

CALIFORNIA PUBLIC UTILITIES COMMISSION

DIVCA Video, Broadband and Video Employment Report For The Year Ending December 31, 2016

The Digital Infrastructure and Video Competition Act of 2006
(DIVCA)

“To promote competition, the state should establish a state-issued franchise authorization process that allows market participants to use their networks and systems to provide video, voice, and broadband services to all residents of the state. . .”

DIVCA § 5810



Annual Report to the Governor and the Legislature

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Team Responsible for this Report:

Michael Pierce, Public Utility Research Analyst

Dion Good, Research Analyst, Geographic Information Systems

Michael Morris, Program Supervisor

Robert Wullenjohn, Program Manager

Cynthia Walker, Director

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1. Executive Summary

The Digital Infrastructure and Video Competition Act (DIVCA)¹ seeks to promote competition in “video and broadband services” via a “state-issued franchise authorization process that allows market participants to use their networks and systems to provide video, voice and broadband services to all residents of the state.”² This Report to the Legislature³ presents the annual video and broadband service information of California state video franchise holders and their affiliates (SVF holders)⁴, and the annual employment data of the largest SVF holders with more than 750 employees, submitted to the California Public Utilities Commission (CPUC) pursuant to DIVCA,⁵ for the period January 1, 2016 through December 31, 2016.

This report is the latest in the series of annual DIVCA reports that have been provided to the Legislature and Governor since 2007.

Key Terms Used in This Report

In ordinary conversation, the phrase video service has a very broad meaning, generally meaning any video we watch on a television or, more recently, a computer or mobile device. As used in this report, **video** programming has a specific meaning, as defined in the DIVCA statute.⁶ DIVCA deals with the issuance of franchises to video service providers (VSPs). VSPs deliver programming similar to that provided by broadcast television, but over facilities that use the public right of way, or what we generally think of as a cable television system. Most notable is what is excluded from the definition – neither satellite-delivered programming nor video services that are streamed over Internet access service count under the statute as video programming or video programming services.⁷ Entities providing video by satellite or over the Internet are not VSPs, and are not franchised by the CPUC.

Broadband service, or Internet access service, is provided by entities referred to as Internet Service Providers (ISPs). By definition, broadband service provides an “always on” connection, and excludes dial up access. Broadband service is a mass market retail service that allows customers to access the Internet to send or receive information. Such information can include audio, video or data, and can be delivered by a variety of wired and wireless technologies such as the following:

¹ Cal. Pub. Util. Code §§ 5800 et seq.

² Cal. Pub. Util. Code §§ 5810(a)(1) and (a)(1)(C).

³ Cal. Pub. Util. Code §§ 914.3 and 914.4.

⁴ Examples of affiliates include those providing wireless service, and video programming pursuant to unexpired local Cable TV franchises. State Video Franchise holders and their affiliates, hereafter are referred to as “SVF holders.”

⁵ Cal. Pub. Util. Code § 5920(a)

⁶ Cal. Pub. Util. Code §5830(r)

⁷ Cal. Pub. Util. Code §5830(s)

- **Digital Subscriber Line (DSL)** services typically employed by traditional telephone companies (Incumbent Local Exchange Providers), such as AT&T, Frontier and the rural telephone companies, allow access to the Internet using legacy twisted pair networks. DSL technology is further designated by the version being deployed, such as sDSL (providing slow, but equal up and down speeds), aDSL (providing faster downstream speeds) and vDSL (providing even faster downstream speeds than aDSL, enabling the offering of video programming services over telephone lines).
- **Cable Modem** service is the name of the technology used by traditional cable companies, such as Comcast, Charter and Cox, allowing access to the Internet using coaxial cables or a hybrid of fiber optics and coaxial cables into the home. Cable Modem services are often described by the transmission standard they employ, almost always DOCSIS (or Data Over Cable Service Interface Specification). The cable industry is in the process of upgrading to the newest DOCSIS version, DOCSIS 3.1, from 3.0, which allows speeds greater than a gigabit per second.
- **Fiber to the Home (FTTH)** is being deployed by cable television companies, telephone companies, and new entrant broadband companies that only provide Internet access. FTTH employs hair-thin glass fibers capable of carrying extremely fast broadband services.

Companies that only provide broadband service do not need a video franchise from the CPUC, even if they also offer over-the-top video streaming service. Only video service providers, as defined above, require a state video franchise.

Finding 1: AT&T and Frontier continued to meet their video build out and low income build-out requirements

AT&T and Frontier⁸ have deployed video technology to 7.8 million households and have exceeded their combined statutorily required deployment level of 6.1 million households by 28% (an increase of 1.7 million households).

Both AT&T and Frontier continued to meet their ongoing annual 30% low income video build-out requirements in 2016. Additionally, in prior years both AT&T and Frontier met their three and five year low income household build-out obligations and exceeded their two, three and five year video build-out obligations.⁹

⁸ Verizon California sold its wireline business, including its video franchise to Frontier Communications Corporation (Frontier) in April 2016. We will refer to Verizon's previous SVF infrastructure, services and employees as Frontier in this Report.

Finding 2: Video availability and consumer choice increased in 2016

As of December 2016, AT&T and Frontier combined offered wireline video to 7.8 million households – more than 60% of all California households. During 2016, AT&T and Frontier increased the number of households to whom they offer video by 5.4% (approximately 400,000 households) over the prior year. Since implementation of DIVCA in 2007, 6.8 million households gained a choice of wireline video providers, in large part due to AT&T and Frontier (formerly Verizon) entering the video market.

Throughout the state, 10.8 million households are located in census tracts in which two or more SVF holders offer video services. This number increased by 4.0% (414,401) during 2016. The number of households located in census tracts in which three or four SVF holders offer video services increased by 9.3% (171,634) to 2.0 million.

Finding 3: Broadband consumer choice: More than twice as many households had a choice of two or more SVF holders offering them broadband service at speeds of 25/3 Mbps or faster, compared with 2015

When compared with the previous year, in 2016 more than twice as many households (7.2million) had a choice of two or more SVF holders offering them broadband at minimum advertised speeds of 25/3 Mbps or faster (7.2 million in 2016 vs. 3.5 million in 2015).

Simultaneously, during 2016, the percentage of households offered wireline broadband service by two or more SVF holders at the slower minimum advertised speeds of $\geq 6/1$ Mbps increased by 25.7% to 10.3 million households during 2016 compared with 8.7 million households in 2015.¹⁰

Finding 4: Broadband subscribership continued to increase, while subscriptions to video service fell by 3% in 2016

Video subscribership fell 3% (approximately 200,000) to 6.4 million households during 2016 from 6.6 million in 2015. Meanwhile, broadband subscribership increased by 2.2% to 8.8 million households. At the end of 2016, there were 4.4 million more broadband subscribers than video.

Finding 5: Broadband availability and subscribership to faster services increased

Broadband ≥ 100 Mbps was available to 93% (12.1 million) of the households in California at

¹⁰ These are calculations where there are overlapping providers, which can result in some double counting. See discussion of data limitations in section 7 at pages 22-23 and in Appendix B, sections H & I) at pages 58-60.

the end of 2016. At the end of 2013, only 54% of California households had such availability.

During 2016, subscribership to the ≥ 100 Mbps minimum advertised downstream speed category increased by 77% to 3.8 million (29.5% of all subscribers).

During the two-year period between 2014 and 2016, the number of subscribers to broadband in the ≥ 100 Mbps downstream speed category increased by 118% (2.1 million). Between 2012 and 2016, the number of subscribers to broadband in the ≥ 100 Mbps downstream speed category increased by 38,743%, from 9,888 to 3.8 million subscribers.

In contrast, the number of subscribers to the slowest minimum advertised download speed categories decreased between 2012 and 2016. The number of subscribers to the minimum advertised downstream speed category “under 6 Mbps” fell by 81.6% (3.7 million) to 839,810 between 2012 and 2016. Similarly, the number of subscribers in the “under 3 Mbps” speed category fell by 94% to 241,253 during this period and the subscribers in the “under 10 Mbps” category fell by 71% to 1.6 million.

Finding 6: Cable modem technology is used by twice as many subscribers as DSL and the difference is widening

By 2016, 64% (6.9 million) of the total number of subscribers to wireline broadband chose cable modem technology, compared to 28.9% (3.1 million) for DSL (Digital Subscriber Line), and 7% for fiber-to-the home.

Finding 7: Between 2007 and 2016, total employment across the five state-issued SVF holders with more than 750 employees decreased by 35.1% (19,933) to 36,815. During 2016, total employment among these five SVF holders decreased by 0.8% (284).

AT&T California’s total number of employees in CA (excluding AT&T Mobility) declined by 43.7% (12,894) between 2007 and December 2016. During that same nine year period, Frontier’s employee count declined by 51.5% (4,174), Comcast’s employees count declined by 36.2% (2,595), and Cox’s employee count declined by 46.8% (1,519).

During 2016, AT&T California’s total number of employees in CA (excluding AT&T Mobility) declined by 6% (1,027) to 16,615. During that same year (2016), Frontier’s employee count increased by 8.6% (313) to 3,936, Comcast’s employee count increased by 1.8% (82) to 2,595, and Cox’s employee count decreased by 8.5% (162) to 1,724.

Charter acquired Time Warner during 2016. The combined Charter/Time Warner entity increased their total number of employees in California by 5% (510) to 9,968 during 2016, over their separate employee counts in 2015.

2. DIVCA Overview

A. The CPUC's Role In Implementing DIVCA

The DIVCA statute provides that the CPUC is the sole franchising authority for issuing state video franchises and prohibits the Commission from imposing requirements on state-issued franchise holders not expressly provided by DIVCA.¹¹ The statute also provides that a “holder of a state franchise shall not be deemed a public utility as a result of providing video service under this division,”¹² SVF holders otherwise operating as public utilities may be subject to public utility requirements.

DIVCA provides authority to the Commission over DIVCA franchise holders in the following areas:

- Issuing and renewing 10-year video franchises;¹³
- Gathering data from state-issued video franchise holders on their deployment of video and broadband services on an annual basis;¹⁴
- Aggregating data submitted by holders for use in an Annual Report from the CPUC to the Governor and Legislature;¹⁵
- Verifying that holders of video franchises have complied with build-out and anti-discrimination requirements;¹⁶
- Enforcing the prohibition of telco-video cross-subsidization;¹⁷
- Collecting fees from video franchise holders to equal the cost of carrying out its duties.¹⁸

As of December 2016, the CPUC has issued 54 state video franchises and 188 amendments to those franchises. A full list of SVF holders is available on the CPUC website in the Video Franchising section of the Communications Division's webpage at: <http://www.cpuc.ca.gov/General.aspx?id=2134>.

SVF holders are required to submit data annually, by April 1, regarding their provision of video and broadband services, and information pertaining to their service to low-income households within the holders' video service areas. DIVCA directs the CPUC to aggregate this data and

¹¹ Cal. Pub. Util. Code § 5840(a).

¹² Cal. Pub. Util. Code § 5820(c).

¹³ Cal. Pub. Util. Code § 5840 (a).

¹⁴ Cal. Pub. Util. Code § 5960 (b).

¹⁵ Cal. Pub. Util. Code § 5960 (c).

¹⁶ Cal. Pub. Util. Code § 5890.

¹⁷ Cal. Pub. Util. Code §§ 5940, 5950. See Decision Adopting a General Order and Procedures to Implement the Digital Infrastructure and Video Competition Act of 2006 at 174 [D. 07-03-014] (2007) (Phase 1 Decision). See pages 15-16 of the 2013 DIVCA Report for a discussion of the telco-video cross-subsidization issue.

¹⁸ Cal. Pub. Util. Code § 5810(a)(3).

report it to the Governor and the Legislature annually. (See Appendix A for a history of DIVCA, and for DIVCA decisions. See Appendix C for a description of data collected.) Sections three (3) and four (4) of this Report summarize data describing video services that are provided by state-issued video franchise holders and their local affiliates, submitted in response to the statutory requirements of DIVCA.

B. Consumer Protection Under DIVCA

Public Utilities Code § 5900(c) states that “the local entity (county or municipality) shall enforce all of the customer service and protection standards of this section with respect to complaints received from residents within the local entity’s jurisdiction.”¹⁹ Sections 5900(d)-(j) set out the procedures for the imposition of fines by local entities and for judicial review; a court “shall conduct de novo review of any issues presented.”

DIVCA incorporates specific consumer protection provisions including, but not limited to, local office and telephone service hours, pricing and programming notices, and billing and disconnect practices and policies.²⁰ DIVCA directs local entities to enforce these customer service and protection standards, and to provide a schedule of penalties for any material breach by ordinance or resolution.²¹ For any alleged material breach of consumer protection standards, a local entity must provide the state video franchise holder written notice of the alleged breach and give the holder at least thirty days to remedy the specified material breach.²²

Even though the stated authority for enforcement of customer service and protection standards rests with the “local entities” (municipalities, counties and special districts), as set forth above, the Communications Division (CD) staff at the CPUC may receive calls from residents and local municipalities who have complaints and questions about services provided by holders of state-issued video franchises. Examples of questions and topics that the CD staff typically addresses include: quality of service issues, pricing concerns, line extension disputes, content and public, educational, and governmental (PEG) access issues. Staff educates callers regarding their concerns, and when appropriate, refers people to their local municipality or the Commission’s Consumer Affairs Bureau for resolution. In addition, CD staff may contact local municipality staff about complaints received and provide information relating to their role in the process. When appropriate, staff attempts to facilitate discussions between the local municipality or customer and the video franchise holder.

¹⁹ Cal. Pub. Util. Code § 5900(c-j).

²⁰ See, Cal. Pub. Util. Code § 5900(a), which in turn incorporates Cal. Gov’t Code §§ 53055, 53055.1, 53055.2 and 53088.2, as well as other customer service standards pertaining to the provision of video service established by federal law or regulation or adopted by subsequent enactment of the Legislature. Section 5900 also requires holders to comply with certain privacy standards.

²¹ Cal. Pub. Util. Code §§ 5900(c) & (d).

²² Cal. Pub. Util. Code § 5900(e).

The CPUC is responsible for ensuring that video service providers have valid state video franchises and for enforcing other franchise provisions of the statute. For example, some small video service providers have been found to be operating without either state or local video franchises. When a local entity reports this to staff, staff sends the video service provider a compliance letter demanding that it obtain a state franchise as required by law. Staff coordinates with affected local governments to advise them of the status of the matter and to seek input. Should the service provider not comply, the matter is escalated to a formal proceeding. No such circumstance was discovered in 2016.

C. 2014 Franchise Renewal Decision

The Commission grants an initial franchise for a period of 10 years, after which the franchise may be renewed. On August 28, 2014, the CPUC issued D.14-08-007 (“Franchise Renewal Decision”) implementing the franchise renewal provisions of DIVCA by adopting rules for the renewal of state issued franchises.²³ Public Utilities Code § 5850 requires that the process for renewing an existing franchise be identical to the process set forth in DIVCA for obtaining an initial franchise, except that the renewal process must be consistent with federal law governing the renewal of cable television franchises and the applicant seeking renewal must not be in violation of any non-appealable court order issued pursuant to DIVCA. The renewal rules are incorporated into General Order 169.

The first franchise renewal application, filed by Frontier California, was approved on October 12, 2017, <http://www.cpuc.ca.gov/General.aspx?id=9710>

²³ ORA filed a petition for modification of D.14-08-057 on July 1, 2015. The petition was denied in D.17-12-006 on December 14, 2017

3. AT&T and Frontier Video Deployment and Low Income Build-Out Requirements

A. AT&T and Frontier Have Met Their Build-out Requirements

DIVCA requires SVF holders or their affiliates, with more than 1 million telephone customers (AT&T and Frontier²⁴), to build out facilities sufficient to provide specified percentages of customers within their telephone service areas access to their video service within five years of the passage of DIVCA.²⁵ DIVCA requires the CPUC to monitor compliance.²⁶ If the Commission finds a SVF holder to be out of compliance with the build out, low income, or other provisions of DIVCA, DIVCA gives the Commission authority to impose fines up to one percent of SVF holders' total monthly gross video revenue, and/or suspend or revoke a state video franchise.²⁷

As part of ongoing enforcement duties, CD staff has analyzed the deployment records of both AT&T and Frontier²⁸ to determine whether both organizations have complied with the requirements of DIVCA. These analyses determined that Frontier exceeded its two and five year build-out obligation, as defined in Public Utilities Code § 5890(e), by offering video services to at least 40% of the households in its telephone service area in 2011.

In 2012, at the five-year time frame set forth in the statute, AT&T did not meet its five-year build-out obligation, but it invoked § 5890(e)(3), which permits a video service provider with more than one million telephone subscribers to delay meeting this five-year build-out obligation until it has a 30% video "take rate" for six consecutive months.²⁹ AT&T qualified for this extension to meet its build-out obligation during both 2011 and 2012. In 2013, AT&T met its build-out obligation by offering video to at least 50% of the households within its telephone service area.

The build-out requirements for SVF holders with over one million telephone customers (AT&T

²⁴ In April 2016, Verizon California sold its wireline business, including its video franchise to Frontier California (Frontier). Consequently, we are using "Frontier" to refer to the video franchise facilities that were previously owned by Verizon.

²⁵ Cal. Pub. Util. Code § 5890(b). Because the incumbent cable companies offer video service to any household that is also offered voice service, the Commission did not impose DIVCA's low-income / build-out requirements on those cable companies. See D.07-03-014, at p.163 and D.07-10-013, at p. 3

²⁶ Phase I Decision, D. 07-03-014, at page 7; R.06-10-005, General Order 169 Implementing DIVCA, VII, §C, page 17; Cal. Pub. Util. Code § 5890 (g)-(i).

²⁷ Cal. Pub. Util. Code § 5890 (g)-(i).

²⁸ Verizon California sold its wireline business, including their video franchise to Frontier in April 2016, subsequent to the time frame of this Report. We are using Frontier to refer to video franchise facilities that were previously owned by Verizon.

²⁹ Cal. Pub. Util. Code § 5890 (e)(3) states: "A holder shall not be required to meet the (build out) requirement...until two years after at least 30 percent of the households with access to the holders video service subscribe to it for six consecutive months."

and Frontier) are shown in the table below:

DIVCA Build-out Requirements

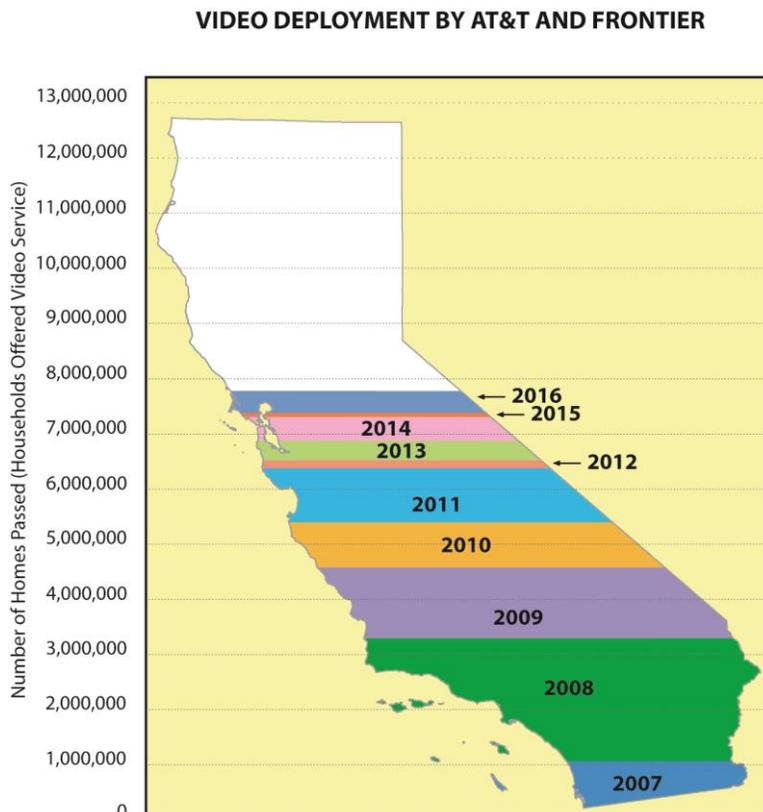
Time Frame	SVF holders with more than One Million Telephone Customers in CA	
	Frontier - Predominantly Fiber Optic to Premises	AT&T - Predominantly Non-fiber Optic to Premises
Within 2 years	25% of customer households in a telephone service area must have access to video service	N/A
Within 3 years	N/A	35% of households in telephone service area must have access to video service
Within 5 years*	40% of customer households in a telephone area must have access to video service	50% of households in telephone service area must have access to video service

* Not required to meet these requirements until 2 years after at least 30% of households with access become subscribers for 6 consecutive months

B. In 2016, AT&T and Frontier Continued to Deploy Video Facilities

To measure video deployment, we count the number of reported households offered video services.³⁰ The chart below shows that during 2016, AT&T and Frontier increased their combined deployment of video services by 5.4% (approximately 400,000 Households) to 7.78 million households, almost 60% of the 13.02 million households in the state. This compares with a 0.1% increase in 2015, a 6.2% increase during 2014, a 5.5% increase during 2013, a 2.3% increase in 2012, and an 18% increase in 2011.

At the end of 2016, AT&T and Frontier exceeded their combined statutorily required deployment levels by 28% or approximately 1.7 million households.



³⁰ By statute, service providers submit DIVCA video availability data to the CPUC on a Census tract basis. For a discussion of the staff's method of collecting, validating and analyzing DIVCA data, and the limitations of Census block and tract granularity, see Section 6 of this Report, pages 24-25, and Appendix C, sections H & I on pages 67-69. No such limitation applies here, as video availability data reflect actual households offered video service within each Census tract. The video availability data provided in Sections 3A & 3B on pages 12 - 14 of this Report involve AT&T and Frontier data only. Those two companies have video franchise areas only where telephone service is also available; traditionally, AT&T and Frontier do not have overlapping telephone service areas. As a result, Census tract granularity does not cause the over-counting described in this Report, which says that over-counting can sometimes occur when multiple companies operate within the same Census tract.

C. AT&T & Frontier Have Met Their Low Income Build-Out Requirements

In addition to imposing overall build-out requirements on AT&T and Frontier, DIVCA states: “A cable operator or video service provider that has been granted a state franchise under this division may not discriminate against or deny access to service to any group of potential residential subscribers because of the income of the residents in the local area in which the group resides.”³¹

To operationalize this requirement, DIVCA requires that beginning five years after Frontier and AT&T first offered video service and continuing thereafter, each is obligated to ensure that at least 30% of the households with access to video service in their respective video service territories are low income households.³² The table below summarizes these requirements:

DIVCA Low Income Build-Out Requirements

Time Frame	SVF holders with more than one million telephone customers in CA
Within 3 years	25% of households in a telephone service area with access to video service must be low-income households
Within 5 years	30% of households in a telephone service area with access to video service must be low-income households.
Annual requirement after 5 years	30% of low-income households in a telephone service area must continue to have access to video service.

As with the overall build-out requirement, if the Commission finds a SVF holder out of compliance with the low income build-out provisions of DIVCA, DIVCA gives the Commission authority to impose fines up to 1 percent of the SVF holders’ total monthly gross video revenue, and/or suspend or revoke a state video franchise.³³

As part of ongoing enforcement duties, the CPUC’s Communications Division staff have analyzed the deployment records of both AT&T and Frontier to determine whether these SVF holders have complied with the low income requirements of DIVCA. These analyses determined that both AT&T and Frontier met their on-going low income build-out requirement

³¹ Cal. Pub. Util. Code § 5890 (a).

³² Cal. Pub. Util. Code § 5890 (j)(4); "Low income household" means those residential households located within the holder's existing telephone service area where the average annual household income is less than thirty-five thousand dollars (\$35,000), based on the 2000 United States Census Bureau estimates adjusted annually, to reflect rates of change and distribution through January 1, 2007. The low income household percentages derived from these 2007 estimates are the basis for calculating low-income compliance thereafter.

³³ Cal. Pub. Util. Code §5890(h).

at both the three year mark in 2010 and the five year mark, in 2012. This analysis was done again in each year since, and staff again determined that both AT&T and Frontier met DIVCA's on-going low income build-out requirement in 2016.

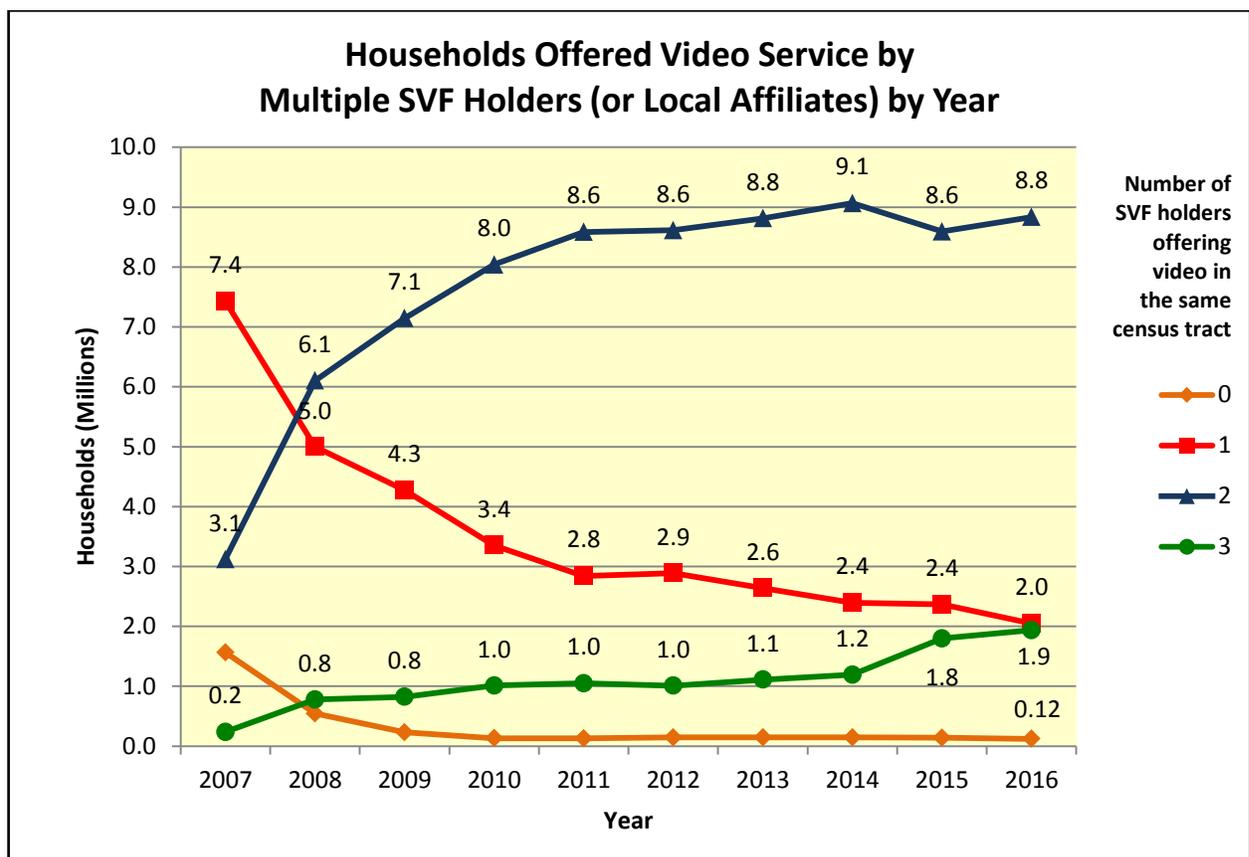
AT&T & Frontier Have Continued to Meet the Community Center Build-Out Requirements
DIVCA requires SVF holders with more than 1 million telephone customers in California to provide free video and broadband service to community centers in underserved areas, as determined by the telephone corporation. These SVF holders must provide this service at a ratio of one community center for every 10,000 video customers.

For each year, including 2016, both AT&T and Frontier met this requirement.

4. Video Information

A. Households Offered Video by Two or More SVF Holders Increased by 4% in 2016

The line graph below shows that at the end of 2016, 10.8 million households are located in census tracts in which two or more SVF holders offer video services (i.e., 8.8 + 1.9 million).³⁴ This number increased by 4.0% (414,401) during 2016. The number of households located in census tracts in which three or four SVF holders offer video services increased by 9.3% (171,634) to 2.0 million. The number of households in census tracts in which four SVF holders offer video services increased by 34,304 (77.4%) to 78,622.

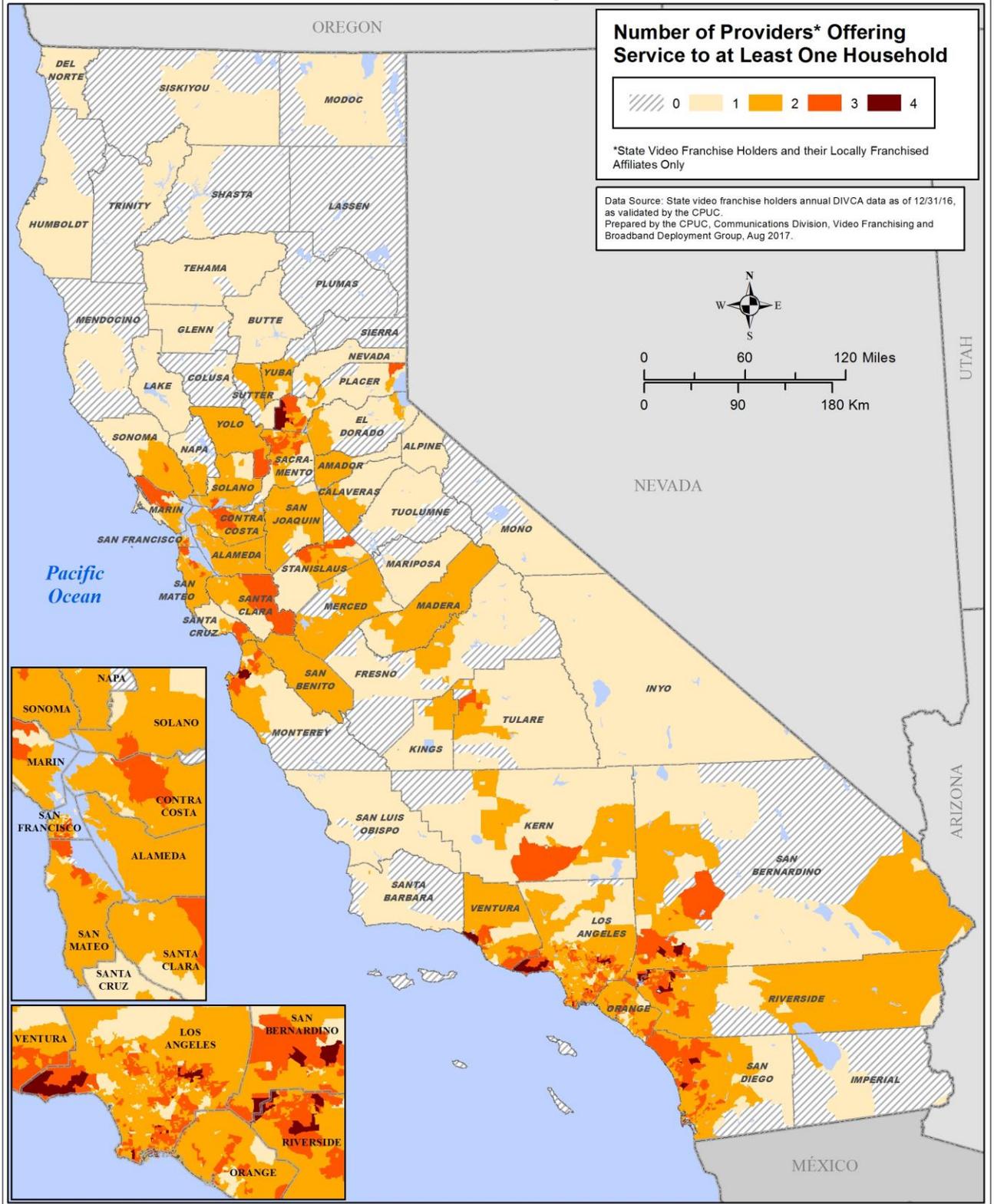


The map on the next page shows the number of SVF holders that offered video in different areas throughout the state at the end of 2016.

³⁴ 78,622 households were offered video by four SVF holders, although are not shown in the graph.



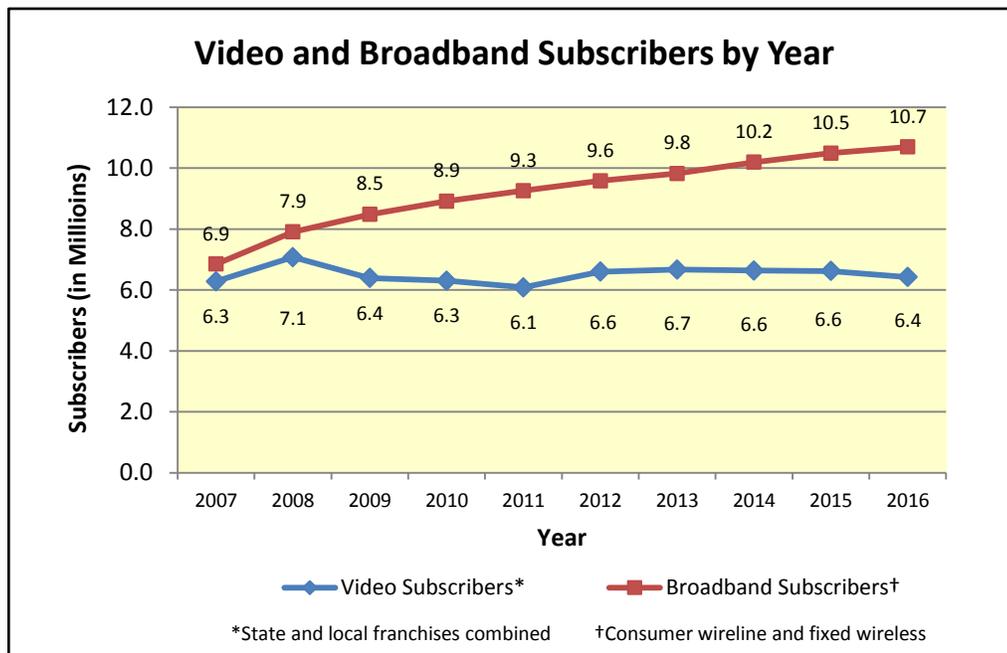
STATE OF CALIFORNIA VIDEO FRANCHISING Video Providers by Census Tract



B. Video Subscribership fell by 3% (200,000) in 2016 to 6.4 million, while Broadband Increased by 2.4%

The line graph below shows that traditional wireline bundled linear video³⁵ subscribership in California fell by 3% (approximately 200,000) to 6.4 million subscribers at the end of 2016. Video subscribership is down 9.2% (approximately 650,00) from a peak of 7.1 million subscribers in 2008, and up 5.6% (approximately 337,000) from a low of 6.1 million in 2011.

In contrast, broadband subscribership continued to grow in 2016, to 10.7 million, an increase of 2.4% (approximately 235,000) over the prior year. Since 2007, broadband subscribership to SVF holders (including their local affiliates) in California has grown by 56.5% (3.9 million) from 6.9 million, while video subscribership increased by only 1.6%, since 2007.



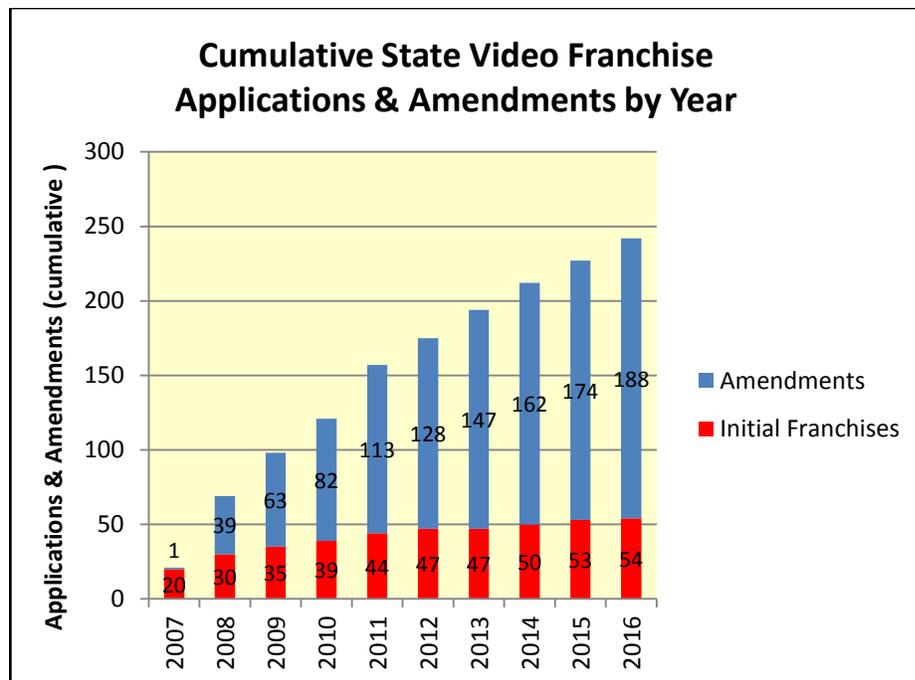
³⁵ Linear video is a television service where the viewer must watch a scheduled program at the particular time it is offered, and on the particular channel it is presented, or record it for later viewing. Alternatives to this are Over-The-Top (OTT) streaming services, digital video recorders (DVRs) and video-on-demand services.

C. Only One New Initial Franchise Application Was Granted in 2016

The red bars below show that during 2016, only one new state video franchise was granted,³⁶ while the blue bars show that 14 applications to amend existing franchises were processed during 2016, compared with 12 in 2015, 15 in 2014, and 19 in 2013. Amendments to existing video franchises are filed to “reflect changes to the franchise service area of a SVF holder.”³⁷

Most incumbent video providers shifted to state-issued video franchises soon after new entrants (incumbent telephone companies) began providing video service in one or more of their local franchise areas in 2007. This shift is reflected by the 20 initial applications granted in 2007 and 10 additional initial applications granted in 2008 (see bar chart below). The growth in initial franchise applications slowed since then.

A state-issued video franchise grants the holder the right to offer video services in all or part of the state. State-issued video franchises are not exclusive. Multiple video service providers can receive video franchises for the same geographic area.



³⁶ Race TV was granted a new SVF in Kern County on May 16, 2016.

³⁷ CPUC, General Order 169, VI, C.

The map on the next page represents both incumbent and new entrant video service providers in California. A map representing each video franchise is available on the CPUC website.³⁸

The green area represents the entire video franchise service areas of AT&T and Frontier. This does NOT represent the areas where they have actually deployed video services. AT&T offers video in approximately 50% of their telephone service area and Frontier offers video in approximately 40% of their telephone service area.

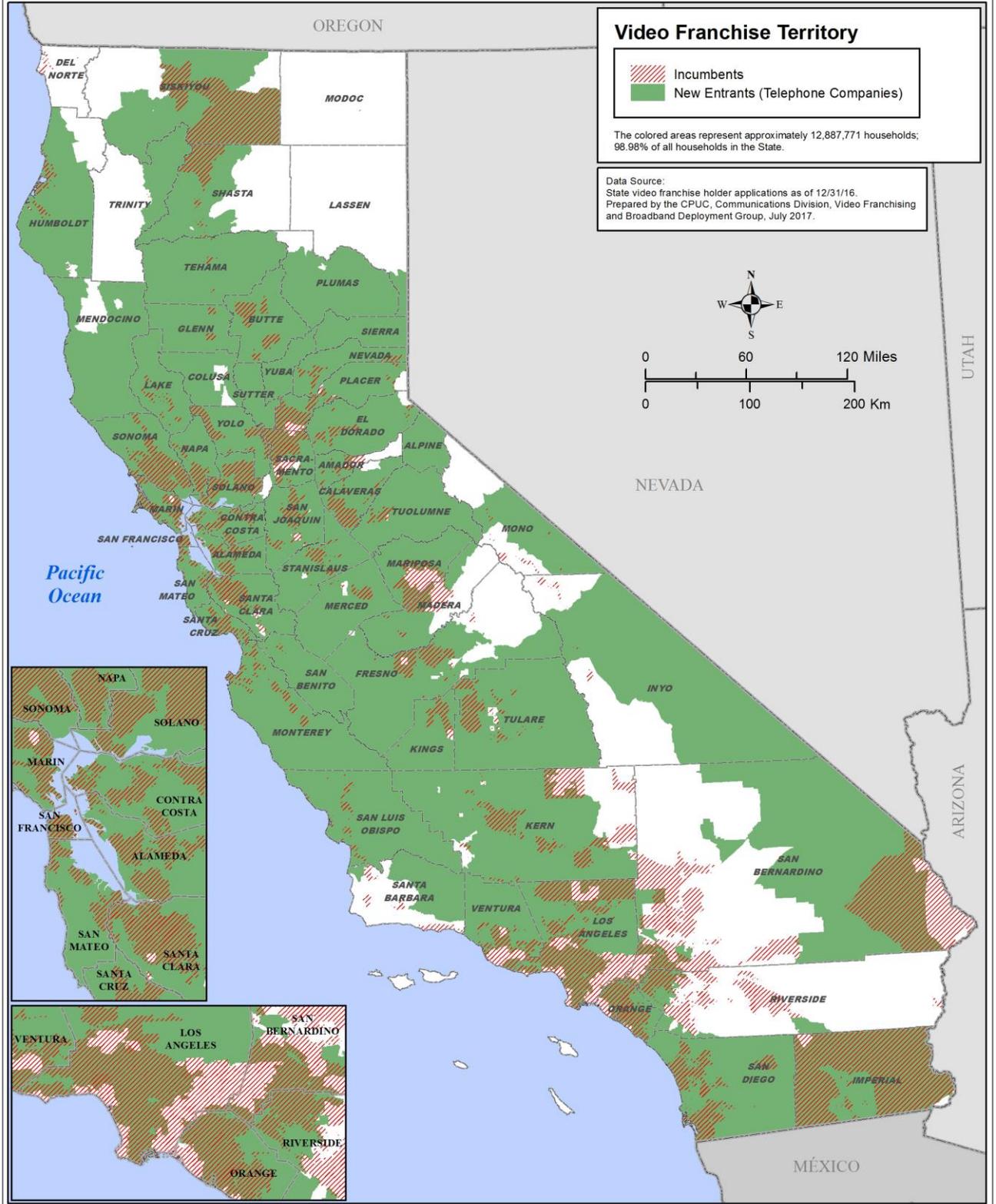
The completely white areas show areas where no telephone companies offered video. The white areas with red diagonal hatching represent the service areas of incumbent cable TV franchise holders.

The areas with red diagonal hatching in green areas indicate areas where both the incumbent Cable TV franchise holders and the telephone companies (AT&T and Frontier) have overlapping video franchise territories.

³⁸ See <http://www.cpuc.ca.gov/General.aspx?id=2134>.



STATE OF CALIFORNIA VIDEO FRANCHISING State-Issued Video Franchise Territory



5. Introduction and Context For Analysis of SVF Holder Broadband Data

The following broadband section of this report analyzes data provided by state-issued video franchise holders and their affiliates.³⁹ The CPUC has previously published a variety of reports describing different aspects of the broadband market in California, which can be found on the Communications Division Reports and Presentation webpage at:

<http://www.cpuc.ca.gov/General.aspx?id=5655> These reports include:

- CalSPEED: California Mobile Broadband – An Assessment. Six semi-annual Mobile Broadband reports have been published, most recently, in Spring 2017. The Mobile Broadband Reports can be accessed at: <http://www.cpuc.ca.gov/General.aspx?id=1778>
- Order Instituting Investigation into the State of Competition Among Telecommunications Providers in California, and to Consider and Resolve Questions raised in the Limited Rehearing of Decision 08-09-042, D. 16-12-025 (December 8, 2016)⁴⁰, and
- The California Advanced Services Fund Report, Several CASF Annual Reports have been published, most recently in April 2017.⁴¹

Like the Federal Communications Commission (FCC), we collect and analyze broadband download speeds over the following speed tiers:

- 200 Kbps to 768 Kbps
- 768 Kbps to 1 Mbps
- 1 Mbps to 3 Mbps
- 3 Mbps to 6 Mbps
- 6 Mbps to 10 Mbps
- 10 Mbps to 25 Mbps
- 25 Mbps to 50 Mbps
- 50 Mbps to 100 Mbps
- 100 Mbps to 500 Mbps
- 500 Mbps to 1 Gbps
- 1 Gbps to 2 Gbps

³⁹ Although this Report does not include data from providers unaffiliated with state-issued franchise holders, the vast majority of broadband connections are associated with SVF holders. Examples of broadband provider data not included in this report are data from Local Exchange Carriers that are not video franchise holders, Wireless Internet Service Providers, and mobile service providers like Sprint, T-Mobile, US Cellular and Metro PCS.

⁴⁰ Available at <http://docs.cpuc.ca.gov/SearchRes.aspx?DocFormat=ALL&DocID=171031953>

⁴¹ Available at <http://www.cpuc.ca.gov/General.aspx?id=9226>

This Report focuses its analysis on several broadband speed categories. The category of service with downstream speed of 6 Mbps and upstream speed 1 Mbps or faster is a key benchmark in California, as this combination of speeds is identified by state statute as the minimum benchmark that the California Advanced Services Fund (CASF) uses to identify areas that can be eligible for CASF funding.⁴²

A second important speed benchmark relates to the FCC's "advanced telecommunications capability" definition of at least 25 Mbps downstream and 3 Mbps upstream.⁴³ While the FCC defines "advanced telecommunications capability" as 25/3 Mbps or greater, we have observed and report here on deployment and subscription at much higher speeds including 100 Mbps and 500 Mbps, which are becoming commonplace, although not universal.

While much of the change in the nature of broadband service is occurring at the fastest speeds (above 100 Mbps), analysis of the lower broadband speeds is still relevant as various IP-enabled services only require very low speeds to operate acceptably. For example, asymmetrical DSL providers can offer Voice over Internet Protocol (VoIP) services utilizing internet connections slower than 6 Mbps downstream.⁴⁴

Interconnected over-the-top (OTT) VoIP providers advertise that their service requires a "high-speed internet connection," which can include "any internet service".⁴⁵ Because lower speed tiers may support interconnected VoIP services, we continue to track their availability and use.

⁴² Assembly Bill 1665 changed the definition of "served broadband" that the California Advanced Services Fund (CASF) uses to a minimum of 6/1 Mbps from 6/1.5 Mbps, Cal. Pub. Util. Code §§ 281, 912.2, 914.7, signed into law by the Governor on October 15, 2017.

⁴³ In the FCC's 2015 Broadband Progress Report, it clarified that "(f)or simplicity, in this Report we sometimes refer to 'advanced telecommunications capability' as 'broadband', but we note that 'advanced telecommunications capability' has a unique definition in section 706 that differs from the term 'broadband' in other contexts. Thus, our discussion of broadband in this Report may not apply equally to discussions of broadband in other circumstances or in other proceedings. However, 'advanced telecommunications capability' is a statutory term with a definition that differs from the term 'broadband' as it is used in other contexts."

In re Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act, FCC 15-10, 30 FCCR 1375, ¶ 1, fn 1 (rel. Feb. 4, 2015) (2015 Broadband Progress Report).

⁴⁴ Though asymmetrical DSL service speed degrades as distance between the end-user and the serving wire center/remote terminal increases, a DSL provider may offer high quality VoIP over a slow broadband speed, such as at 3/1 Mbps or lower. Of note is that ISDN provided reliable high quality voice service using only 128 kbps.

⁴⁵ In an on-line chat between CPUC staff and a Vonage representative about whether there was a minimum speed requirement for its service to work well, the Vonage representative stated "you just need a high-speed Internet connection". The representative further stated that 1 Mbps downstream and 300 Kbps upstream, "will be more than enough. It will definitely work as long as you have the Internet service". This information was obtained during an on-line chat between Robert Wullenjohn and a Vonage service representative, www.vonage.com, May 3, 2016. Despite this assurance, such OTT services are affected by the vagaries of the underlying network through which the voice service is provided and are subject to greater quality variances than within a managed VoIP provider's network. Other considerations include the number of access applications being used for upload and download during VoIP sessions.

6. Analysis of Broadband Availability Data

A. Method Used to Produce Broadband Availability Data

The method of estimating the availability of SVF-provided broadband services begins with SVF holders providing data at specified granularities i.e., by “census block” for providers of fixed broadband services.⁴⁶ This data is validated by CPUC staff using other available commercial and government data. To validate reported availability data, staff also uses subscriber data to invalidate inaccurate availability data provided by SVF holders. For example, if a SVF holder reports that it offers broadband service in a census block, but they report no customers in that block, staff notifies the SVF holder and removes that census block from the served category. Similarly, consumer feedback to the CPUC detailing where service is not available from a particular provider invalidates the availability information received from SVF holders.

We describe below the limitations of collecting broadband data at the census block level. Note that these limitations do not apply to subscription and penetration analyses presented in subsequent sections of this report, as those analyses rely upon actual subscribership numbers as opposed to deployment data, which assumes that service is available to all households in a census block.

Despite improvements in granularity of the data collected over time, e.g. census block and tracts, rather than prior zip-code and state based data, there are still analytical limitations inherent in collecting data at anything beyond street address level. Further, because census blocks are a much more granular mapping unit than census tracts, they provide a much better picture of broadband availability than census tracts do. However, the unavoidable fact of aggregation away from address level data is the introduction of a level of imprecision into the availability analysis.⁴⁷

Since it is impossible to know precisely where within each census block service is being offered, we can only classify census blocks as being served if at least one broadband provider offers service to any part of the census block. This naturally can result in an overstatement of the number of served households, as it is quite possible that there are households located in areas of a served census block that no provider actually serves.

⁴⁶ Mobile service is reported using geographic information system “shapefiles,” which designate a polygon within which service is provided, rather than by individual census blocks.

⁴⁷ The FCC has also wrestled with the appropriate level of granularity to measure competition, most recently in its *Special Access/Business Data Services* decision. *In re Business Data Services, et al.*, 31 FCC Rec 4723 (May 2, 2016) at ¶ 63 and Figure 5, and ¶ 192 (distinguishing between census block and building-level data).

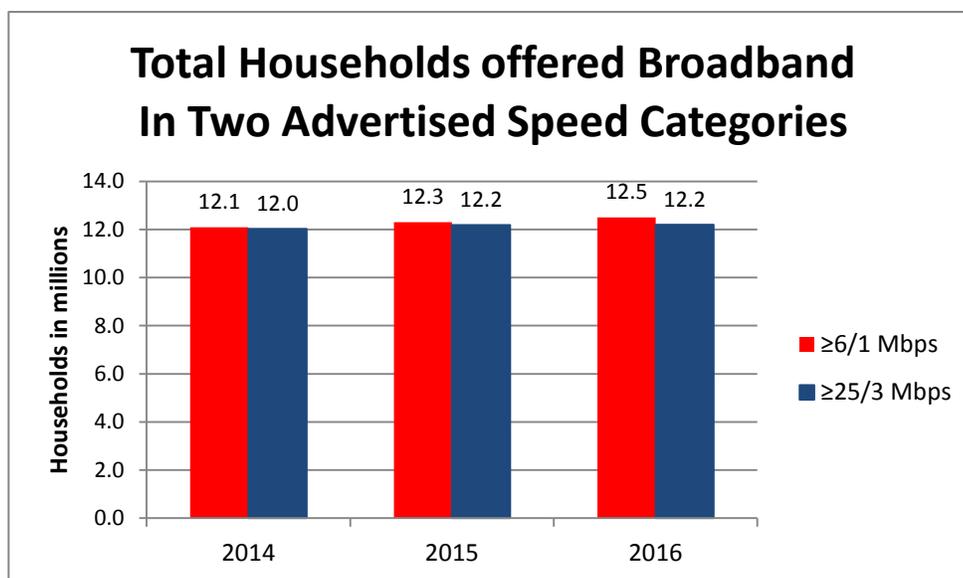
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When drawing conclusions from this Report, in addition to the data limitations described above, it is important to keep in mind that only services offered by SVF holders and their locally-franchised affiliates are reflected. Broadband and video services offered by local independent wireline providers and wireless and satellite ISPs are, by definition, excluded. A more detailed and technical discussion of these topics can be found in Appendix B on pages 52 through 64.

B. Broadband Availability

The bar chart below shows that between 2014 and 2016 there was very little change in the total number of households having access to broadband at two key benchmarks.⁴⁸ During 2016, the total number of households offered broadband at 6/1 Mbps and faster increased by 3.3%, while the number of households offered broadband at 25/3 and faster increased by 1.4%.

There were 13.02 million total households in the state in 2016; 95.9% were offered broadband at 6/1 Mbps and 93.6% were offered broadband at 25/3 Mbps.



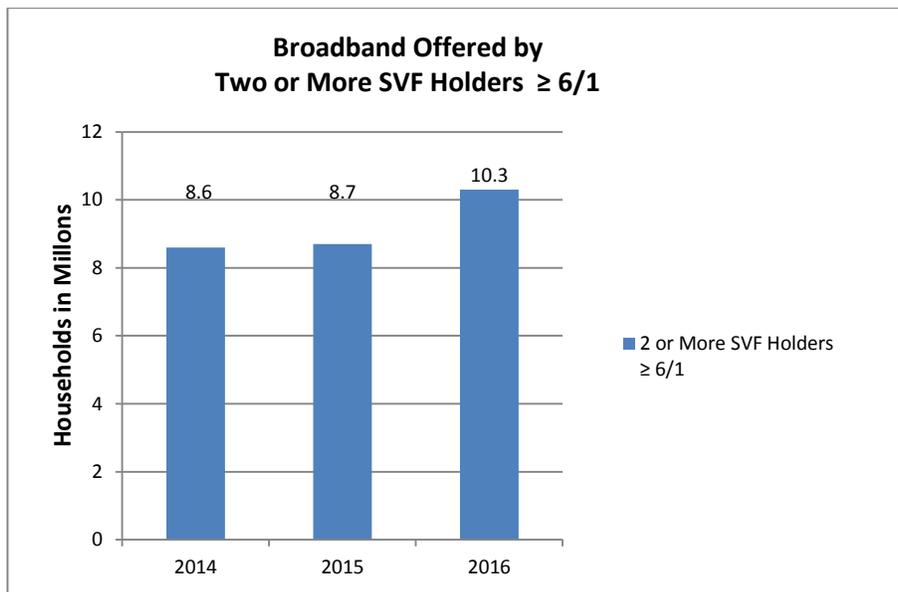
These metrics include households that were offered broadband by only one SVF holder as well as households that were offered broadband by multiple SVF holders.

⁴⁸ While this growth represents “very little change” statewide, even the gain of 132,199 households with 6/1 Mbps broadband available in 2016 is significant with regard to the number of remaining unserved households needed to be served to meet CASF’s 98% goal.

C. Broadband Choice: Households Offered $\geq 6/1$ Mbps Broadband Service by Two or More SVF Providers Increased by 18% to 79%.

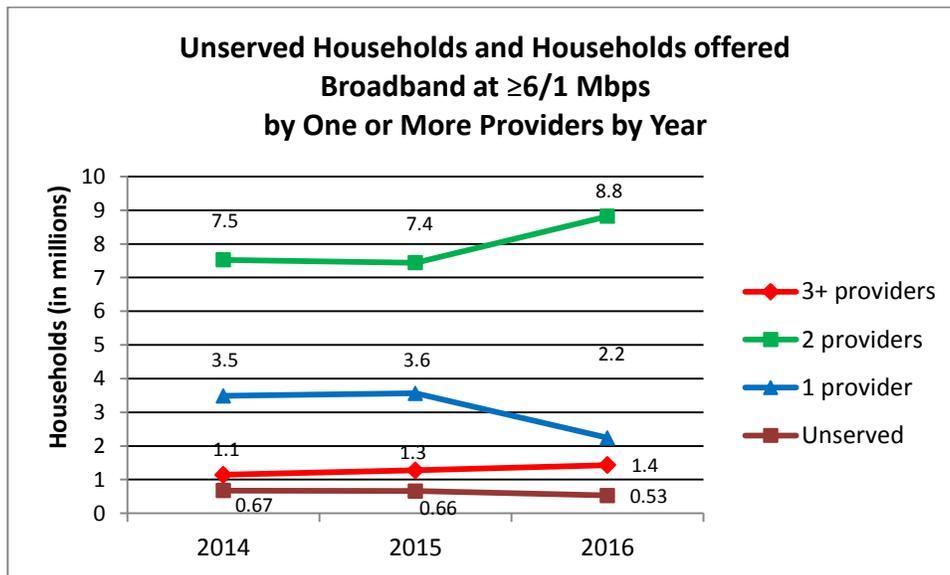
The bar chart below shows the number of households located in census blocks in which two or more SVF holders offered broadband in the $\geq 6/1$ speed category in 2016.

While 79.2% percent of households in the state (10.3 million) were offered broadband by two or more SVF holders at minimum advertised speeds of 6/1, 17.2% of households (2.2 million) were offered wireline broadband service by a single SVF holder at that minimum CASF “served” advertised speed category of $\geq 6/1$ Mbps in 2016. In 2016, 4.1% (530,041) of households had no service available at this 6/1 Mbps or faster speed category, compared with 5.2% (670,000) in 2014.⁴⁹



⁴⁹ Served census blocks may also have providers with underserved speeds and are not counted. Unserved areas may also contain underserved.

The line graph below shows that during 2016 the number of households offered broadband at $\geq 6/1$ Mbps by two SVF holders increased by 18.5% (from 7.4 to 8.8 million). The number of households offered broadband at $\geq 6/1$ Mbps by only one SVF holder decreased by 37.2% (from 3.6 to 2.2 million), and the number of unserved households decreased by 20% (from 662,240 to 530,041).

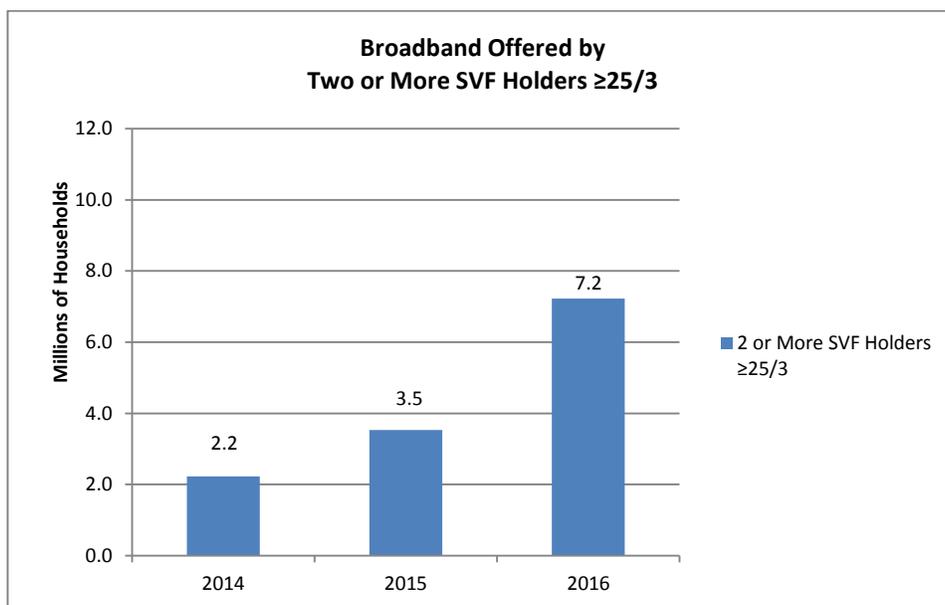


D. Households Offered $\geq 25/3$ Mbps Broadband by Two or More SVF Holders More Than Doubled in 2016 to 55.3%

The bar chart below shows the number of households located in census blocks in which two or more SVF holders offered broadband in the $\geq 25/3$ Mbps speed category in 2016.

During 2016 more than twice as many households had a choice of two or more SVF holders offering them broadband at minimum advertised speeds of 25/3 Mbps or faster when compared with the previous year (3.5 M in 2015 vs. 7.2 M in 2016). This was an increase of 105.7%.

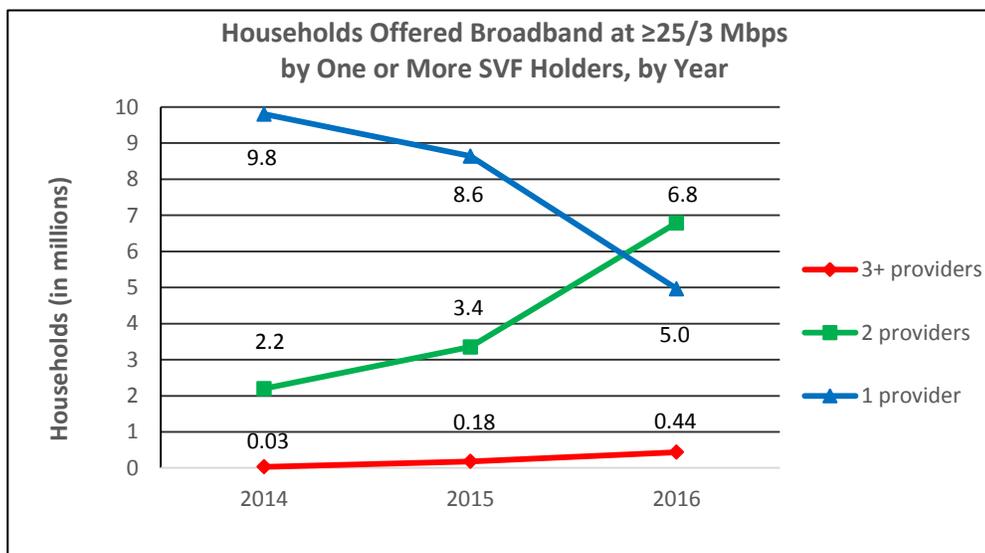
While 55.5% percent of households in the state (7.2 million) were offered broadband by two or more SVF holders at minimum advertised speeds of 25/3 Mbps, 38.1% of households (5.0 million) were offered wireline broadband service by a single SVF holder at an advertised speed of $\geq 25/3$ Mbps in 2016. In 2016, 6.4% (829,420) of households were unserved at this 23/3 Mbps or faster speed category.⁵⁰



⁵⁰ Served census blocks may also have providers with underserved speeds and are not counted. Unserved areas may also contain underserved.

The line graph below shows that while the number of households offered broadband at minimum advertised speeds of 25/3 by two or more SVF holders increased by 100.0% in 2016 (from 3.6 to 7.2 million), the number of households with only one provider fell by 41.9% (from 8.6 to 5.0 million).

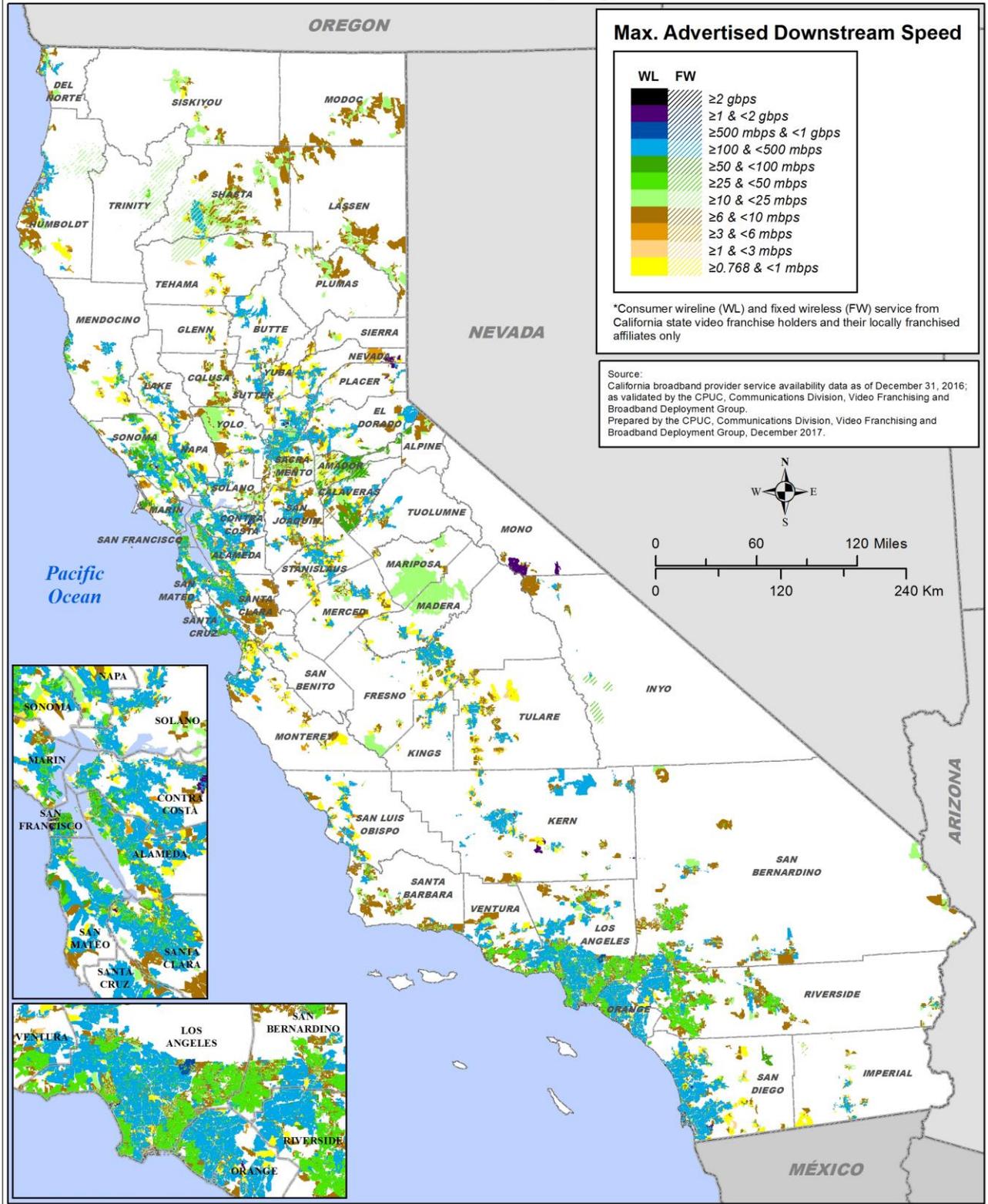
Further, during 2016 the number of households offered broadband at $\geq 25/3$ Mbps by one SVF holder decreased by 41.8% (from 8.6 to 5.0 million), and the number of unserved households was 6.4% (829,420).



The map on the next page shows broadband availability by maximum advertised downstream speed available in census blocks across the state. The areas with light browns and yellow colors have maximum advertised broadband speeds less than 6 Mbps downstream available and are considered to be unserved by broadband. These unserved areas are located in more than half the counties in the state, including: Amador, Butte, Calaveras, El Dorado, Fresno, Humboldt, Imperial, Kern, Madera, rural Marin, Merced, Mendocino, Monterey, Nevada, Orange, Placer, Plumas, Sacramento, San Diego, San Joaquin, San Luis Obispo Counties Sierra, Siskiyou, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Ventura, and Yuba.



STATE OF CALIFORNIA VIDEO FRANCHISING Broadband Availability* by Census Block



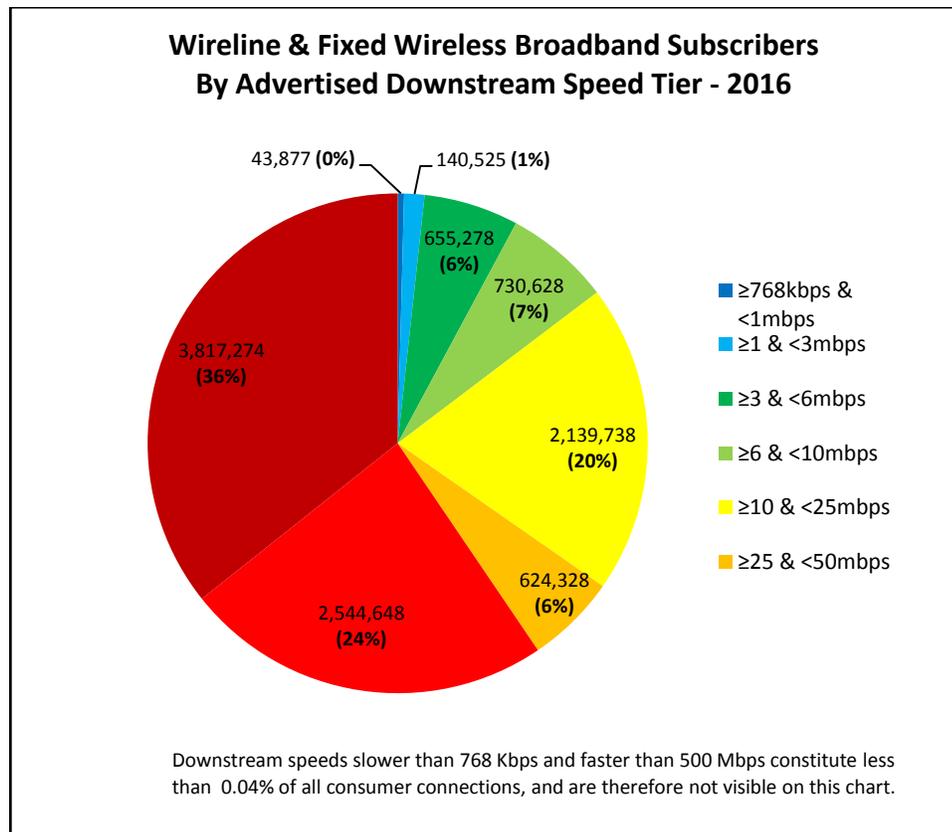
7. Analysis of Broadband Subscriber Data

This section analyzes the broadband subscriber data in a variety of different ways. The purpose of providing these analyses is to show the data in ways that may help policy makers see meaningful trends.

A. Percentage Breakdown of 2016 Broadband Subscribers by Downstream Speed Tiers

The pie chart below divides the 10.7 million households in CA that subscribed to wireline broadband provided by SVF holders into eight advertised downstream speed tiers. As with our analysis of deployment data, we group these individual speed tiers into various speed categories in the analysis that follows to help policy makers see significant trends in the data over time.

Subscribers to two of the fastest individual downstream speed tiers (≥ 50 & < 100 Mbps and ≥ 100 & < 500 Mbps) constituted 60% (6.4 million) of all of the subscribers at the end of 2016, compared with 53.5% in 2015. In contrast, only 8% (0.84 million) subscribed to speeds of 6 Mbps or slower in 2016.

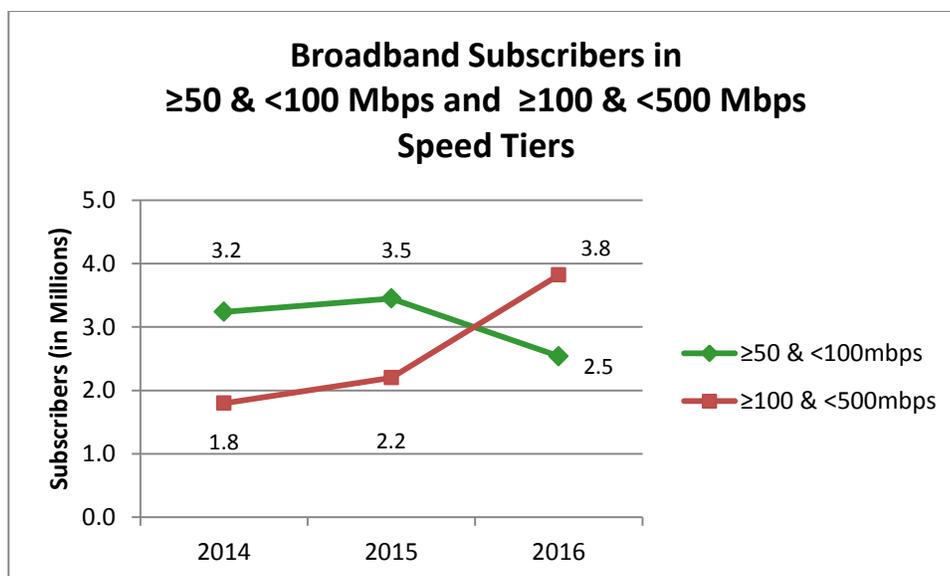


B. Subscribers Continue to Move to Faster Speed Tiers

The 100 Mbps and faster speed category has been experiencing phenomenal growth since 2013. Between 2013 and 2016, the number of subscribers at speeds of at least 100 Mbps and faster increased by 874% to 3.8 million households. At the end of 2013, only 39,160 households subscribed to broadband 100 Mbps and faster. Two years later in 2015, 2.2 million subscribed at speeds faster than 100 Mbps. At the end of 2016, 3.8 million households subscribed to broadband faster than 100 Mbps.

The red line in the graph below shows that during 2016, the number of subscribers to broadband in the advertised downstream speed tier of ≥ 100 Mbps & < 500 Mbps increased by 73% (1.7 million) to 3.8 million subscribers. During the two year period between 2014 and 2016, the number of subscribers to broadband in this speed tier increased by 117% (2.1 million).

These increases are primarily due to the cable companies like Comcast, Charter and Cox upgrading their DOCSIS systems, and choosing to offer significantly faster broadband speeds.

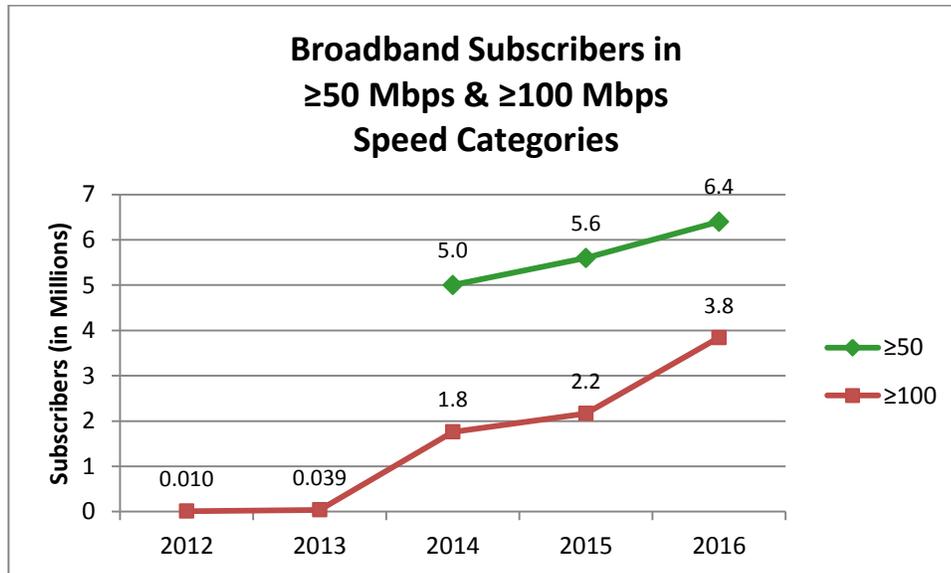


Meanwhile, the green line in the graph above shows that during 2016, the number of subscribers to broadband in the slower advertised downstream speed tier of ≥ 50 & < 100 Mbps decreased by 29% to 2.5 million.

When combined together, subscribers to both of the speed tiers shown in the graph above constituted 60% (6.4 million) of all of the subscribers at the end of 2016, compared with 53.5% in 2015.

The green line⁵¹ in the line graph below shows that during 2016, the number of subscribers to broadband in the advertised downstream speed tier of ≥ 50 mbps speed category increased by 13.7% (768,922) to 6.4 million subscribers. Meanwhile, during 2016, the number of subscribers to the ≥ 100 mbps speed category increased by 73% (1.7 million).

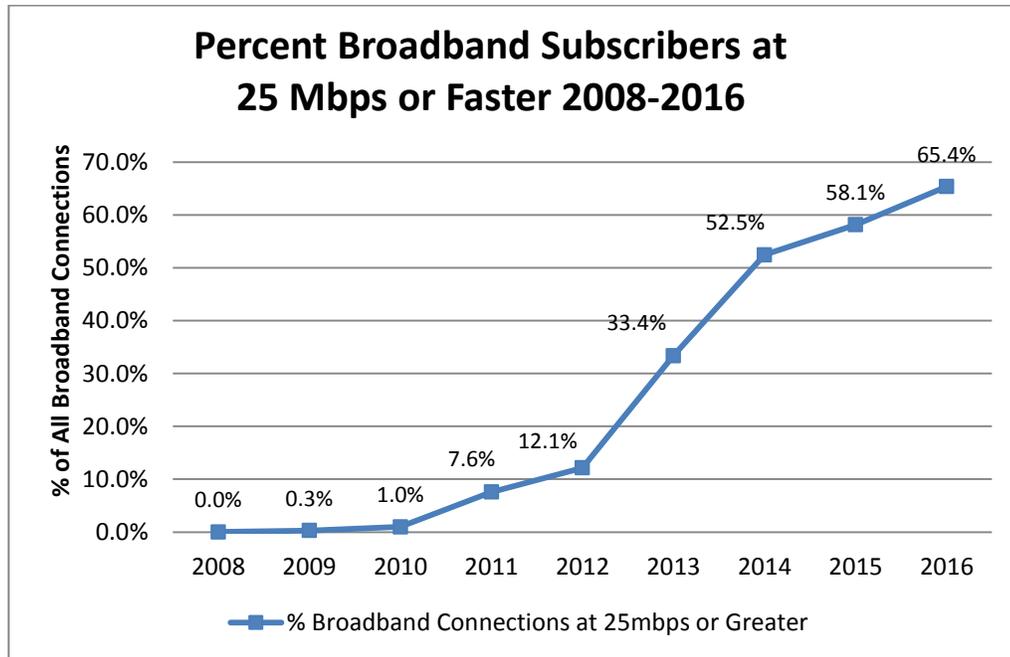
During the two year period between 2014 and 2016, the number of subscribers to broadband in the ≥ 50 mbps speed category increased by 27.7% (1.3 million).



⁵¹ We do not have data for the ≥ 50 mbps speed category before 2014.

C. In 2016, 65.4% of Subscribers to Broadband Subscribed to Speeds \geq 25 Mbps

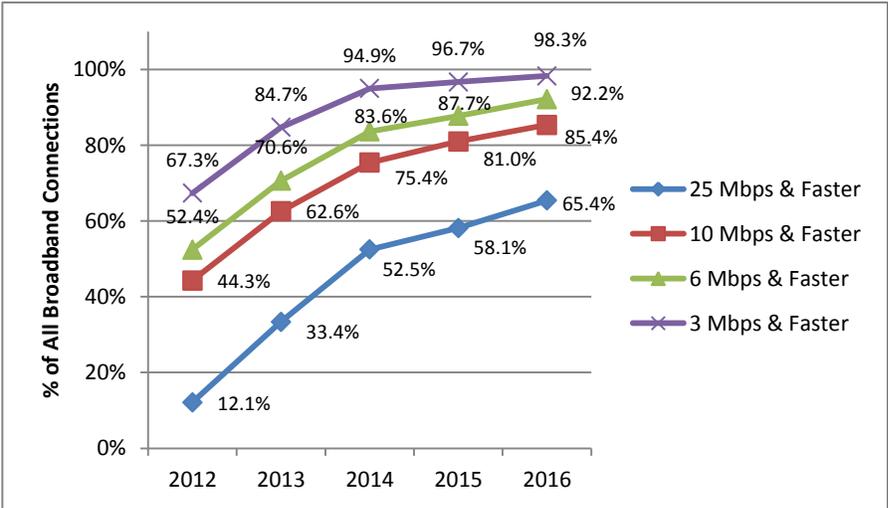
The line graph below shows that between 2012 and 2016, the percentage of broadband subscribers with advertised downstream speeds of 25 Mbps or faster increased by 440% (from 12.1% to 65.4%). While the percentage of broadband subscribers that subscribed to speeds at 25 Mbps or faster was 65.4% in 2016, the percentage of all households in the state that subscribed to broadband (penetration rate) at downstream speeds of 25 Mbps or faster, was 53.8% in 2016. See Section 7e on page 34 for the complete table of penetration rates.



The four lines in the graph below contrast the percentage of subscribers to 25 Mbps and faster service with the percentage of subscribers to three slower broadband speed categories.

The slopes of the lines in the graph below show that the fastest speed category (25 Mbps & faster) continues to have a higher growth rate than the slower speed categories. However each of the slower speed categories have significantly more subscribers than the 25 Mbps and faster speed category.

**Broadband Subscribers in California
Divided into Four Different speed Categories Over Time**



D. Subscribership to the 25 Mbps and Faster Downstream Speed Category Grew by 502% Between 2012 and 2016, While the 6 Mbps Downstream Speed Category Almost Doubled, Growing by 96%

The table below shows that the number of households subscribing to wireline broadband from SVF holders at minimum advertised downstream speeds equal to or faster than 100 Mbps increased by 38,743% (from 9,888 to 3.8 million) between 2012 and 2016.

The number of households subscribing to wireline broadband from SVF holders at minimum advertised downstream speeds equal to or faster than 25 Mbps increased by 14.9% during 2016, twice the growth rate for the 10 Mbps and 6 Mbps speed categories. This is a significant decrease from the 2013-2014, growth rate of 63% for the 25 Mbps minimum advertised downstream speed category.

Wireline Broadband Subscribers by Minimum Advertised Downstream Speed Category

Speed Category	2012	2013	2014	2015	2016	2013-14 Growth	2014-15 Growth	2015-16 Growth	2012-16 Growth
BB Subscribers to Download Speeds Equal to or Faster than 100 Mbps	9,888	39,160	1,760,873	2,167,631	3,840,840	4,397%	23.1%	77.2%	38,743%
BB Subscribers to Download Speeds Equal to or Faster than 25 Mbps	1,163,506	3,278,810	5,349,069	6,102,438	7,009,816	63.1%	14.1%	14.9%	502.5%
BB Subscribers to Download Speeds Equal to or Faster than 10 Mbps	4,242,231	6,147,350	7,688,548	8,498,107	9,149,554	25.1%	10.5%	7.7%	115.7%
BB Subscribers to Download Speeds Equal to or Faster than 6 Mbps	5,023,733	6,937,468	8,526,423	9,206,558	9,880,182	22.9%	8.0%	7.3%	96.7%
BB Subscribers to Download Speeds Equal to or Faster than 3 Mbps	6,451,286	8,322,211	9,681,186	10,148,205	10,535,460	16.3%	4.8%	3.8%	63.3%
BB Subscribers to Download Speeds Equal to or Faster than 200 kbps	9,582,393	9,825,394	10,196,517	10,494,659	10,695,222	3.8%	2.9%	1.9%	11.6%
Total Households in California	12,675,876	12,731,223	12,830,035	12,941,948	13,020,413	0.8%	0.9%	0.6%	2.7%

E. The Penetration Rate of California Households Subscribing to Broadband at Downstream Speeds of 100 Mbps or Faster Increased by 76.6% During 2016

The table below shows that the penetration rate⁵² for the 100 Mbps and faster speed category was 29.5% in 2016, 76.6% higher than in 2015. Meanwhile, the penetration rate for the 25 Mbps and faster minimum advertised downstream speed category was 53.8% in 2016, 14% higher than in 2015. The penetration rates for the slowest minimum advertised downstream speed category of 200 kbps and faster was 83%, growing 2.7% in 2016.

The table below shows that the penetration rate for the 6 Mbps minimum advertised downstream speed category has grown by 91% from 2012 to 2016 (from 39.6% to 75.8%).

**Wireline Broadband Penetration Rates In
Five Minimum Advertised Download Speed Categories**

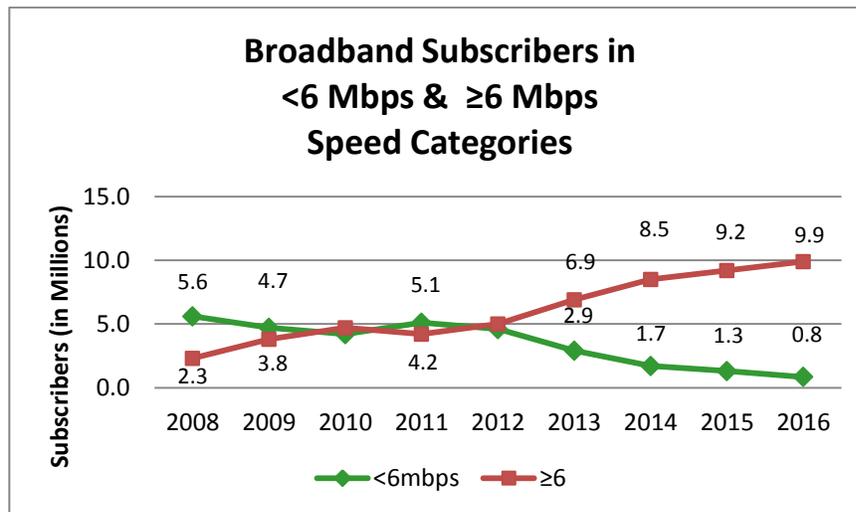
Download Speed Category	Penetration Rates in Each Year					Penetration Growth Rates			
	2012	2013	2014	2015	2016	2013-2014 Growth	2014-2015 Growth	2015-2016 Growth	2012-2016 Growth
100 Mbps or Faster	0.1%	0.3%	13.7%	16.7%	29.5%	4,466%	21.9%	76.6%	29,400%
25 Mbps or Faster	9.2%	25.8%	41.7%	47.2%	53.8%	61.9%	13.1%	14.0%	484.8%
10 Mbps or Faster	33.5%	48.3%	59.9%	65.7%	70.2%	24.1%	9.6%	6.8%	109.6%
6 Mbps or Faster	39.6%	54.5%	66.5%	71.1%	75.8%	22.0%	7.0%	6.6%	91.4%
3 Mbps or Faster	50.9%	65.4%	75.5%	78.4%	80.9%	15.4%	3.8%	3.2%	58.9%
200 kbps or Faster	75.6%	77.2%	79.5%	81.1%	82.1%	3.0%	2.0%	2.7%	10.2%
Total Households in California	12,675,876	12,731,223	12,830,035	12,941,948	13,020,413	0.9%	0.8%	0.6%	2%

⁵² Penetration rates are determined by dividing the number of subscribers to a particular advertised speed category or speed tier by the number of households in CA; 13,020,413 in 2016.

F. The Slowest Speed Categories Lost Significant Numbers of Subscribers, While Faster Speed Categories Gained Subscribers

The table and line graph below show different ways of analyzing the same subscriber data that was presented in the previous sections.

The graph and table below show that between 2012 and 2016 the number of households subscribing to broadband in the ≥ 6 Mbps speed category increased by 96.7%, and during 2016 increased by 8%. Meanwhile the under 6 Mbps category decreased by 81.6% between 2012 and 2016 and during 2016 decreased by 34.8%.

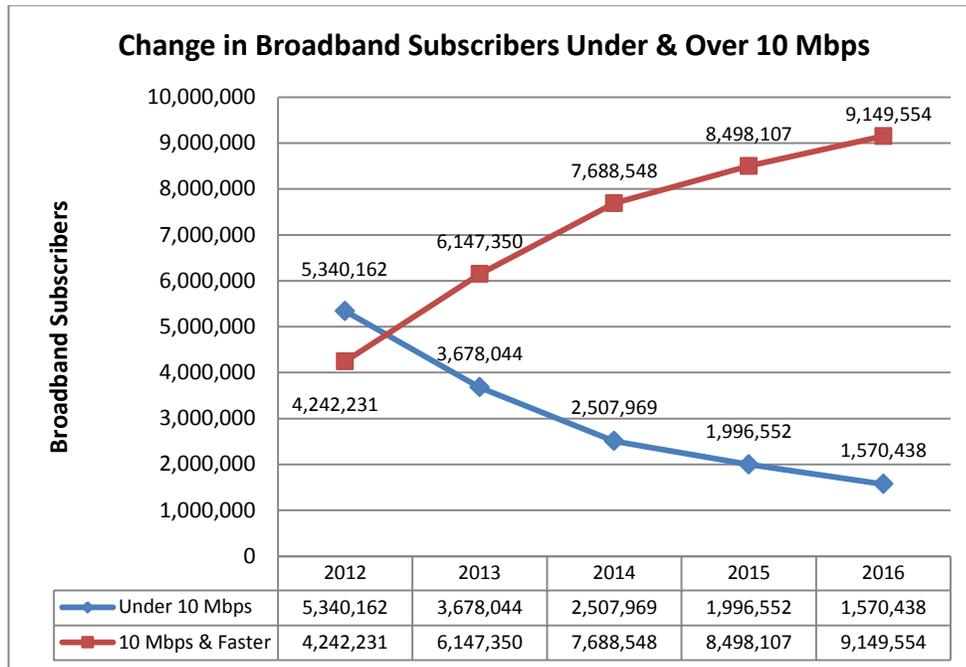


The table below shows that between 2012 and 2016, the number of broadband subscribers in the minimum advertised downstream speed category “Under 3 Mbps” fell by 94.1%, while the number of broadband subscribers in the minimum advertised downstream speed category “25 Mbps or faster,” increased by 539%.

Broadband Subscribers (in Millions)

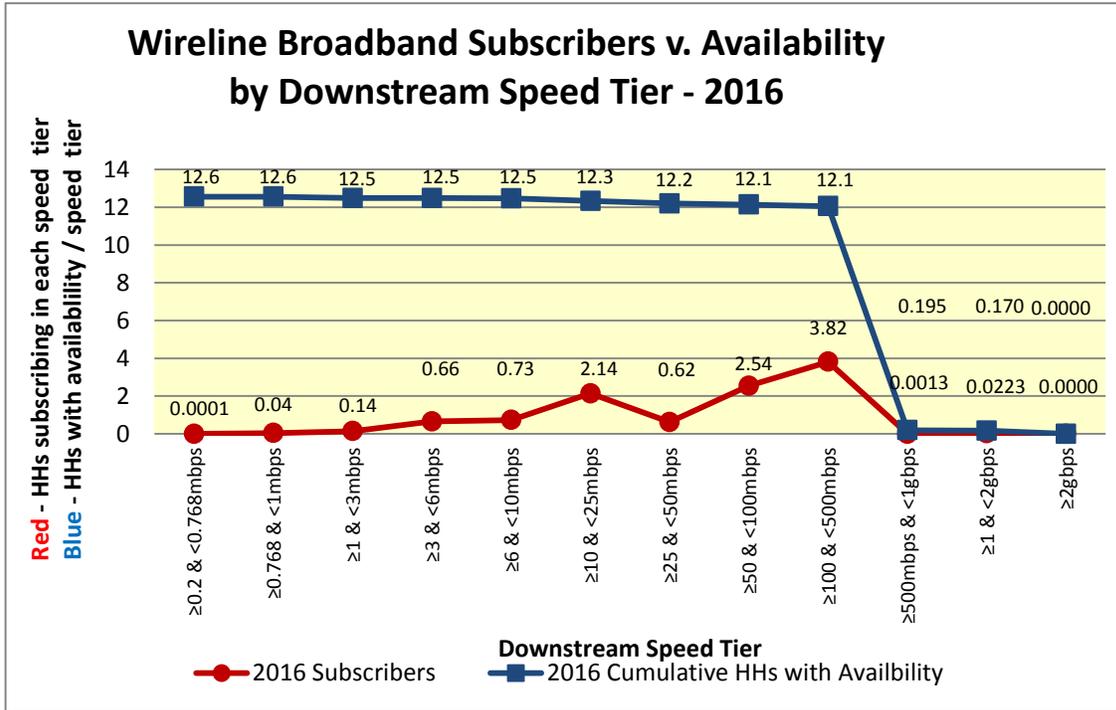
Minimum Advertised Broadband Downstream Speed Category	2012	2013	2014	2015	2016	% Change 2014-2015	% Change 2015-2016	% Change 2012-2016
Under 3 Mbps	3.1	1.5	0.5	0.4	0.2	-32.8%	-46.7%	-94.1%
Under 6 Mbps	4.6	2.9	1.7	1.3	0.8	-22.9%	-34.8%	-81.6%
Under 10 Mbps	5.3	3.7	2.5	2.0	1.6	-20.4%	-21.3%	-70.6%
6 Mbps & Faster	5.0	6.9	8.5	9.2	9.9	8.0%	7.3%	96.7%
10 Mbps & Faster	4.2	6.1	7.7	8.5	9.1	10.5%	7.7%	115.7%
25 Mbps & Faster	1.1	3.3	5.3	6.1	7.0	14.1%	14.9%	539.4%

Both the table on the previous page and graph below show that between 2012 and 2016, the number of households subscribing to broadband in the 10 Mbps and faster speed category increased by 115% to 9.1 million, and during 2016 increased by 7.7%. Meanwhile, the table the under 6 Mbps speed category decreased by 81.6% between 2012 and 2016, and during 2016 decreased by 34.8%.



**G. The Broadband Availability / Subscription Gap:
Broadband Availability Significantly Exceeds Subscribership
For Each Advertised Download Speed Tier**

The gap between the red and blue points in the graph below, illustrates the gap between broadband availability and subscribers in each individual download speed tier.



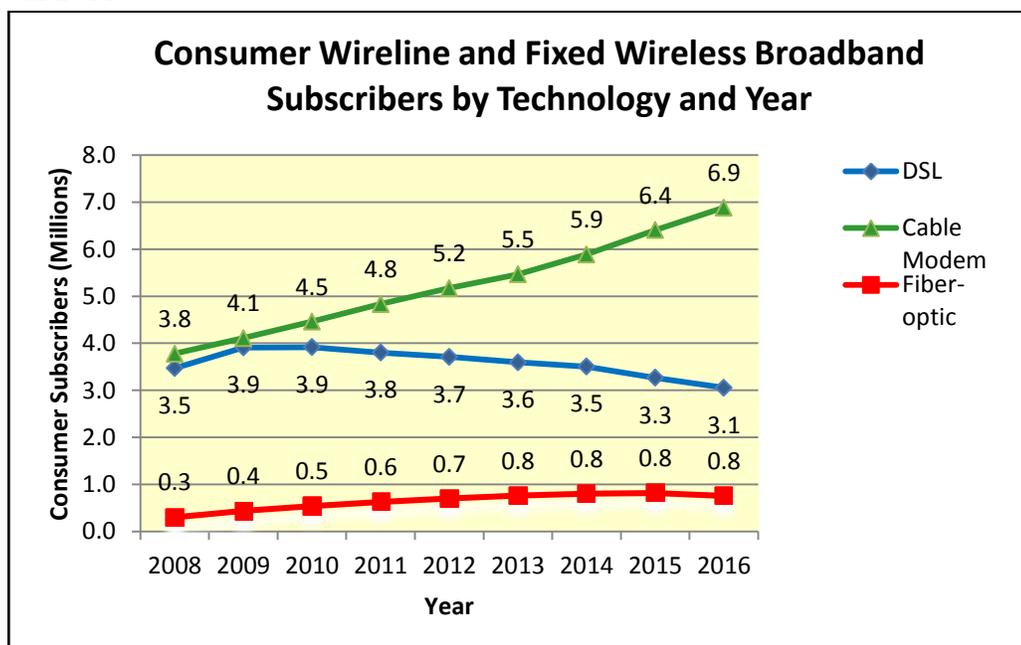
H. Cable Modem Technology is Used by Twice as Many Subscribers as DSL and the Difference Is Widening

The line graph below shows how the different technologies' share of the market have changed over time since 2008.⁵³

Cable modems continued to be the broadband wireline technology most frequently chosen by residential customers at the end of 2016. Cable modems were used by 64% (6.9 million) of the residential households to subscribe to broadband, up from 61% (6.4 million) in 2015, 58% in 2014, 56% in 2013 and 52% (4.8 million) in 2011. Between 2008 and 2016, cable modem usage has increased by 81.6% from 3.8 to 6.9 million.

Digital Subscriber Line (DSL) technology peaked in 2010 at 44% (3.9 million) subscribers. Since then, DSL has steadily declined to a low of 28.9% (3.1 million) of broadband subscribers in 2016. DSL technology typically is used by telephone companies to deploy broadband over their existing copper plant. U-Verse uses a version of DSL to provide data at speeds over 25 Mbps.

Fiber-to-the-home (FTTH) technology provided broadband to 7.1% percent of residential subscribers in California in 2016. FTTH's share of broadband subscribers declined from a peak of 7.8% in 2015, compared with 7.3% in 2012, 6% in 2010 and 4% in 2008. Fixed wireless technology provided broadband to 1,774 subscribers in California in 2014, up from 754 in 2014 and 504 in 2011.



⁵³ Except for 2008, synchronous DSL, other copper wireline, and fixed wireless subscribers have never accounted for more than 0.5% of total consumer subscribers, and are therefore not visible on the graph above.

8. Employment Reporting Required Under DIVCA

DIVCA requires the California Public Utilities Commission (CPUC) to collect employment information from state-issued video franchises employing more than 750 full-time employees in California. The CPUC is required to post the information on its website and report it to the Assembly Committee on Utilities and Commerce and the Senate Committee on Energy, Utilities and Communications annually.⁵⁴

This is the seventh report on SVF employment data.⁵⁵ The data in this Report reflects data as of December 31, 2016. Five state-issued video franchise holders reported that they employed more than 750 full-time employees in the State of California. The franchise holders were AT&T California (AT&T), Frontier, Comcast, Cox and Charter.⁵⁶

The following information is required to be reported to the CPUC by the qualifying SVFs:

- Number of California residents employed on a full-time basis
- Percentage of the state-issued video franchise holder's total domestic workforce that resides in California
- Employees categorized by occupation
- Average wages and salaries (including benefits) categorized by occupation
- Number of out-of-state residents employed by independent contractors, which personally provide services to the franchise holder, unless the holder is contractually prohibited from disclosing this information to the public
- Forecast of the number of net new positions expected to be created during the next year (2017).

As in the past, of the 54 state-issued video franchise holders, the following five had more than 750 full-time employees in California and were therefore required to report employment data for 2016:

- AT&T California (AT&T)
- Frontier
- Comcast
- Charter Communications
- Cox Communications

The employees of state-issued video franchise holders that are described in this Report may be involved in wireline telephone, video, and/or data services. DIVCA does not require franchise

⁵⁴ Cal. Pub. Util. Code §§ 914.4, 5920.

⁵⁵ This Report and previous DIVCA Employment Reports, which were published as stand-alone documents can be found at this link on the CPUC website: <http://www.cpuc.ca.gov/General.aspx?id=2241>

⁵⁶ In prior years, six companies reported. In 2016, Charter merged with Time Warner. As a result, five companies reported for 2016.

holders to categorize their employees by the type of technology they work on. Video programming operations may include existing local affiliates of state-issued video franchise holders. AT&T and Frontier's employment numbers exclude data from some of their related operations, as detailed below.

- Frontier's employment submission **includes** the total number of employees in its wireline telephone, DSL and FiOS data and video operations.
- AT&T California's employment submission **includes** their wireline telephone, U-verse video, and DSL operations, but **excludes** AT&T's wireless operations.

A. Total Employees

The tables below show the change in the number of employees of state video franchise (SVF) holders between 2007 and 2016. The bar chart on the next page shows the number of employees each SVF holder reported at the end of 2007 and 2016.

The tables below show that the five reporting holders of state-issued video franchises, reported a total of 36,815 employees in California, as of December 31, 2016. Between 2007 and 2016, the total number of employees declined by 35.1% (-19,933).

In aggregate, the total number of people employed by all the SVF holders declined by 0.8% (-284) during 2016. During 2016, Comcast, Frontier, and Charter increased the number of their California-based employees. Comcast's increased by 82 (1.8%) to 4572 employees, Frontier increased by 313 (8.6%) to 3,936 employees, and Charter/Time Warner combined increased by 510 (5%) over their separate numbers in previous years, to 9,968 employees.

Total Employees by SVF Holders 2007 – 2016

SVF Holder	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AT&T	29,509	25,881	24,751	21,447	20,481	19,360	19,595	18,728	17,642	16,615
Frontier	8,110	7,070	6,242	5,804	5,409	4,951	4,399	4,133	3,623	3,936
Comcast	7,167	7,290	6,608	6,221	5,943	4,332	4,166	4,461	4,490	4,572
Cox	3,243	3,321	3,121	3,065	2,751	2,800	2,486	1,842	1,886	1,724
Charter	1,398	1,341	1,240	1,312	1,175	1,456	1,527	1,492	1,504	9,968
Time Warner	7,321	7,900	6,409	6,038	5,960	7,017	7,382	7,714	7,954	N/A
Total	56,748	52,803	48,371	43,887	41,719	39,916	39,555	38,370	37,099	36,815

Percentage Change of Total Employees by SVF Holder Between 2007 and 2016

SVF Holder	% Change 2013-2014	% Change 2014-2015	% Change 2015-2016	% Change 2007-2011	% Change 2007-2015	% Change 2007-2016
AT&T	-4.4%	-5.8%	-5.8%	-30.6%	-40.2%	-43.7%
Frontier	-6.0%	-12.3%	8.6%	-33.3%	-55.3%	-51.5%
Comcast	7.1%	0.7%	1.8%	-17.1%	-37.4%	-36.2%
Cox	-25.9%	2.4%	-8.6%	-15.2%	-41.8%	-46.8%
Charter	-2.3%	0.8%	563%	-16.0%	7.6%	5%
Time Warner	4.5%	3.1%	N/A	-18.6%	8.6%	N/A ⁵⁷
Total	-3.0%	-3.3%	-0.8%	-26.5%	-34.6%	-35.1%

⁵⁷ Because Time Warner was acquired by Charter during 2016, Time Warner did not report for 2016.

B. Total Employees by Occupation

Most SVF holders that are required to report employee information under DIVCA, provide the CPUC with copies of their U.S Equal Opportunity Commission EEO-1 filings. The CPUC uses the same categories listed in these filings to show the statistics below. However, some similar categories have been grouped together for the purposes of this report. See Appendix D (pages 65-66) for a detailed description of the job classifications used in this Report.

The table below categorizes the 36,815 employees who were employed by the five reporting holders at the end of 2016, into eight different occupational categories. Skilled craft workers made up the largest category of workers, for all of the franchise holders.

Total CA Employees by Occupation - 2016

Occupational Categories	AT&T	Frontier	Comcast	Cox	Charter	Total
Exec / Sr. Leaders	0	10	12	0	4	26
Officials / Managers	668	17	618	281	1,221	2,805
Professionals	527	88	252	144	667	1,678
Technicians	4,505	232	568	184	275	5,764
Sales / Associates	315	310	516	308	2,245	3,694
Office / Clerical	3,779	0	698	240	2,355	7,072
Skilled Crafts	6,821	3,279	1,783	529	3,189	15,601
Oper/Labor/Serv	0	0	125	38	12	175
Total	16,615	3,936	4,572	1,724	9,968	36,815

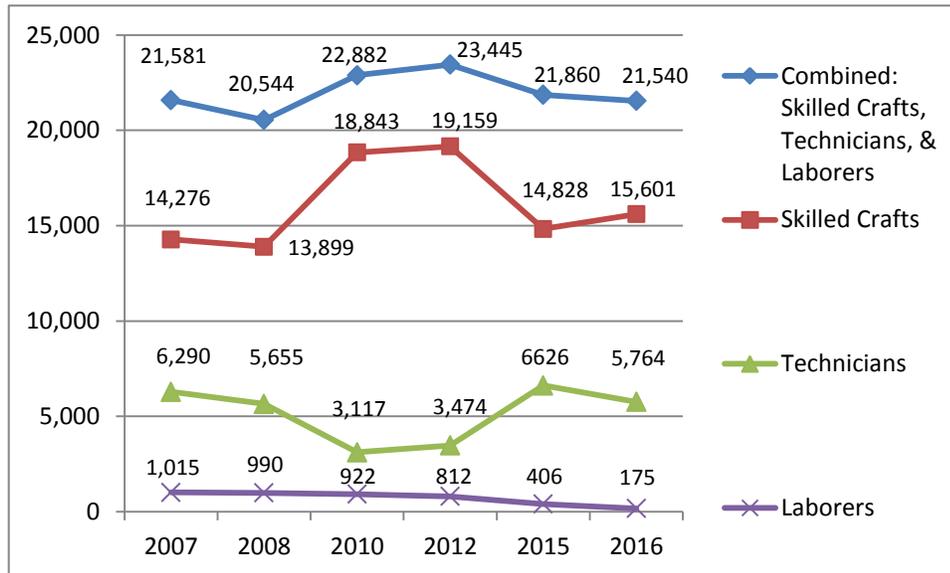
C. Network Infrastructure Installation and Maintenance Employees Between 2007 and 2016 by Occupational Classification

This section of the report is a longitudinal analysis of the number of people employed by the six largest SVF holders to install and maintain their network infrastructure. The line graphs on the next page show the same information for AT&T and Verizon.

The line graph below shows the total number of employees reported by all six SVF holders, for the skilled crafts, technician and laborer occupational classifications for 2007, 2008, 2010, 2012, 2015 and the five largest SVF holders in 2016. The blue line on top is a combined total of all three occupational classifications.

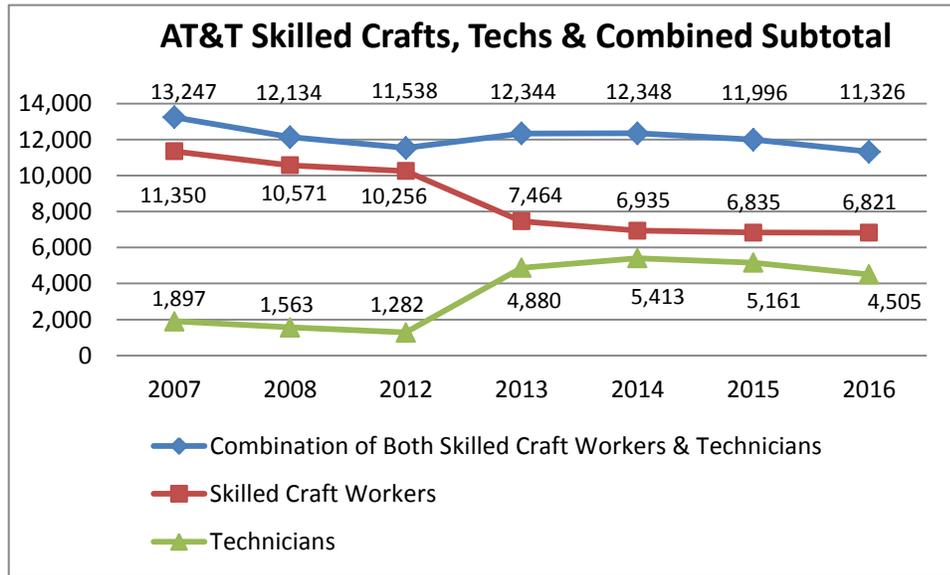
During 2016, the total number of technicians, skilled crafts and laborer employees declined by 1.5% (320). That is only 41 employees fewer than were employed by the six reporting SVF holders in 2007. At the end of 2016, there were 9.3% (1,325) more skilled craft workers than in 2007, while the number of technicians declined by 8.3% (526) since 2007.

Total Number of Technicians, Skilled Crafts and Laborers and All Three Combined Over Time: 2007 – 2016



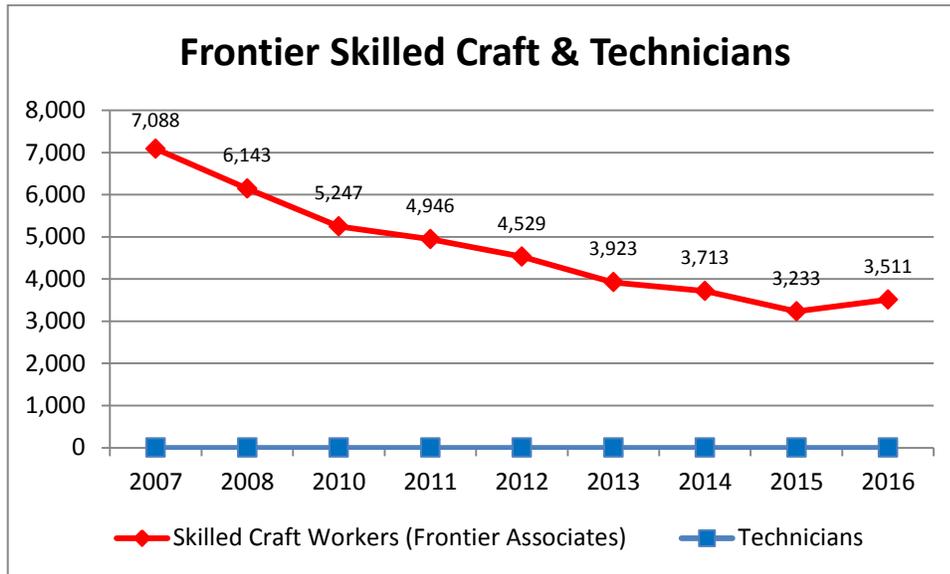
The next two pages contain line graphs showing the number of employees that AT&T and Frontier reported in the skilled crafts, technicians and laborer occupational categories.

The line graph below shows that during 2016 the number of AT&T skilled crafts workers fell by only 14 employees, while the number of technicians fell by 14.6% (656). Between 2007 and the end of 2016 the combined number of AT&T skilled crafts and technical employees fell by 14.5% (1,921) to 11,326. During that time, the number of skilled crafts employees fell by 39.9% (4,529), while the number of technicians increased by 137% (2,608).



Between the end of 2012 and the end of 2013 (during 2013), the number of skilled craft workers reported by AT&T fell by 27.2% (2,792) to 7,464. Simultaneously, the number of technicians employed by AT&T during the same time period almost tripled, (3,598) for a net increase of 806 skilled craft workers and technicians during 2013. AT&T reported that the main reason for these changes is that “during 2013 the ‘Premise Technician’ title was moved from the Skilled Crafts to the “Technicians” category, as part of a regular review of job classifications.”

The line graph below shows that during 2016, the number of Frontier/Skilled Crafts/Technical employees increased by 8.6% (278). Between 2007 and 2016, the number decreased by 50.5% (From 7,088 to 3,511).



D. Number of Out-of-State Residents Employed by Independent Contractors

None of the five companies reported out-of-state residents employed by independent contractors, companies, and consultants hired by the holder.

E. Forecasts of Job Creation

None of the five SVF holders provided forecasts for job creation in 2018.

Appendix A

DIVCA History

On September 29, 2006, the Governor signed into law Assembly Bill 2987, the Digital Infrastructure and Video Competition Act of 2006 (DIVCA). DIVCA's goals are to promote rapid, widespread competition in the broadband and video markets, and accelerate the deployment of additional infrastructure in California.

DIVCA is implemented by the CPUC and addresses not only video franchising, but also provides a vehicle for the deployment of additional broadband infrastructure within California, particularly to unserved and underserved areas. DIVCA changed video franchising within California by transferring the authority for issuing franchises for the provision of video services from local entities to the State of California and separated franchising and enforcement. The State Legislature designated the CPUC as the sole franchising authority for issuing state video franchises as of January 1, 2007.

California was the eighth state to reform video franchising with the intent to facilitate competitive video and broadband entry. As of 2014, twenty five states had transferred video franchising authority to the state. These states include California, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Iowa, Indiana, Kansas, Louisiana, Michigan, Missouri, New Jersey, North Carolina, Nevada, Ohio, Rhode Island, South Carolina, Tennessee, Texas, Vermont, Virginia, and Wisconsin.

Prior to DIVCA, cable television franchises in California were issued by cities, counties and special districts, as provided by state statute. This required cable operators to negotiate separate franchise agreements with each local entity where they wished to provide video service. California contains 58 counties encompassing 482 incorporated municipalities (cities and towns). These local franchise agreements required that service providers comply with specific customer service and performance standards and other requirements that often varied by locality.

For new entrants seeking to provide video and broadband services over a large area, the process of negotiating franchise agreements with each individual local entity would have been an arduous process, delaying entry into the market by many years and increasing startup and operating costs. To speed the entry of new video and broadband providers into the marketplace, the Legislature sought to replace the local franchising system with one in which the State would issue video franchises. The CPUC was designated as the agency charged with issuing state video franchises.

Following the adoption of DIVCA implementation rules, the CPUC began issuing ten-year state video franchises. [See Appendix B on the next page (p. 39) for summaries of implementing decisions]. The Commission will issue a state video franchise so long as an applicant is eligible for a state franchise, the application is complete, the applicant pays the \$2,000 application fee and provides evidence of having obtained an appropriate surety bond, and the applicant swears that it will adhere to all state and federal laws, rules, and regulations.

Rules Adopted to Implement DIVCA

On October 5, 2006, shortly after DIVCA was enacted, the CPUC issued its Order Instituting Rulemaking to consider the adoption of a General Order and procedures to implement DIVCA (R. 06-10-005) (“Rulemaking”). In the course of this Rulemaking, the CPUC developed rules for implementing DIVCA.

On March 1, 2007, following the receipt of comments and reply comments in the Rulemaking and subsequent Proposed Decision, the CPUC issued Decision (D.) 07-03-014 (Phase I Decision) establishing rules for implementing DIVCA and adopting General Order 169. These rules set forth application requirements, CPUC procedures for considering applications, build-out, anti-discrimination, annual reporting requirements of both cable and broadband information by census tract, and other requirements as mandated by DIVCA.⁵⁸

Non-Discriminatory Buildout Requirements for Small Local Exchange Carriers (LECs)

On October 4, 2007, in Phase II of the Rulemaking, the CPUC issued D.07-10-013 (Phase II Decision), which adopted non-discriminatory build-out requirements for smaller companies and additional reporting requirements.⁵⁹ In Phase II, the CPUC determined that the “reasonable time” deployment standard applicable to franchise holders who are telephone companies with fewer than one million telephone customers should largely mirror the build-out timetable required of the larger telephone companies. Further, the CPUC determined that, in their annual reports to the CPUC, holders must provide video subscriber data, finding that such data are necessary in order for the CPUC to determine whether franchise holders are adhering to the requirements of DIVCA.⁶⁰

On July 10, 2008, in Phase III of the Rulemaking, the CPUC issued D.08-07-007 (Phase III

⁵⁸ On October 5, 2006, the Commission issued Opinion Modifying Decision 07-03-014 [D. 10-07-050], Cal. PUC Lexis 298 (2010), which amended the form of the franchise certificate adopted in the Phase I Decision to conform to statutory requirements.

⁵⁹ Order Instituting Rulemaking to Consider the Adoption of a General Order and Procedures to Implement the Digital Infrastructure and Video Competition Act of 2006 Opinion Resolving Issues in Phase II [D.07-10-013] 2007 Cal.PUC Lexis 548 (2007).

⁶⁰ Previously, the Commission’s Rules required the submission of data related to the number of households offered video services, but not the number of households subscribing to such services.

Decision), which amends the bonding requirements under DIVCA, adopts new rules regarding deadline extensions for build-out requirements, and adopts additional reporting requirements.

Under DIVCA, holders of a state video franchise are subject to statutory requirements regarding, among other things, the extent and pace at which large new entrant franchise holders must build facilities and offer video services to households. The statute provides that franchise holders may apply to the CPUC for an extension of the time for such build-out requirements to be satisfied, under certain circumstances. The Phase III Decision added procedural requirements to ensure that holders' extension requests are made and decided in a timely fashion.

Further, the Phase III Decision eliminates an unintended and unfair asymmetry in the bond requirement under General Order 169 between new entrants in the video marketplace and incumbent cable operators. Local franchises held by incumbent cable operators tend to be held by many separate affiliates of an ultimate parent. Verizon and AT&T, by contrast, have each applied for only one state franchise covering their entire video service areas. The Phase III decision changes the rules under DIVCA to require only one bond to be posted to cover all affiliated holders rather than separate bonds so that "incumbent" applicants for video franchises do not have additional burdens placed on them due to their historic corporate organization under the local franchising scheme.

Finally, the Phase III Decision requires holders to include in their annual data submitted to the CPUC, broadband subscriber data they have reported to the FCC on Form 477.⁶¹ The FCC released its Report and Order and Further Notice of Proposed Rulemaking adopting new requirements for reporting broadband service by speed tier on June 12, 2008.⁶² The CPUC issued this decision to reflect the FCC's requirements for reporting broadband service. Holders are now required to report the same broadband speed information that it reports to the FCC to the CPUC.

Franchise Renewal Rules

On August 28, 2014, the CPUC issued Decision 14-08-007 (D. 14-08-007) implementing the franchise renewal provisions of DIVCA by adopting renewal rules. Initial franchises are granted for a period of 10 years but may be renewed by a franchise holder if it wishes to continue to provide service. Section 5850 requires that the process for renewing an existing franchise be identical to the process set forth in DIVCA for obtaining an initial franchise except that the renewal process must be consistent with federal law governing the renewal of cable television franchises and the applicant seeking renewal must not be in violation of any non-

⁶¹ Throughout this Report, reference is made to "477 Data." Franchisees do not actually provide the CPUC with a copy of the actual Form 477 they submitted to the FCC. Rather, they submit the same information the FCC collects on its Form 477 to the CPUC in response to an independent data requirement based on state law.

⁶² F.C.C., Form 477 Order, fn. 21, *supra*.

appealable court order issued pursuant to DIVCA. In addition, § 5900(k) of DIVCA requires that ORA be allowed to advocate on behalf of consumers during the renewal process.

The Decision finds that these requirements are met by adopting rules for the renewal of existing franchises that are identical to the rules for the issuance of an initial franchise with two exceptions. First, the rules require that a renewal applicant attest to the fact that it is not in violation of any non-appealable court order issued pursuant to DIVCA. Second, they require that ORA and local entities be provided with notice of the application and the opportunity to comment on the sole issue of whether the applicant is in violation of a non-appealable court order.

Renewal applications must be submitted no later than 3 months prior to the date current franchise is due to expire but no earlier than 6 months prior to that date. Comments on the application must be submitted in writing to the Commission's Video Franchising and Deployment Group within 15 days after the application is served on local entities and ORA and must be accompanied by a court order supporting the claim that the applicant is in violation of a non-appealable court order.

In addition, the rules permit ORA to comment on whether the application is complete and the extent to which the applicant has complied with DIVCA's obligations during the term of its existing franchise. Comments submitted by ORA on past compliance with DIVCA's obligations may lead to future action by the Commission but have no bearing on the disposition of the application for renewal.

On July 1, 2015, ORA filed a petition seeking to modify the renewal decision. Responses to the petition were filed on July 31, 2015 and a reply was filed by ORA on August 10, 2015. The Commission has not acted on the petition to date.

Resolutions

CPUC staff made several recommendations for revisions to the application forms through two resolutions, T-17107⁶³ and T-17141⁶⁴, which were subsequently adopted by the CPUC.

DIVCA provides for video franchise holders to pay fees to the CPUC calculated to equal the amount authorized in the CPUC budget for DIVCA implementation. In March 2008, Resolution T-17137 was adopted, which stated that beginning with fiscal year 2007-2008, each SVF holder's user fee would be determined annually based on the pro-rata percentage of households that exist in that holder's video serve area, compared to the total number of households in the service areas of all holders combined. Subsequently, another resolution was

⁶³ Phase II Decision, September 2007

⁶⁴ Phase III Decision, D08-07-007, July 10, 2008

passed reverting back to the original process of determining user fees for each SVF holder annually based on the pro-rata percentage of each SVF holder's gross video revenue, compared to the total gross video revenues reported to the CPUC by all SVF holders in the state.

DIVCA Application Process

The application process was designed to be simple and straight-forward. It requires applicants to file the following: a completed application form; a \$2,000 application fee; confirmation of technical, managerial, and financial qualifications demonstrated through the posting of a bond (\$100,000 to \$500,000); an affidavit attesting to the lawful operation of the franchise; a definition of the video service area sought; demographic information by census block group; the expected date for the deployment of video service in the video service area; and, a list of affected local entities.

The CPUC must determine within 30 days if an application is complete and issue the franchise within 14 days of such determination.⁶⁵ If the application is not complete, CPUC staff is required to notify the applicant, and the 30-day clock restarts. If the CPUC does not issue the franchise within the required 14 days, it is deemed issued. The new franchise holder then notifies the affected local entities.⁶⁶

The CPUC's Phase I Decision allowed applicants, except for incumbent cable operators, to begin filing applications for state-issued video franchises as of March 1, 2007.⁶⁷ The first such application was filed by Verizon California Inc. on March 2, 2007. AT&T California filed its application on March 7, 2007. These franchise applications were reviewed for completeness, and video franchises Nos. 0001 and 0002 were issued to Verizon and AT&T on March 8 and March 30, 2007, respectively. All franchise applications and grants may be viewed on the Commission's web site.⁶⁸

⁶⁵ Cal. Pub. Util. Code § 5840 (h).

⁶⁶ Cal. Pub. Util. Code § 5840 (n).

⁶⁷ Phase 1 Decision at Appendix B at 4; DIVCA required the CPUC to begin accepting applications no later than April 1, 2007; Cal. Pub.Util. Code §5847(g).

⁶⁸ <http://www.cpuc.ca.gov/PUC/Telco/Information+for+providing+service/videofranchising.htm>

Appendix B

DIVCA Data Collection, Methods, Sources and Limitations

State video franchise holders are required to submit data relating to their provision of video and broadband services annually by April 1.⁶⁹ Pursuant to DIVCA, all video franchise holders must report, by census tract, the following:⁷⁰

Video Information:

- a. The number of households in the holder's video or telephone service area.⁷¹
- b. The number of *low-income* households in the holder's video or telephone service area.
- c. The number of households in the holder's video or telephone service area to which video service is offered by the holder.
- d. The number of *low-income* households in the holder's video or telephone service area to which video service is offered by the holder.
- e. The number of subscribers in the holder's video or telephone service area.⁷²

Broadband Information:

- a. The number of households to which the holder makes broadband available in California. If the holder does not maintain this information on a census tract basis, in its normal course of business, the holder may reasonably approximate the number of households based on information it keeps in the normal course of business.
- b. The number of households that subscribe to broadband that the holder makes available in this state.
- c. The speed of service that subscribers obtain, based on the speed tiers adopted by the FCC.⁷³
- d. Whether the broadband service provided by the holder utilizes wireline-based facilities or another technology.
- e. If a SVF holder and/or any of its Affiliates uses non-wireline technology to provide Broadband, it must list the type(s) of technology used in each census tract.⁷⁴
- f. DIVCA directs the CPUC to aggregate the data described above and to report the

⁶⁹ Cal. Pub. Util. Code § 5960.

⁷⁰ Cal. Pub. Util. Code § 5960.

⁷¹ Incumbents must report by video service area; telephone corporations by telephone service area.

⁷² Phase II Decision D. 07-10-013.

⁷³ Cal. Pub. Util. Code Decision Amending General Order 169 Phase III Decision D.08-07-007, 07/10/2008, Appendix C (1)(b).

⁷⁴ Cal. Pub. Util. Code Decision Amending General Order 169 Phase III Decision D.08-07-007, 07/10/2008, Appendix C (2)(a) .

aggregated totals to the Governor and the Legislature annually.⁷⁵

Reporting Obligations Imposed on State Video Franchise Holders with More than 750 California Employees

A State Video Franchise Holder employing more than 750 total employees in California shall report to the CPUC annual employment information, as of January 1 of the year in which it first was issued a State Video Franchise and each year thereafter. These reports shall include the following information:

- a. The number of California residents employed by the State Video Franchise Holder, calculated on a full-time or full-time equivalent basis.
- b. The percentage of the State Video Franchise holder's total domestic workforce that resides in California, calculated on a full-time or full-time equivalent basis.
- c. The types and numbers of jobs by occupational classification held by residents of California employed by State Video Franchise holders and the average pay and benefits of those jobs and, separately, the number of out-of-state residents employed by independent contractors, companies, and consultants hired by the State Video Franchise holder, calculated on a full-time or full-time equivalent basis, when the State Video Franchise holder is not contractually prohibited from disclosing the information to the public. This paragraph applies only to those employees of an independent contractor, company, or consultant that are personally providing services to the State Video Franchise holder, and does not apply to employees of an independent contractor, company, or consultant not personally performing services for the State Video Franchise holder.
- d. The number of net new positions proposed to be created directly by the State Video Franchise holder during the upcoming year by occupational classifications and by category of full-time, part-time, temporary, and contract employees.

Video and Broadband Subscribership Data Sources

DIVCA requires SVF holders to submit annual data describing their territories, availability of service, and subscribership. The most recent data used in this report were current as of December 31, 2016. These data were used throughout this report and provided a base from which to compare and evaluate providers' year-to-year performance under DIVCA.

All state video franchise holders who had state franchises and/or amendments issued before December 31, 2015, submitted annual data pursuant to Public Utilities Code § 5960. Each parent company of a state video franchise holder filed one annual report which included broadband and video service data for all of their state-franchised operations, as well as their locally-franchised affiliates that operate in California and provide video or broadband service in

⁷⁵ Cal. Pub. Util. Code § 5960.

the state.

The analysis of video and broadband service begins with these self-reported data from parent companies of the state video franchise holders and affiliates. This report does NOT include video or broadband data from service providers that do not hold state video franchises.⁷⁶

To aggregate the data reported by census tract and map and analyze it, staff used an Oracle database and a Geographic Information System (GIS). Staff also used Excel spreadsheets to aggregate, analyze and create graphs of the annual data. The findings are illustrated in maps, graphs, and charts throughout the report.

Broadband Availability Data Sources

Broadband availability data used in this analysis prior to 2015 was collected pursuant to the CPUC's State Broadband Initiative Program (SBI) grant, under the auspices of the National Telecommunication and Information Administration's (NTIA). The NTIA used the data collected by the CPUC, and each other state, for its National Broadband Map.

At the end of the 5-year SBI program (from 2015 onward), the responsibility for broadband data collection and for the National Broadband Map shifted from the NTIA to the FCC, and the FCC began collecting broadband availability data every six months on Form 477. While SVF holders are required by DIVCA to report broadband availability data by census tract, we ask SVF holders to submit the same data they reported to the FCC on Form 477.

In submitting their availability data to the FCC, a broadband provider may elect to provide data on the availability of their service by either 1) address, or 2) census block. If a provider offers service in a census block the entire block is assumed to be served. Subscriber data (connections) prior to 2016 were reported on Form 477 by census tract. In 2016 the FCC switched to census block reporting of connections. After collecting the raw broadband data directly from providers, staff subjected it to validation using several available resources. More details are available in the introduction to section 6 of this report and on the State Broadband Mapping Program webpage.⁷⁷

Build-out and Non-Discrimination Data Sources

Under California Public Utilities Code § 5890(e), telephone companies with more than one million subscribers are required to submit data supporting their compliance with the statute's 5-year build-out and non-discrimination requirements. These data were provided to the

⁷⁶ Some of the small video franchisees did not report broadband availability data. They may provide only video and no broadband data.

⁷⁷ See <http://www.cpuc.ca.gov/General.aspx?id=2540>.

Commission as separate filings by AT&T and Verizon by their respective 5-year franchise anniversaries.

Determining the Number of Providers and Households Served per Census Block or Tract

The broadband availability data from each provider were incorporated into feature classes in a file geodatabase according to FCC standards, where they exist in a many-to-one relationship to the census blocks. That is, many availability records exist for each census block, based on differences in provider name, technology type, and upstream and downstream speed. To estimate the number of distinct broadband providers per census block, data from each provider was exported to shapefiles then attribute-joined to a clean census block shapefile, which removes any “duplicate” records, thereby enforcing a one-to-one relationship.

After all provider data has been exported and joined, each distinct provider name, contained in a separate field, is concatenated together into a single field, using the field calculator’s “&” operator. The resulting concatenation sequences were then sorted alphabetically, common blocks of sequences were identified visually and selected, and the number of distinct providers were entered in a new field.

Video data mandated under DIVCA are gathered in Excel data templates and stored permanently in an ORACLE database, from which data is queried. Calculations, such as the number of distinct providers per census tract, were performed directly in the queried tables, then exported to Excel and immediately joined to a census tract shapefile for mapping.

Once the number of broadband providers per census block and video providers per census tract were determined, the aggregate number of households associated with each of these provider numbers could be summed from the shapefile attribute tables.

2010 Census Data

Census 2010 household data were used as the basis for estimating the aggregate number of households in census blocks with a common number of broadband providers (0, 1, 2, 3, 4, or 5). These data were combined with household growth factors derived from the California Department of Finance’s (CDF) annual household estimates by incorporated city and county, to project a household estimation to the current year for each census block. We derived the household growth factor by dividing the CDF’s current year household estimate by their previous year household estimate for each incorporated city, and the unincorporated balance of each county. This growth factor was then applied to all census blocks whose centroid fell within the incorporated city or unincorporated balance of the county in question, to arrive at a new current year projected household estimate for each census block.

This method of household projection is a significant improvement over the methods used in the earliest DIVCA reports. In 2008 we used a single statewide growth rate for every calculation, both county and census tract. We refined the method in 2009 by using separate growth rates for each county, and their component census tracts. This addressed the regional variation in growth rates but failed to address the urban/rural dichotomy.⁷⁸ This method most likely resulted in an overestimation of the number of households served by multiple providers, thus painting a rosier picture of broadband competition in California than has actually been the case.

The current method accounts for variations in both regional household growth rates and urban / rural areas. As a result, the projections are closer to reality. But it also creates a statistical disconnect with previous reports, which became progressively less accurate the further away from Census 2000 they were. Prior to January 2011, when the 2010 census data were released, our best estimate of households in California was 12,790,143. The 2010 Census data showed that the actual number of households in California (in April 2010) was 12,577,498. We had overestimated the number of households by about 1.7% statewide, and probably much more in some locations.

2010 Census Boundaries

The 2010 Census delivered more than just up-to-date household estimates. It also added new blocks and tracts and redrew existing boundaries. The number of census blocks in California increased by 33.2% (533,136 to 709,128) over 2000. The number of census tracts increased by 14.1% (7,049 to 8,043) over 2000. The effect of these increases is to reduce the average size of both blocks and tracts, thereby increasing their overall granularity as mapping units, and increasing the accuracy of any household estimation based on their selection. This increased accuracy can manifest as a decrease in the household estimate in specific areas outside urban cores, because the blocks or tracts which now comprise these areas have a smaller overall footprint. Blocks and tracts within urban cores are far less likely to have been split or redrawn. Therefore, they only manifest an increase in the overall household estimate.

Census Data Aggregation Limitations

Despite the use of more granular census boundaries and up-to-date data, there are still limitations inherent in their use for household estimation in local areas. Census blocks are a much more granular mapping unit than census tracts, and they provide a much better picture of broadband availability than census tracts do of video availability under DIVCA. However, the unavoidable fact of aggregation means that staff's ability to perfectly analyze and depict the availability of broadband and video service is still limited.

The table below compares the relative sizes of census tracts and blocks in California, as of

⁷⁸ With the exception of purely rural counties, such as Alpine, Modoc, and Trinity.

January 1, 2017.

Geo- graphy	Count	Size (in sq. mi.)			Number of Households		
		Min.	Max.	Ave.	Min.	Max.	Ave.
Census Block	709,128	<0.000001	523	0.22	0	1,649	18
Census Tract	8,043	0.00052	7,008	19.7	0	8,963	1,619

Census tract reporting for video availability data, as opposed to actual address reporting, makes it impossible to know exactly how many households are offered service in any given census tract, or how many households exist within the franchise territory of any given state franchise holder. Individual franchise holders report the number of households to which they offer service by census tract. For census tracts where they are the only provider, this figure can be taken as the actual number of households offered service in that tract. However, for census tracts in which there are multiple providers, it is impossible to know whether or not the competing services are offered to the same households. Therefore, simply adding the “households offered video” figures from two or more providers may result in double or triple counting, bringing some availability and subscription rates to over 100%.

Consequently, mapping where competition has occurred (one of the core concerns of DIVCA) is complicated. Since it is impossible to know where, within each census tract, video service is being offered, we can only classify tracts as being either served or unserved by each provider, then add up the number of providers in each tract. In this way, the current level of video competition is also overstated.

Similarly for broadband, if one household in a census block was offered service by any franchise holder, then it was assumed that all households within it were offered the service, and the block was considered “served.” This naturally results in an overstatement of the level of availability. Error estimation was not done for this report, so it is not known how inaccurate these estimates are. Nor would error estimation be of much use in this case, due to the use of aggregated data, rather than discreet data points. On the other hand, the population density within California varies widely, as reflected in the extreme variation in its census geography sizes. This means that the census tracts comprising California’s vast rural north and east (where most of the error in the results probably lie) are relatively few, and the total number of households this represents are also relatively few.

When drawing conclusions from this report, it is important to keep in mind that only services offered by state-issued video franchise holders and their locally-franchised affiliates are reflected. Broadband and video services offered by local independent wireline providers and fixed wireless ISPs or satellite ISPs are, by definition, excluded.

Validation Resources and Methods for 2016 California Broadband Map

Census block data create a challenge when trying to understand the status of broadband availability at a more detailed level, such as for a specific address. It is not uncommon for the map to show all of the households in a census block as “served” at the threshold of 6 Mbps down or greater and 1.5 Mbps up or greater even though some households in that block remain under- or unserved (a false positive). At the same time, there are instances of the opposite problem as well where the map shows a census block being 100% unserved when there are indeed some households that are served (a false negative).

Given the Legislative and Commission directives to implement the California Advanced Services Fund (CASF) program, the validation procedures currently in place tend to favor false negatives over false positives. In other words, the Interactive Map may understate availability of broadband rather than overstate it.

The CPUC’s CASF Grant Program relies on the California Broadband Initiative Map and supporting data to determine eligibility for infrastructure grants. However, the California Interactive Broadband Map is not the final arbiter of CASF eligibility. Indeed, the CASF application includes a challenge process, which allows providers to identify portions of a census block that are in fact served.

In order to minimize false positives, the 2016 update of the Interactive Map, which is based on broadband availability data as of December 31, 2016, includes “red zone” and “purple zone” validation layers for each provider.⁷⁹ The red zone layer shows areas for which either no validation method exists to verify the existence of a broadband provider’s service, or public feedback contradicted the provider’s claim of service. The purple zone layer shows areas for which no validation method could verify a broadband provider’s advertised downstream or upstream throughput. This does not mean there is no service, or service is definitely not available at the speeds submitted. It only means that we haven’t been able to confirm the presence of service with the data sources available to us. Nevertheless, blocks that cannot be validated are shown as unserved, which reduces false positives.

Methods to Validate Broadband Data Submitted by SVF Holders

The table below and on the next page summarizes the validation method, type of data, and to which type of broadband connection the validation method applies.

⁷⁹ See <http://www.broadbandmap.ca.gov/>.

Data Source	Data Type	Fixed: Wireline	Fixed: Wireless	Mobile Wireless
Broadband Subscriber Data from providers	Number of subscribers by upstream and downstream speeds by census tract used to validate availability and speed at census tract	YES	YES	NO
TeleAtlas Wire Center	Serving wire center locations of telephone companies used to validate DSL coverage	YES	NO	NO
CPUC Mobile Field Test Upstream and Downstream Interpolation	Interpolated coverage based on mean minus 2 standard deviation used to validate availability at census block	NO	NO	YES
CPUC Mobile Field Test Results Point Data	Provider-specific, "In coverage" location results showing "No Effective Service" (point data)	NO	NO	YES
CalSPEED results	Speed test results from LTE-capable devices and "No Effective Service" results from ANY device	NO	NO	YES
Customer address service and speed information	Provider-supplied list of customers showing their address and subscribed speeds – used to validate availability and speed at census tract	YES	YES	NO

Data Source	Data Type	Fixed: Wireline	Fixed: Wireless	Mobile Wireless
Public Survey	Reports of “no service” for a specific provider used to validate availability at census block (“no service” = block becomes unavailable for that provider)	YES	YES	YES
Tower data and/or EDX propagation image	Coverage propagation of fixed wireless provider based on tower, radio, and antenna data submitted by the provider used as a baseline for availability footprint	NO	YES (footprint only)	NO

Detailed Description of Each Type of Data Used to Validate Broadband Data Submitted by SVF Holders

Subscriber Data is provided in response to a data request directly to the CPUC once each year. This includes the number of broadband connections by technology type and speed tier (upstream and downstream) for each census tract where the provider has customers. If a provider indicates it has broadband service in a particular census block but has not reported customers for the census tract where that block resides, the subscriber data cannot validate the actual presence of service. In the case of speed validation, if a provider has not reported any subscribers in the blocks that are nested within a particular census tract, then this subscriber information cannot validate the speed for the entire census tract. As with any validation technique, there are inherent errors. For example, if subscriber data show that a particular provider has customers in a census tract and at the maximum advertised speeds submitted to us, we consider all blocks within that census tract to be validated for speed and/or availability for that provider. Because subscriber data is only available at the census tract level, this validation tool tends to yield false positives and overstates validation for individual census blocks. In contrast to fixed broadband service data, mobile broadband service data are aggregated at the state level which is not useful for census tract level validation.

TeleAtlas Wire Center Data lists every Local Exchange Carrier (LEC) landline wire center in the United States. The term “wire center” refers to the location where the telephone company terminates its local lines; this is usually the same location as a central office, although a wire center might house multiple central offices. Buffers are created at 12,000 feet from provided Wire Center point datasets to cross reference ISP data submissions to the CPUC. The wire center boundary is a representation of the area served by all of the switching

equipment housed at that physical location. When a provider indicates broadband availability in a particular census block, and that location is within the distance from the wire center to support a given speed, that census block is considered validated. If the census block is beyond 12,000 feet from the central office, the speed cannot be validated. This methodology is used for DSL technologies only.

CPUC Mobile Field Test Upstream and Downstream Interpolation uses data generated by the CPUC's semi-annual mobile field tests, which cover 1,990 randomly selected points across the state and measure broadband performance for the four major mobile wireless operators: Verizon, AT&T, Sprint, and T-Mobile USA. The mean minus two standard deviation results are interpolated to create a kriging map. This map is used to estimate availability, upstream, and downstream throughputs. We compare the interpolated model against each provider's stated coverage and speed. In cases where the estimate is below the provider's stated coverage, we create a purple zone for the census block(s) that fall under all or part of that area. In cases where the estimate shows no coverage but the provider's map does show coverage, we create a red zone.

CPUC Mobile Field Test Point Data come from our semi-annual field tests. The mean minus two standard deviation point data from the Fall 2016 tests were compared against each operator's advertised availability in the census block where the test was conducted. In census blocks where the test result for a particular operator was zero or "No Effective Service," but the operator advertised coverage there, the coverage for that census block was considered unvalidated.

CalSPEED Results are crowd-sourced mobile test results from the CPUC's Android mobile testing application. The CPUC launched CalSPEED on Google Play's app store on April 5, 2013. The point data results through May 2014 were compared against each operator's advertised availability in the census block where the test was conducted. These results included operators beyond the four tested for the bi-annual mobile field testing. In census blocks where the test result for a particular operator was zero or "No Effective Service," but the operator advertised coverage there, the coverage for that census block was considered unvalidated.

Customer Address Service and Speed Information - Where we were unable to validate any areas of a provider's availability (their entire footprint was shown as a red zone), we requested customer address information to use as a validation data source. Census tracts where customers resided were considered validated.

Public Survey - As part of our effort to collect and incorporate information from the public, we created an online as well as downloadable paper survey that members of the public fill out to tell us their providers and at what speeds they subscribe. The survey also captures whether they have been denied service or do not have access to specific providers claiming to offer

service to their area. There is also a section where they can tell us the results from speed tests. The survey and FAQ are available on the CPUC web site at: <http://www.cpuc.ca.gov/General.aspx?id=5868>. Results through May 30, 2016 were used to validate broadband availability. Reports of “no service” override other validation methods.

Tower data and/or EDX propagation image - For fixed wireless providers, we used tower location and system parameter information, where available, to propagate a fixed wireless provider’s coverage area using EDX’s Signal software, version 11.2. The wireless propagation model is based on the Anderson-2D propagation model. System parameters included frequency, transmit power, receiver sensitivity, antenna gain, and height. EDX produced coverage patterns for each tower/sector combination taking into account terrain and land use/clutter that may hinder signal dispersion. For terrain, we used two data sets, EDX universal .201 and SRTM 3- second .HGT format. For land use/clutter, we used is GCATTN_2011_clutter 30-meter .151 files. A separate propagation shapefile was created for each downstream and upstream speed tier combination, and all shapefiles were later overlaid and dissolved to where only the fastest advertised speed available was visible.

Description of Mobile Broadband Field Testing Program

Through the mobile broadband field testing program, the CPUC has shown that carrier-reported “highest advertised broadband speeds” are not representative of the typical user experience. The FCC similarly rejects the adequacy of the carrier-reported maximum advertised speeds collected by the NTIA under its Broadband Data Initiative, and instead requires carriers to report their lowest advertised speeds on FCC Form 477 Deployment. The FCC has not yet determined whether “lowest advertised speeds” now being collected will be any better at representing that experience.

Assuming a normal distribution of data, adopting a speed standard at two standard deviations below the mean results in estimate speeds that would meet or exceed the speed standard 98% of the time. While the test results do not fall into a normal distribution, and the actual percent probability of availability will vary, we believe that speeds two standard deviations below the mean is more representative of a typical user experience than average speeds.

For the interpolation model used for mobile provider validation, we calculate, for every test location within a provider’s footprint, a mean minus two standard deviation value for both upstream and downstream speeds. The standard deviation is calculated from the 40 test results (20 for upstream, 20 for downstream) collected at each test location for each provider. We take the mean upstream and downstream speeds for each provider from the most recent mobile field test for each location (averaging smartphone and tablet speeds) and subtract two standard deviations for those upstream and downstream speeds from the means. The resulting mean minus two standard deviation values form the basis of the kriging (interpolation) model created

for each provider. The image created by the kriging process looks similar to a heat map with color shading denoting high speeds, low speeds, and no service.

Appendix C

Video Franchise Area Maps

Maps of Video Franchise areas can be found in the video franchising section of the CPUC website, or at:

<http://capuc.maps.arcgis.com/home/webmap/viewer.html?webmap=84e56f2c02834408a6b7a5f3bebb044b>

If you need assistance locating maps of state-issued video franchise holders, please contact Michael.Pierce@cpuc.ca.gov or call him at (415) 703-2618.

Appendix D

Employee Categorization

The DIVCA statute does not require SVF holders to categorize their employees into separate job classifications when they report the number of their employees each year.⁸⁰ Therefore, when the Commission wrote General Order 169, it required that SVF holders with more than 750 employees report the number of California residents it employees “by occupational classification.”⁸¹ However, the Commission did not specify any particular method to use or names for job classifications.

Because the Legislature and Commission left the method and classifications up to each SVF holder, not all SVF holders used the same method or job titles for classifying their employees. Therefore, in 2008, staff harmonized the different job categories in a ways that made logical sense. Staff continues to use the same method each year. The fact that each of the SVF holders has been very consistent from year to year in the way they categorized their employees has made this job much easier then it might have been.

Staff has always used the definitions provided by the U.S. Equal Employment Opportunity Commission to classify the employees reported by the SVF holders. Below are two of the occupational classifications, *Technicians* and *Craft Workers*, described by the U.S. EEOC:

From **2017** EEO Instruction Booklet:

Technicians. Jobs in this category include activities that require applied scientific skills, usually obtained by post-secondary education of varying lengths, depending on the particular occupation, recognizing that in some instances additional training, certification, or comparable experience is required. Examples of these types of positions include: drafters; emergency medical technicians; chemical technicians; and broadcast and sound engineering technicians.⁸²

From **2017** EEO Instruction Booklet:

Craft Workers [formerly Craft Workers (Skilled)]. Most jobs in this category include higher skilled occupations in construction (building trades craft workers and their formal apprentices) and natural resource extraction workers. Examples of these types of

⁸⁰ Section 5920 (a) of DIVCA states: “ A holder of a state franchise employing more than 750 total employees in California shall annually report to the commission... (1) The number of California residents employed by the holder, calculated on a full-time or full-time equivalent basis.”

⁸¹ Section VII (B)(1) of G.O. 169 require SVF holders to report: “...the types and numbers of jobs by occupational classification held by residents of California employed by State Video Franchise Holders and the average pay and benefits of those jobs...”

⁸² See, <https://www.eeoc.gov/employers/eeo1survey/2017survey-instructions.cfm>.

positions include: boilermakers; brick and stone masons; carpenters; electricians; painters (both construction and maintenance); glaziers; pipelayers, plumbers, pipefitters and steamfitters; plasterers; roofers; elevator installers; earth drillers; derrick operators; oil and gas rotary drill operators; and blasters and explosive workers. This category also includes occupations related to the installation, maintenance and part replacement of equipment, machines and tools, such as: automotive mechanics; aircraft mechanics; and electric and electronic equipment repairers. This category also includes some production occupations that are distinguished by the high degree of skill and precision required to perform them, based on clearly defined task specifications, such as: millwrights; etchers and engravers; tool and die makers; and pattern makers.’’⁸³

⁸³ See, <https://www.eeoc.gov/employers/eeo1survey/2017survey-instructions.cfm>.

Appendix E

Confidentiality of the Employment Data Provided by Video Franchise Holders

Note on Confidentiality

The employment data submitted is not afforded confidentiality protection under DIVCA.⁸⁴ While the CPUC extends the confidentiality provisions of Pub. Util. Code § 583 to broadband and video data submitted under DIVCA,⁸⁵ the CPUC has determined that the employment data submitted under DIVCA is not protected by the general policy of confidentiality. The CPUC's Phase I Decision states:

Despite AT&T's and Verizon's requests, we do not afford confidential treatment to the employment data. To do so would violate the express language of DIVCA. Public Utilities Code §5920(b) requires the CPUC to make "the information required to be reported by holders of state franchises . . . available to the public on its Internet Web site." Unlike annual broadband and video reports produced pursuant to Public Utilities Code §5960, DIVCA does not direct that our employment reports aggregate information provided by state video franchise holders; instead, these reports are supposed to convey "information . . . reported by holders" without any further stipulation. The Legislature could have imposed an aggregation requirement, but it chose not to here. Thus, we find it is most consistent with the statute to make individual reports submitted pursuant to Public Utilities Code §5920 available to the public. . . .

⁸⁶

⁸⁴ Cal. Pub. Util. Code § 914.4 provides: "The commission shall annually report the information required to be reported by holders of state franchises pursuant to Section 5920, to the Assembly Committee on Utilities and Commerce and the Senate Committee on Energy, Utilities and Communications, or their successor committees, and within a reasonable time thereafter, shall make the information available to the public on its Internet Web site."

⁸⁵ Order Instituting Rulemaking to Consider the Adoption of a General Order and Procedures to Implement the Digital Infrastructure and Video Competition Act of 2006, Decision 08-07-007, Decision Amending General Order 169 (Cal. P.U.C. July 10, 2008) at P. 22, Phase III Decision, July 14, 2008, 5.2 Discussion. . . we note that §5960(d) of the California Public Utilities Code extends the protections of §583 to all data provided to the CPUC annually in the reporting requirements imposed by DIVCA.

⁸⁶ Phase I Decision, March 1, 2007, Order Instituting Rulemaking to Consider the Adoption of a General Order and Procedures to Implement the Digital Infrastructure and Video Competition Act of 2006, 07-03-014,

Given this determination, the CPUC makes employment data provided by individual video franchise holders available to the public in this Report. The information in the Report has been aggregated to the extent necessary so as not to disclose pay and benefits information at the level where an individual employee could be identified.

Note on Full Time Equivalent Counts

Some franchise holders reported employee headcounts, rather than full-time equivalent (FTE) counts as required. This means that some part-time employees may have not been counted.

End of DIVCA Video, Broadband and Employment Report

For the Year Ended December 31, 2016

adopting a General Order and Procedures to Implement the Digital Infrastructure and Video Competition Act of 2006.