benefits to basic POTS customers. However, because broadband services are not regulated, carriers are under no legal obligation to pursue

such upgrades. Thus, from the carrier's perspective, the decision to invest is driven mainly by competitive and financial considerations that have little direct bearing upon improving service to legacy POTS customers.

Broadband upgrades provide service quality benefits to basic POTS customers, but a carrier's decision to invest in broadband is driven mainly by factors that have little direct bearing upon improving service to legacy POTS customers. California ILECs are under no legal obligation to invest in broadband, but fines imposed pursuant to GO 133-D, if scaled correctly with respect to the extent of the shortcoming, have the potential to provide the necessary incentives to encourage such investments.

In August 2016, the CPUC issued a revised GO 133-D that imposes financial penalties upon ILECs that persistently fail to meet minimal POTS service quality standards. GO-133-D §§9.3, 9.4 and 9.5 provide for escalating daily fines where a carrier's failure to meet the required service standards persists for an extended period of time.[61] As of November 8, 2018, the first fines that have thus far been imposed upon AT&T California have totaled $2.2-million, and for Frontier, cumulative fines have summed to $759,833.[62] However, §9.7 offers offending carriers an "Alternative Proposal for Mandatory Corrective Action" whereby carriers can avoid the fine by submitting "a request to suspend the fine." Under this provision,

> ... carriers may propose, in their annual fine filing, to invest no less than twice the amount of their annual fine in a project (s) which improves service quality in a measurable way within 2 years. The proposal must demonstrate that 1) twice the amount of the fine is being spent, 2) the project (s) is an incremental expenditure with supporting financials (e.g. expenditure is in excess of the existing construction budget and/or staffing base), 3) the project (s) is designed to address a service quality deficiency and, 4) upon the project (s) completion, the carrier shall demonstrate the results for the purpose proposed.[63]

Carriers can avoid fines either by meeting the GO-133-D §3 performance standards or by investing in network upgrades that will result in improved service quality overall. These investments must, however, be directed specifically at services that fall within the scope of GO 133-D, i.e., legacy circuit-switched voice lines. Both companies have sought approval for an alternative proposal for mandatory corrective action under § 9.7. It will thus be some time before the results of the alternative to fines as offered under §9.7 can be determined and fully evaluated.

61. D.16-08-021 (R.11-12-001), Adopted Aug. 18, 2016; Effective Aug. 18, 2016; Except Section 9 on fines, which is effective Jan. 1, 2017.

62. Resolution T-17625 (re AT&T), issued November 8, 2018; Resolution T-17631 (re Frontier), issued November 8, 2018.

63. GO 133-D, §9.7.