



Communications Division

Market Share Analysis of Retail Communications in California June 2001 through June 2013

*Expanding Markets, Market Concentration,
and the Impact of Intermodal Competition*

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CALIFORNIA PUBLIC UTILITIES COMMISSION STAFF REPORT

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MARKET SHARE ANALYSIS OF RETAIL COMMUNICATIONS
IN CALIFORNIA

JUNE 2001 THROUGH JUNE 2013

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I. Summary

In this Staff Report, the authors assess the level of concentration among service providers in California's communications market.¹ We examine subscribership data by technology modes: wireless voice, wireline voice,² voice-over-internet-protocol (VoIP),³ and all modes of broadband with a subscription billing address in California.⁴ We also assess the level of concentration across different technology modes.

This report focuses on California as a single statewide market, with market segment adjustments for technology mode, parent company ownership, and service provider territories. For more geographical granularity, we also compared urban and rural markets. Assessing California's communications markets on a statewide basis enables us to determine:

- The extent to which wireless, wireline, cable, and VoIP service providers compete for the same customers as an indicator of the health of competition; and
- The technologies to which California's business and residential consumers subscribe;⁵

Trends revealed by our analysis include:

- **The California communications market has doubled in size since 2001.** Relative to population, there are many more services available.
- **Intermodal voice and broadband markets are not monopolistic and exhibit only moderate HHI concentration.** The traditional wireline market is highly concentrated and concentration varies considerably among the other technology modes, however each are at, or above, levels considered moderately concentrated.
- **Market concentration is evident across the entire communications market.** The overall California market is led by two companies, AT&T and Verizon, who's combined market share totals 62.5 percent.
- **Past mergers have increased market concentration.**⁶ Consolidation among wireline and wireless service providers in years 2004/2005, led to fewer providers, with the merged entities having increased market shares. While concentration has trended downward for intermodal communication services, the recent T-Mobile and MetroPCS merger has reversed this trend.

¹ We use the term "market" to reflect retail offering of communications services available to business and residential subscribers broadly in California.

² We use the term 'wireline voice' as defined by the FCC's Form 477 to mean (ILEC-provided) traditional voice grade access line service. Typically, such service is provisioned via a 56 to 64 kbps, analog circuit at a frequency range of 300 to 3000 Hz.

³ This category includes interconnected VoIP service capable of placing and receiving calls from the public switched telephone network. This excludes machine to machine VoIP, as those connections are not interoperable with the public switched telephone network.

⁴ Herein we use 'subscription' as defined by the FCC in Form 477. 'Subscriptions' will exceed the number of 'subscribers'.

⁵ By 'consumer' we include all entities purchasing services, including residences, businesses and community organizations.

⁶ This report is limited to an analysis of subscribership data and does not address other effects due to merger activity.

- **Urban and rural areas have similarly concentrated markets.** Nonetheless, urban customers tend to have more provider choices for fixed-location services.

Due to intermodal substitution, California’s consumers have choices in both the voice and broadband markets. The Commission’s regulatory policy relies upon this intermodal competition as the foundation of its consumer choice policy.⁷ Evaluation of markets by a single technology alone (e.g., wireline) as had been previously presented in reports to decision makers, is now an insufficient basis for determining the status of competition. Today an intermodal analysis is essential for understanding the overall communications market in California.

As the findings that follow illustrate, staff conclude that market concentration exists in California and the Commission’s continuing pledge to monitor the state’s communications market is appropriate. We also conclude that the market concentration analyses presented here are not determinative of the existence of exercised market power. Continued analysis is warranted to refine the picture of this rapidly-changing industry sector. Beyond the scope of this report are the other variables that need to be analyzed to contribute to the Commission’s understanding of how to optimize its participation / role in California’s communications market, consumer experience, and choice.⁸

II. Introduction

The CPUC’s Uniform Regulatory Framework (URF) decision of 2006 found that wireless, cable and VoIP services are close and/or direct substitutes for local wireline telephone service.⁹ The URF decision concluded that the potential entry of competitors offering these services, combined with unbundling requirements developed by the FCC and the CPUC, represent sufficient competitive options to check the market power of the four largest incumbent local exchange telephone companies (ILECs),¹⁰ which are AT&T, Verizon, SureWest and Frontier. The decision determined, however, that “[t]here is an ample need for the Commission to remain vigilant in monitoring the voice communications marketplace in order to ensure that the market continues to serve California consumers well.”¹¹ Accordingly, this Staff Report updates the previously-issued

⁷ Decision 06-08-030, at 132 states; “Cross-platform competition, particularly that from wireless and VoIP technologies, provides an additional check that reduces market power of each carrier.” Additionally, General Order 168, Consumer Bill of Rights and Freedom of Choice states; “Consumers have a right to select telecommunications services and vendors of their choice.”

⁸ Ongoing analyses of variables that may be indicative of market abuse such as consumer experience data, pricing trends and market entry, is necessary. Staff reports include; the June 2014 Cramming Report, The 2014 Limited English Proficiency Survey Report; the 2010 Affordability Basic Telephone Service Report, and the Market Pricing Survey of Retail Communications Services in California Report, among other reports. See; <http://www.cpuc.ca.gov/PUC/Telco/generalInfo/CPUC+Reports+and+Presentations.htm>

⁹ D.06-08-030, Findings of Fact 19, 20, 39, 44, 62 and 63.

¹⁰ Ibid., Finding of Fact 61. The consideration of the threat of entry as a sufficient indication of competition is based on contestable markets theory, which states that such markets’ “fundamental feature is low barriers to entry and exit; a perfectly contestable market would have no barriers to entry or exit.” William J. Baumol, John C. Panzar, & Robert D. Willig (1982). *Contestable Markets and the Theory of Industry Structure*.

¹¹ D.06-08-030, Finding of Fact 73.

Market Share Report of March 10, 2011, and joins other monitoring reports on conditions in California's voice and broadband marketplace.¹²

In prior staff reports, market competition was assessed by technology segment or mode.¹³ During the regulatory experiment with the unbundling of the telephone network for competing providers to re-bundle into retail offerings, traditional local wireline service (and the unbundled "local loop") was the pre-eminent technology to provide communications services, and substitution between different technology modes was not as prevalent as today. Now most consumers have more than one technology option for their communications and often the different technology mode providers are direct competitors.¹⁴

'Market concentration' is the extent to which the largest company or companies in a market may dominate that market. Of regulatory concern is whether market concentration exists to the extent that there is an exercise of market power with an excessive transfer of wealth from buyers to sellers and/or a misallocation of resources and diminished innovation. Such could mean that both business and residential consumers have fewer choices and/or pay too much relative to a fully competitive market. However, concentration itself is not proof that market failure has occurred, as the degree of concentration can vary greatly. The Commission's URF policy relies on sufficient market competition to ensure that consumers have available services and options, and that competition will keep prices affordable. Herein we evaluate market concentration. However, we do not attempt to conclude whether market concentration has resulted in the exercise of market power. Our analysis is the first step in making such determinations.

For purposes of our market share analysis here, we use Federal Communications Commission (FCC) Form 477 data through June 2013, consisting of: (1) *wireline voice* service connections, (2) *wireless voice* connections directly billed, (3) *VoIP* service interconnected to the Public Switched Telephone Network, (4) *fixed broadband* connections,¹⁵ and (5) *mobile broadband* subscriptions for data plans associated with smartphones, tablets, laptops and a variety of emerging devices.

¹² In 2002 and 2003, in response to a legislative mandate, CD produced three reports documenting wireline, wireless and advanced services competition by sector. These previous reports did not include an HHI intermodal analysis. See; <http://www.cpuc.ca.gov/PUC/Telco/generalInfo/030326TelecommunicationsCompetition.htm>.

¹³ The Status of Telecommunications Competition in California, 3rd report, submitted to the California State Legislature in compliance with P.U. Code Section 316.5 (no longer effective), CPUC, October 31, 2003

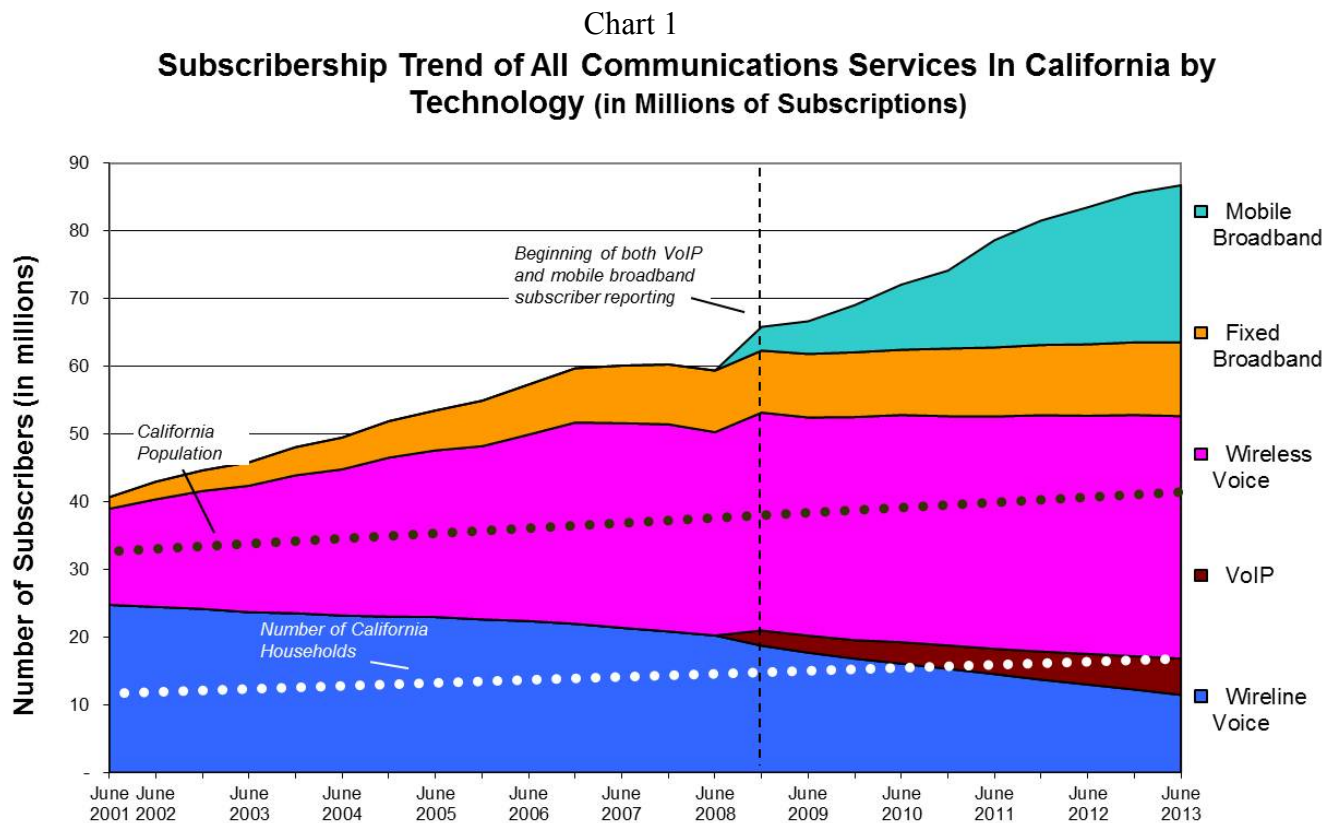
¹⁴ An example is residential voice service where ILECs and cable service providers may compete for the same customer using different technology modes.

¹⁵ Fixed Broadband technologies include Asymmetric xDSL, Cable Modem, Optical Carrier (Fiber to the End User), Satellite, Symmetric xDSL, Terrestrial Fixed Wireless, and Other Wireline.

III. California's Growing Communications Market

Since adoption of URF, California's communications markets have continued to shift as customers embrace new technologies from old and new providers. Besides new services and devices, many households which had previously subscribed to multiple communications services from unaffiliated individual providers can now consolidate these separate services into provider-offered bundles or localize them onto a single wireless device.

The chart and table below shows the trends in the number of communications subscriptions by technology type.¹⁶ This cumulative total comprises our estimate of the market for communications services delivered to residences, businesses and institutions.¹⁷ The subscription trends are illustrative. Traditional wireline telephone service is shrinking in absolute terms and relative to the total subscriptions market.¹⁸ Further, subscription in all technologies but traditional wireline telephone service is increasing, though some at a small rate. (See Appendix A for data used in charts and tables)



¹⁶ Note: Required reporting of mobile broadband and VoIP subscribership on FCC Form 477 began with the December 31, 2008 reporting cycle.

¹⁷ Includes all five technology categories that are tracked in Form 477: wireline voice, VoIP, wireless voice, fixed broadband, and mobile broadband, whether they are delivered to residences, businesses, or institutions.

¹⁸ The Affordability of Basic Telephone Service Report, table 12, states 24% of California's households rely solely upon traditional landline telephone service. <http://www.cpuc.ca.gov/PUC/Telco/generalInfo/2010AffordabilitySurveys.htm>

California Communications Market Findings:

- **California's communications market growth outpaced population growth.** The total market grew 113 percent between June 2001 and June 2013. The state's population grew about 12 percent over the same period.¹⁹
- **Wireline voice is becoming an ever smaller proportion of the market.** This mode has fallen behind wireless voice and mobile broadband. In June 2001, wireline voice service represented about 61 percent of the total communications market whereas by June 2013, it declined to 13.2 percent of the total subscriptions market. Over that interval the absolute number of wireline telephone subscriptions declined about 54 percent.
- **Wireless voice and mobile broadband subscriptions continue to dominate growth in the overall voice and broadband market.** In June 2013, wireless voice and mobile broadband comprise 68 percent of all communications subscriptions in California.

Historically, the Commission's regulatory policies generally have focused on Incumbent Local Exchange Carriers and in particular the two largest carriers, AT&T of California (formerly Pacific Bell) and Verizon of California (formerly General Telephone of California). Chart 1 reflects change in the communications market and such change has been cause for policy makers to revise regulatory policies created when there were vastly different market conditions than exist today.

Some of the significant past policy revisions by the California Public Utilities Commission, Legislature, Federal Communications Commission and Congress include: open entry policies for competitive service providers, removal of inter and intra-LATA regulatory barriers, removal of rate and economic regulation for competing services and providers, permitting Bell Operating Companies into the long-distance market, removal of most regulatory tariffs, removal of the cross-ownership ban between video and communications, creation of the state video franchise, and efforts to make public policy programs technologically neutral, such as low-income access to subsidized phone service. Further, policy changes are under considerations at the FCC that would treat broadband as a universal service and reform how current universal service programs are funded.²⁰

Regardless of the regulatory changes in the past two decades, the two historical service providers mentioned above continue to be the largest provider of retail communications services across the wireline, wireless, and mobile data technology platforms. However, they are not together the largest across all service categories, in particular not in VoIP and fixed broadband.

These data alone cannot construe whether the market is highly concentrated or is failing consumers. We attempt below to explore further the implications of market share and dominance utilizing concentration measures.

¹⁹ Sources are California Department of Finance estimates and <http://quickfacts.census.gov/qfd/states/06000.html>

²⁰ The CPUC is participating in these FCC proceedings.

IV. Market Concentration by HHI Indicator

We use the Herfindahl-Hirschman Index (HHI) to assess the level of market concentration in California.²¹ The higher the HHI the more concentrated the market; in a highly concentrated market, a few firms have most of the customers. A highly concentrated market is generally characterized by an HHI score greater than 2500 on a scale of 1 to 10,000 and moderately concentrated is characterized by an HHI score between 1500 and 2500 points (see Appendix B).²²

We present two different HHI analysis of the California communications market: First is a technology mode analysis which assumes choice is limited within the technology mode. For example, each technology market is distinct such that wireline and wireless services are not substitutable services. Second is an intermodal analysis which assumes choice of services among the various technology modes. For example, a market exists among a group of different technologies, such that wireless and wireline technology providers compete.

Additionally, for both the technology mode and the intermodal analysis there are two mutually exclusive adjustments applied. First, a parent company may own multiple affiliate companies within a technology type and between technology types. Its' common ownership increases its market share when considering affiliated providers as one entity. Thus, we analyze HHI market share considering parent company ownership, such that its data are inclusive of affiliated subsidiaries also operating in the state. We call this the Parent Company Adjusted Analysis.²³

Second, not all providers offer their services statewide.²⁴ Individual wireline and cable service provider service territories are typically geographically limited; reflecting their embedded geographical segmentation from legacy franchise service territories and do not overlap. Today's AT&T retail wireline phone services generally do not compete with the Verizon retail wireline phone services.²⁵ Similarly, the Time Warner cable retail fixed digital phone services generally do not compete in the territories served by the Comcast cable network where it offers digital phone services.²⁶ When calculating HHI, the number of statewide available services providers must be adjusted. Thus, we combine ILEC broadband data into a single broadband entity and their fixed wireline data into a single wireline entity.²⁷ Similarly, for cable companies, we separately combine broadband into a single entity

²¹ For a discussion of the market indices used in this Staff Report, see Appendix B.

²² <http://www.justice.gov/atr/public/guidelines/hhi.html>. The U.S. Department of Justice and the Federal Trade Commission in their Horizontal Merger Guidelines define Unconcentrated Markets as having an HHI below 1500; Moderately Concentrated Markets as having an HHI between 1500 and 2500; and Highly Concentrated Markets as having an HHI above 2500.

²³ Even within a technology type there are cases where ILECs provide competing affiliated services and such adjustment is appropriate.

²⁴ No provider ubiquitously covers California; however AT&T Mobility and Verizon Wireless mobile voice and mobile broadband service coverage is much larger than that of wireline providers.

²⁵ To underscore this point, author attempted to subscribe to Verizon Home Phone and received the following response: "We are having trouble locating your address. Are you sure you input your zip code correctly? "Please review the zip code listed below and if it is incorrect, please re-enter your address. If the zip code listed below is correct, Verizon does not provide service in your area."

²⁶ Author's inquiry into Time Warner Cable service availability resulted in a website redirect to the local cable operator, Comcast. In both cases, author was unable to get service offered from the non-territorial serving entity.

²⁷ This means that for the purposes of the territory adjusted HHI analysis, AT&T, Verizon and the small incumbent local exchange carriers (ILECs) are combined into one entity.

and their VoIP data into an entity.²⁸ We call this the Territory Adjusted Analysis. No such adjustment for the large wireless and non-affiliated VoIP providers is made as they generally offer service almost ubiquitously throughout the state.²⁹

Both adjustments are mutually exclusive and each has limitations. The parent adjustment is particularly useful for assessing overall market share owned by a parent company across technologies. However, the parent company analysis results in an overly liberal estimation of HHI due to its consideration of all named parent companies as being an equal competitive option regardless of actual service territory. The territory adjustment analysis corrects this by summing the HHI for each incongruent service provider, wireline, broadband and cable. However, in doing so it is no-longer possible to assess parent company ownership across technologies.³⁰ Thus, the territory adjustment understates parent company ownership as a factor when assessing the total subscriptions market.

HHI by Technology Mode

Chart 2 below shows HHI concentration by market technology mode; wireline, wireless, fixed broadband, mobile broadband and interconnected VoIP adjusted for parent company ownership. The calculation is based upon combined affiliate data within each market technology type. Note that the VoIP category creation corresponds with an increase in wireline HHI. Previous to 2008, Comcast and Time Warner cable offered a non-VoIP wireline service. The VoIP category was created nearly coincident with their shift from non-VoIP service to VoIP service.

Chart 2 indicates that the wireline voice technology market appears highly concentrated and is well above the HHI concentration levels of the other technologies. The HHI measurements for the Mobile broadband and wireless voice markets appear are just above near the moderately concentrated threshold of 2,500, whereas fixed broadband, at 2,000 is in the midrange of the being moderately concentrated range of between 1,500 and 2,500. VoIP has the lowest concentration of all and appears not concentrated. Also of note in the trend lines is how merger activity has increased HHI concentration. The increase in wireline, wireless and fixed broadband show in years 2004/2005 are coincided with the mergers occurring in those years. In those two years, four of California's top five providers were involved in mergers.³¹ In 2013, the merger of T-Mobile and MetroPCS coincides corresponds with a slight increase in wireless voice and mobile broadband market concentration.

²⁸ This means that for the purposes of the territory adjusted HHI analysis, Comcast, Time Warner Cable, Charter, Cox and all the other cable companies are combined into one entity.

²⁹ Among wireless providers, geographical distinctions, if they exist, reflect a regional focus unrelated to wireline franchise territories. Wireless companies are usually national (or international) in scope (e.g., AT&T Mobility, Verizon Wireless (with Vodafone of Germany), Sprint, T-Mobile-Deutsche Telekom), and other wireless companies, while they may have a regional reach, provide roaming services to their customers that extend beyond these geographical focuses.

³⁰ Not entirely true as some weighting criteria could be established to assign relative HHI share to Parent companies, however such additional methodological step would add a questionable variable to outcomes.

³¹ The proposed AT&T/T-Mobile merger failed to gain the approval of federal regulators in 2011. Had the merger been approved, both mobile broadband and wireless voice concentration would have increased.

Chart 2
HHI Market Concentration by Technology
Adjusted for Parent Companies

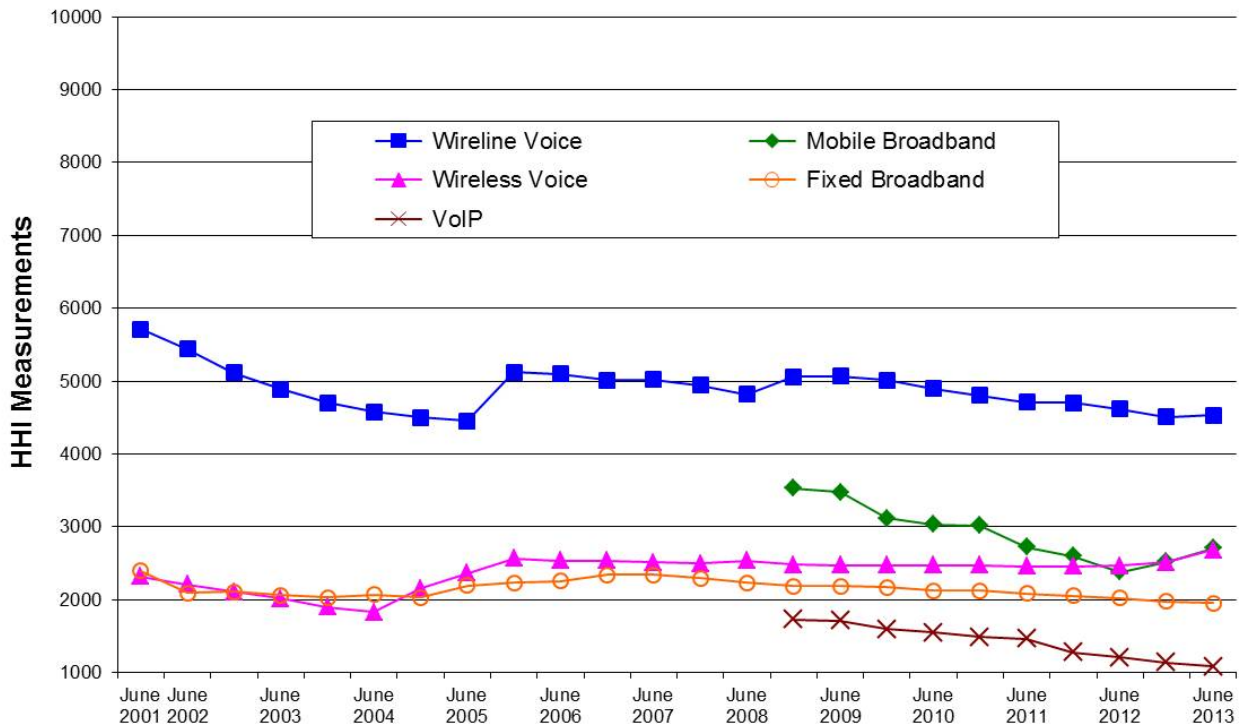
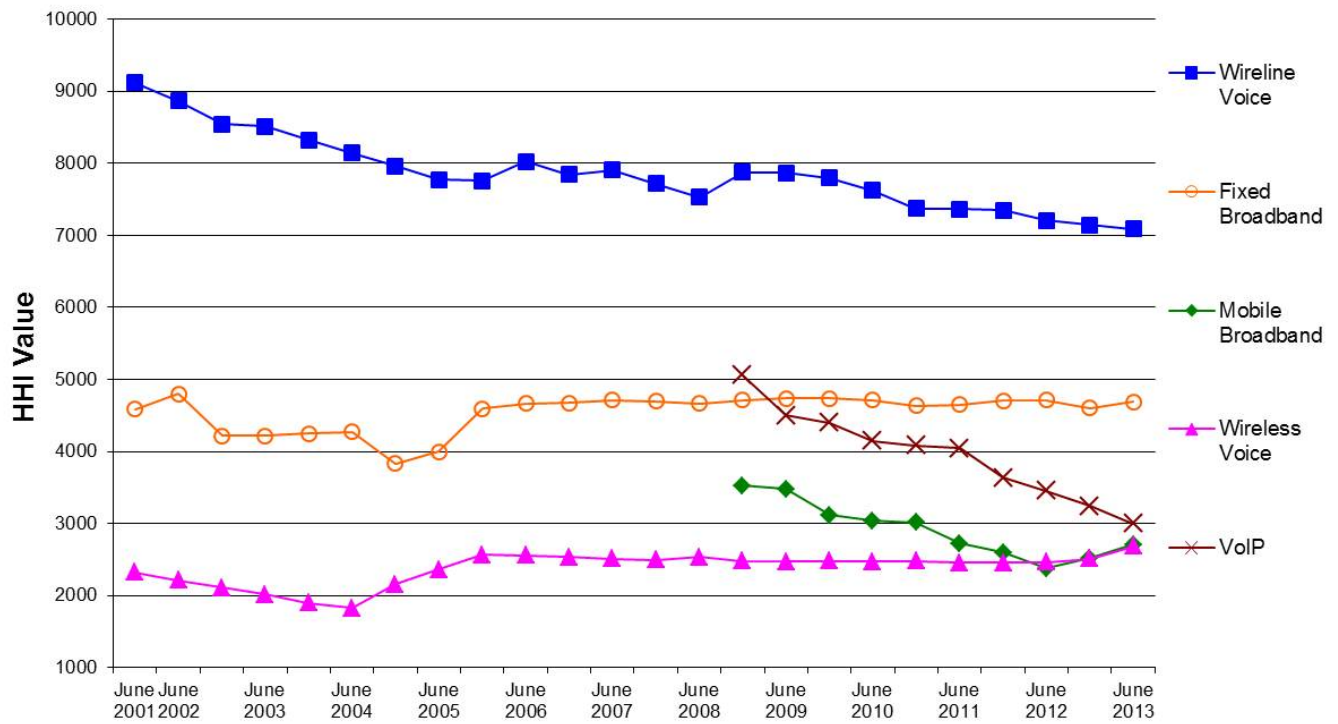


Chart 3 below represents HHI concentration using the Territory Adjusted method. ILECs in this method are no-longer considered competing wireline providers because their legacy franchise service territories (and therefore their local network facilities) do not overlap. With the territory adjustment, the HHIs for wireline voice, fixed broadband and VoIP increased significantly above those associated with the Parent Adjustment and are all in the highly concentrated regions above 2,500. For example, the territory adjusted HHI for fixed voice increased about 56 percent over the Parent Analysis to just above 7,000. This result is not surprising as it reflects that not all providers offer services statewide. For example, it is typical that CLECs compete with legacy ILEC providers in the wireline market. Chart 3 indicates that the wireline voice market has the highest level of market concentration and all other technology markets have HHIs significantly lower than it. Of additional note, the fixed broadband market concentration more than doubles above the previous values shown in Chart 2, and the VoIP HHI increases into the highly concentrated range.

Chart 3
HHI Market Concentration by Technology
Adjusted for ILEC and Cable Service Territories



HHI Concentration by Technology Market Findings:

- **Most of the separate communications technology markets in the state are *highly concentrated*.** Except for interconnected VoIP and fixed broadband in the parent adjusted HHI, measurements for all individual technologies have recently exceeded the 2500 point HHI threshold that characterizes a highly concentrated market.
- **The trends in wireline voice, VoIP and mobile broadband markets have generally improved since December 2008.** The market concentration trend for the wireless voice and fixed broadband markets has started to increase since December 2012.
- **Wireline voice has the *highest concentration level*** at almost three times the HHI threshold for highly concentrated markets. The declining HHI for wireline voice was affected by the 2005 SBC/ AT&T merger, and the 2006 Verizon/ Worldcom merger.
- **Previous wireless mergers have *increased* HHI market concentration values.** The HHI trend for wireless voice decreased after 2001, but then rose in December 2004 and December 2005 perhaps due in part to the respective mergers of Sprint/ Nextel, and of AT&T Mobility/ Cingular Wireless. In 2013 it rose above the 2,500 threshold for highly concentrated markets.
- **The HHI value of the territory adjusted fixed broadband market is *between* the HHI's of the wireline and wireless markets.** The HHI for fixed broadband shows little volatility since 2005.
- **The mobile broadband HHI concentration is declining relative to the fixed broadband market.** Mobile broadband capable devices first reported in June 2005 were provisioned by two service providers in the State, however since that time both service providers and subscribers have grown. The mobile broadband HHI measurements have fallen from 3,600 in 2008, 1,100 points above the highly concentrated threshold, to 2,400 in 2012, 100 points below the highly concentrated market threshold. However, the mobile broadband HHI measurement has risen again to 2,700 in 2013, 200 points above the threshold for highly concentrated markets.

HHI for Intermodal Markets

An intermodal market considers substitute technologies and services. The combined intermodal analysis recognizes the range of technological options available and reveals the market power of large carriers offering multiple services, often sold as a single bundle. We examine two combined intermodal markets:

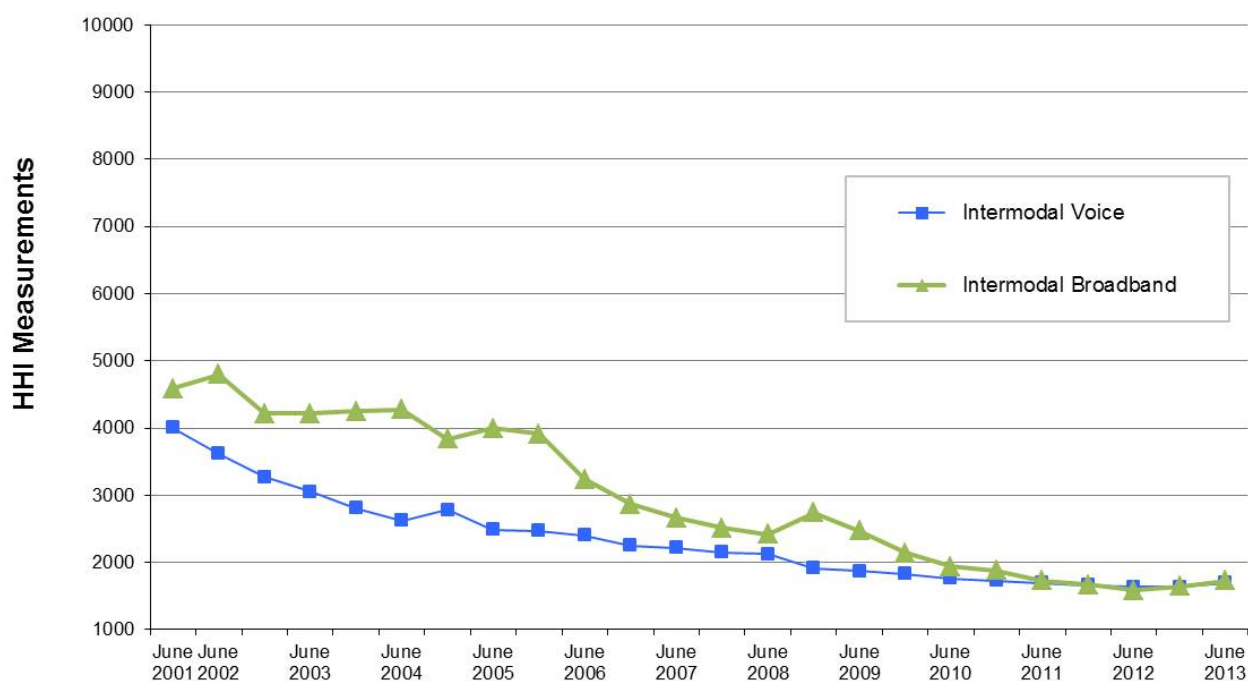
- 1) *Intermodal Voice* which includes interconnected VoIP, wireless and traditional landline wireline voice;
- 2) *Intermodal Broadband* which includes mobile broadband for smartphones and tablets, and all fixed broadband services such as DSL, coaxial cable modem, satellite and fiber-to-the-premise.

Because intermodal voice excludes broadband services, there is an assumption that broadband is not a direct substitute for voice services, though arguably for some it is particularly if they rely on “over-the-top voice applications.”³² As previously described, CPUC policy recognizes intermodal voice communications competition and the substitutability of wireline and wireless *voice* services. Also, the substitutability of wireless and wireline *broadband* is assumed in the California Advanced Services Fund, which makes available infrastructure grants for broadband deployment regardless of broadband technology type. However, fixed and mobile *broadband* are not necessarily substitutable technologies and for many consumers may be complimentary services. In particular, mobile broadband can be more expensive than wireline broadband when comparing the data capped monthly allotment of usage compared to wireline broadband data usage.³³

Chart 4, below shows the HHI concentration for the intermodal voice and intermodal broadband markets using the same territory adjusted data.

Chart 4

HHI Market Concentration for Combined Intermodal Markets Adjusted for ILEC and Cable Service Territories



³² Over-the-top voice applications can include Google Voice, FaceTime, Skype, or other such IP or non-interconnected VoIP services.

³³ Studies show that wireless and wireline broadband can be complementary technologies. However, the market is not static and these studies below contain conclusions not reflecting changes in market offering, such as increased data caps, that have occurred in the interim. See: <http://www.pewinternet.org/2013/09/16/cell-internet-use-2013/>
<http://www.amta.org.au/articles/Wireless.broadband.and.fixed.are.complementary.say.experts>

Of note is (a) the two lines converge in June 2011, approaching the 1,500 non-concentrated market threshold, (b) the two lines are much lower in concentration than the individual technology HHIs shown in Chart 2, and (c) that merger activity had a smaller overall impact.

As shown above in Chart 1, until approximately 2008, market growth was primarily in wireless *voice* subscriptions, whereas later, growth is primarily in wireless *broadband* subscriptions.³⁴ Wireless subscription growth has had an impact on both intermodal trend lines. In Chart 3, the intermodal broadband line pre 2006 is disparate from the other lines as it is primarily wireline based. Since 2008, the addition of wireless broadband reporting caused intermodal broadband to trend more closely with the line as the share of total subscriptions associated with wireless has increased.

HHI Concentration for Intermodal Markets findings:

- **The California intermodal voice and broadband markets are moderately concentrated.** Both the parent and territory adjusted HHIs are at 1,800, only 300 points above a moderately concentrated market and well below the 2500 threshold for a highly concentrated market. It is reasonable to consider intermodal voice technologies as substitutes, however, such assumption of substitution between fixed and mobile broadband may not yet be accurate.
- **The intermodal voice market has lower concentration relative to disaggregated fixed and wireless markets.** The concentration that exists in the wireline voice market is greatly diluted when wireless is considered to be a competitive option.
- **The intermodal HHIs have approached the 1500 non-concentrated market threshold.** Intermodal broadband in June 2001 began at 4,500, well above the 2,500 HHI threshold for a highly concentrated market, but declined to 2,500 four year later in 2005, and as of June 2013, is measured at 1,800, only 300 points from the bottom threshold for a moderately concentrated market.

³⁴ Prior to their required reporting in 2008, it is unknown whether providers reported on Form 477 their VoIP subscription in their wireline counts or whether broadband subscriptions were counted in their wireless subscriptions.

V. Two-Firm and Four-Firm Concentration Ratios

The Concentration Ratio method of market analysis gives us another way to assess levels of concentration.³⁵ This ratio is calculated by simply adding the percentage market shares of the largest firms in a given market. For example, a Four-Firm Concentration Ratio (CR4) is the sum of the market shares of the top four firms. Likewise the Two-Firm Concentration Ratio (CR2) is the sum of market shares of the two largest firms. The higher the CR2 or CR4 value, the more concentrated the market. A concentrated market is generally characterized by CR4 ratios greater than 40%, and highly concentrated for ratios exceeding 70%, though these criteria are subject to debate.³⁶ This method does not consider the remaining market providers, regardless of how many there are in that particular market. Implications of a concentrated, consolidated or Oligopolistic market are addressed later in this report.

Tables 1 and 2 below, show the top two and four service providers in California by technology type and intermodal market, adjusted for parent company ownership.³⁷ Table 1, reveals that AT&T and Verizon are the dominant two providers in the wireline voice, wireless voice and mobile broadband markets, but not the VoIP and fixed broadband markets. However, when considering intermodal markets, AT&T and Verizon parent companies continue to dominate based on their affiliated company offerings.

Table 1

California Two-Firm Concentration Ratio (CR2) June 2013 (Parent Adjusted)		
Market Segment	CR2 %	Top Providers
Wireline Voice	81.9%	AT&T, Verizon
VoIP	36.5%	Comcast, Time Warner
Wireless Voice	64.6%	Verizon, AT&T
Fixed Broadband	51.1%	AT&T, Time Warner
Mobile Broadband	68.3%	AT&T, Verizon
Intermodal Market		
Intermodal Voice	63.4%	AT&T, Verizon
Intermodal Broadband	60.1%	AT&T, Verizon
Total Subscriptions	62.5%	AT&T, Verizon

³⁵ The CR4, Four-Firm Concentration ratio is described in Appendix B. In Mark Hirschey's words, "Concentration ratios measure the percentage market share held by (concentrated in a group of top firms. When concentration ratios are low, industries tend to be made up of many firms, and competition tends to be vigorous. When concentration ratios are high, leading firms dominate and sometimes have the potential for pricing flexibility and economic profits. The Herfindahl-Hirschmann Index (HHI) is a measure of competitor size inequality that reflects size differences among both large and small firms." Hirschey adds, "From the public policy perspective, competitive forces must be understood if the rules governing the competitive process are to maximize social benefits." *Managerial Economics*, 12th Edition. Cengage Learning, 2009, p. 536.

³⁶ <http://info.umuc.edu/mba/public/AMBA607/IndustryStructure.html>; <http://www.economicexpert.com/a/Concentration:ratio.htm>; <http://www.unf.edu/~traynham/ch14%20edited%20lecture.pdf>

³⁷ Data combines for each parent company the affiliated entities' subscriptions by technology.

Table 2, below, shows the top four providers by technology type and intermodal market, adjusted for parent company ownership. Of interest is that cable providers have significant market share in the individual VoIP and fixed broadband markets, however in the Intermodal markets only appear as one-of-top-four in intermodal broadband.

Table 2

California Four-Firm Concentration Ratio (CR4) and Providers June 2013 (Parent Adjusted)		
Market Segment	CR4 %	Top Providers
Wireline Voice	90.0%	AT&T, Verizon, U.S. TelePacific, Cox
VoIP	56.8%	Comcast, Time Warner, AT&T, Cox
Wireless Voice	98.9%	Verizon, AT&T, T-Mobile, Sprint
Fixed Broadband	80.9%	AT&T, Time Warner, Comcast, Verizon
Mobile Broadband	94.5%	AT&T, Verizon, T-Mobile, Sprint
Intermodal Market		
Intermodal Voice	87.2%	AT&T, Verizon, Sprint, T-Mobile
Intermodal Broadband	78.4%	AT&T, Verizon, Sprint, Time Warner
Total Subscriptions	83.3%	AT&T, Verizon, Sprint, T-Mobile

CR2 and CR4 and Provider Findings:

- **All technology segments are concentrated.**
- **The VoIP market segment is the least concentrated market segment followed by fixed broadband.** With the exception of CR2 for the VoIP segment, the CR2 and CR4 values are well above the concentration threshold of 40 percent.
- **Wireline voice has the highest CR2 value, but a lower CR4 value than both mobile broadband and wireless voice.** These metrics highlight the traditional duopoly in California's wireline voice market and the high concentration (oligopoly) among the top four wireless voice and mobile broadband providers. Prior to the T-Mobile and MetroPCS merger in 2013, there had been five dominant national wireless providers in California.
- **The intermodal voice, broadband and total subscriptions market is highly concentrated.** The CR4 total subscriptions measurement of 83.3 percent is above the 70 percent threshold-indicative of a highly concentrated market.
- **Intermodal competition reduces market concentration.** Intermodal voice is less concentrated than wireline voice. Intermodal broadband is less concentrated than mobile broadband. Cross technology substitution, as evidenced in the Subscribership Trends Chart 1, reduces concentration, resulting in a more competitive market, as evidenced in the intermodal HHI graphs. However, the total market concentration ratios indicate a contradictory, highly concentrated assessment compared to the HHIs.

Change in CR2 and CR4 from 2008 to 2013:

The following analysis compares changes in market concentration ratios since December 2008, the first available data since the FCC required service providers to report both VoIP and mobile broadband subscription as separate categories. The percentage change analysis is based on the data tables, contained in Appendix A.

Table 3, below, shows the percentage change in CR2 and CR4 values from December 2008 through June 2013. With the exception of wireless voice and fixed broadband, the individual technologies, have declining concentration. The comparison of the CR2 and CR4 trends in relation to each other demonstrates the relative change in market share between the top four firms. If a CR2 is declining more quickly than the corresponding CR4, it follows mathematically that the firms in third and fourth place are growing relative to the top two. It is possible that the lost subscribers of the top two are moving to the third and fourth provider rather than being spread among the smaller competitors.

Table 3

California CR2 and CR4 Trends by Technology December 2008 – June 2013 (Parent Adjusted)		
	Percentage Change	
Market Segment	CR2	CR4
Wireline Voice	-2.9%	-3.5%
VoIP	-16.1%	-44.2%
Wireless Voice	5.2%	8.0%
Fixed Broadband	-0.8%	-1.6%
Mobile Broadband	-3.6%	-5.3%
Intermodal Market		
Intermodal Voice	-0.4%	-0.6%
Intermodal Broadband	-3.4%	-5.5%

Change in CR2 and CR4 Findings:

- **The CR2 and CR4 measurements show that except for wireless voice, all the markets have been becoming less concentrated since 2008.** All concentration values are declining with the exception of wireless voice CR2 and CR4.
- **Market shares are becoming more diffuse among the top four.** CR4 concentration is generally declining at a greater rate than CR2 concentration, with the exception of wireless voice having increasing concentration primarily due to the recent T-Mobile and MetroPCS merger.
- **Intermodal markets are decreasing in concentration relative to 2008.** Some CR4s have declined more quickly than their comparable CR2. This means that the Intermodal broadband market has become less concentrated more rapidly than the Intermodal voice market. Since all values are negative, this indicates overall improvement.

VI. Urban vs. Rural Communications Markets

In the previous sections, we reported on statewide market concentration. In this section we attempt to compare urban markets to rural markets by examining counties by the predominance of rural or urban population. We investigate two general categories of services, fixed voice and fixed broadband services for residential and business consumers.³⁸

In order to assess differences between urban and rural markets, we combine 477 data from the FCC with statistics from the US Census Bureau.³⁹ The US Census Bureau defines “rural” areas as encompassing “all population, housing, and territory **not** included within an urban area.”⁴⁰ Urban areas must contain at least 2,500 people living in contiguous census blocks or contiguous census tracts with densities of at least 1,000 people per square mile.⁴¹ Of California’s 58 counties, 11 have a predominately (over 50 percent) rural population, leaving 47 as predominately urban.

In order to align the subscribership data with urban and rural demographics, we examine each category of service at the county level and assume that a single county represents one market.⁴²

Availability of Technologies

All counties throughout California have access to various fixed voice technologies, including traditional copper wireline, fixed wireless and interconnected VoIP telephone services. In addition, numerous fixed broadband technologies are deployed in all counties, but not necessarily throughout an entire county.⁴³ Some rural counties do not have all the options that are available to their urban counterparts. For example, Fiber to the End User and Symmetric xDSL appear in only half the counties where at least one out of every three people lives in a rural area. Cable Modem can be found in all counties except for Modoc County and Trinity County, which are two of the most rural counties in the State. Finally, Terrestrial Fixed Wireless does not appear in six counties, two of which have a population that is 100 percent rural.

³⁸ Form 477 data does not include a geographic component for mobile wireless subscribers and is therefore our analysis does not take into account mobile wireless services.

³⁹ To address concerns regarding cross-ownership of companies, our analysis considers only parent company totals, so that the data are inclusive of affiliated subsidiaries operating within the same county.

⁴⁰ <https://www.census.gov/geo/reference/ua/urban-rural-2010.html>

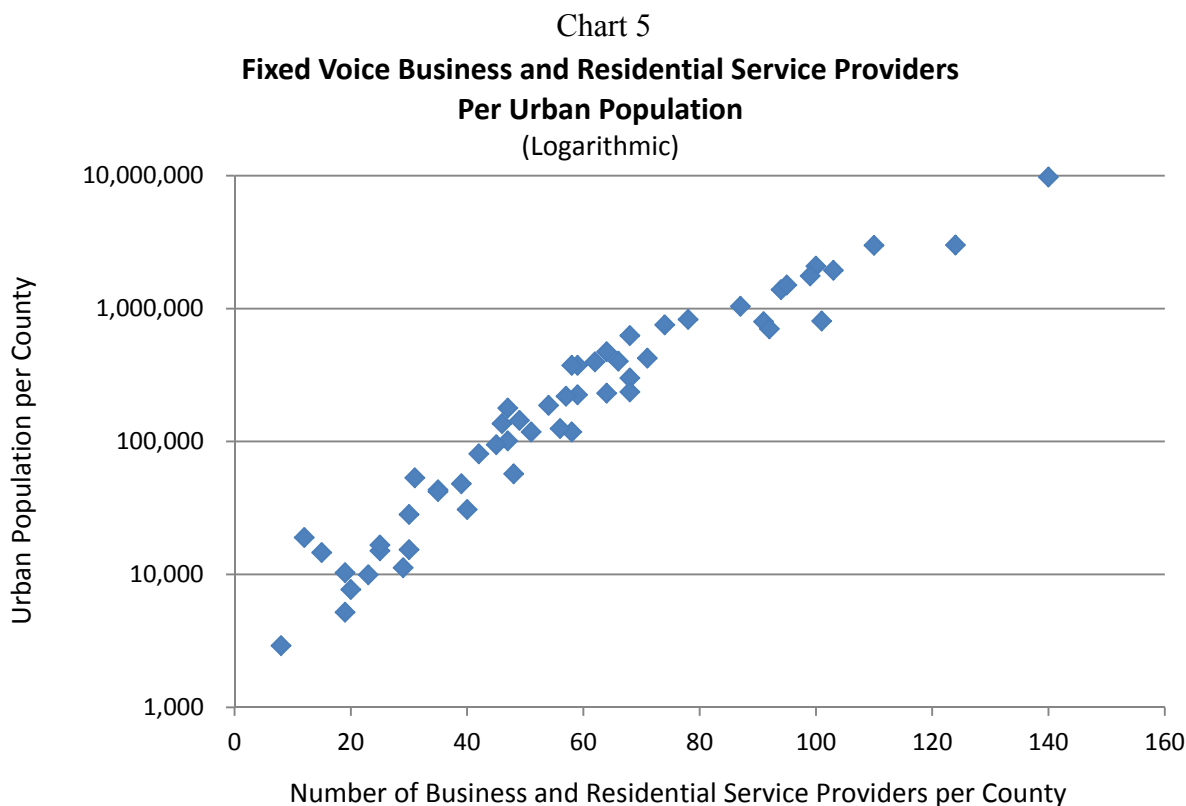
⁴¹ To identify urban areas, “the Census bureau will begin the delineation process by identifying and aggregating contiguous census tracts, each having a land area of less than three square miles and a population density of at least 1,000 people per square mile” (Federal Register / Vol., 76, No. 164 / August 24, 2011, pages 53039-53040).

⁴² The fixed voice services were reported by ZIP Code, which do not perfectly align with county boundaries. According to unitedstateszipcodes.org, about 10% of ZIP Codes cross county lines. Nonetheless, converting ZIP Codes into counties allows us to approximate the demographics.

⁴³ See Appendix C for a list of the fixed broadband technologies deployed in each county.

Number of Service Providers per County

Urban business and residential markets tend to have more fixed voice service providers than rural markets. Chart 5, below plots all 58 counties according to the total urban population and the number of fixed voice service providers within that county.⁴⁴ As the urban population of a county increases, the number of fixed voice service providers reporting subscribers also increases in that county.



Likewise, urban markets tend to have more fixed broadband service providers than rural markets. As with fixed voice services, many fixed broadband providers serve only businesses. Chart 6 below, depicts the positive relationship between percentage of population classified as urban and the number of fixed broadband service providers present in a county.

⁴⁴ Note: The number of service providers per county may seem high to the casual viewer. The data represents a count of the number of providers reporting at least one customer in the county. Thus, the counts do not represent what is available to each subscriber and is not intended to represent the number of choices each customer may have.