

The Business of Broadband, Part 1: Understanding the Broadband Market

California Public Utilities Commission

March, 2023



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Overview of Caseworker Seminars

Level 1	Level 2	Level 3
Business Considerations: <ul style="list-style-type: none">• Services, customer segments, market participants• Business/ownership models	Business Considerations: <ul style="list-style-type: none">• Funding strategies and fundamentals of finance• Intro to business plans	Business Considerations: <ul style="list-style-type: none">• Business plans, revenue sources, and forecasting• Marketing and strategic planning
Technology Talks: <ul style="list-style-type: none">• Overview of broadband technologies• Definitions, descriptions, graphics	Technology Talks: <ul style="list-style-type: none">• Cost modeling/resources required to deploy broadband• Strengths/weaknesses of different technologies	Technology Talks: <ul style="list-style-type: none">• Best practices for deploying and operating broadband• IRUs, pole attachments, easements, etc.
Policies and Tools: <ul style="list-style-type: none">• State/federal funding overview• CPUC role and available tools (maps/data)	Policies and Tools: <ul style="list-style-type: none">• Regulatory considerations and permitting best practices• Timeline for accessing grant opportunities	Policies and Tools: <ul style="list-style-type: none">• Using the Federal Funding Account + Loan Loss Reserve• Data collection, mapping, and reporting requirements

Goal: A community that completes the seminar series will be prepared to acquire grants and subsequently develop a successful broadband network.

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Business 101 Seminar Agenda

- The last mile and middle mile markets
- How the various markets fit together
- Introduction to public-private partnerships
- Introduction to broadband business planning
- Discussion

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The Last Mile and Middle Mile markets

Learning Objectives

- Understand the service providers in the market
- Understand the customer segments
- Understand the products and services
- Put all this together to understand how the last mile market functions

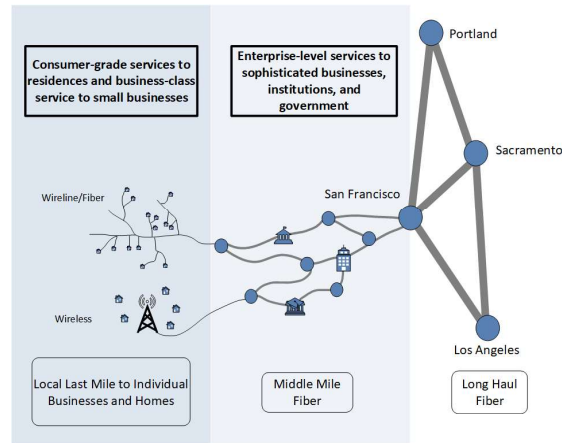


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Market elements

As with the physical structure of the network itself, the market is divided by types of providers and services based on:

1. Long haul
2. Middle mile
3. Last mile



Last mile services connect the customer to the local network and, thereby, to the internet

Consumer-grade internet services:

- Sold to households and small businesses
- No service quality guarantees
- Speeds advertised are maximums, not minimums

Business-class internet services:

- Sold to small and mid-sized businesses
- No service quality guarantees
- ISP will prioritize business-class consumers when capacity is constrained

Enterprise-level internet services:

- Sold to sophisticated institutions and businesses
- Provides service quality guarantees
- May include point-to-point transport and point-to-point dark fiber

Middle-mile services bridge the local network and the internet

Transport:

- Middle-mile providers transport traffic between local network and a major hub
- This is a high-end service used by more sophisticated ISPs

Commodity internet bandwidth:

- The service of putting traffic on the internet
- Prices vary from location to location
- Can be purchased locally or in another market (with transport)

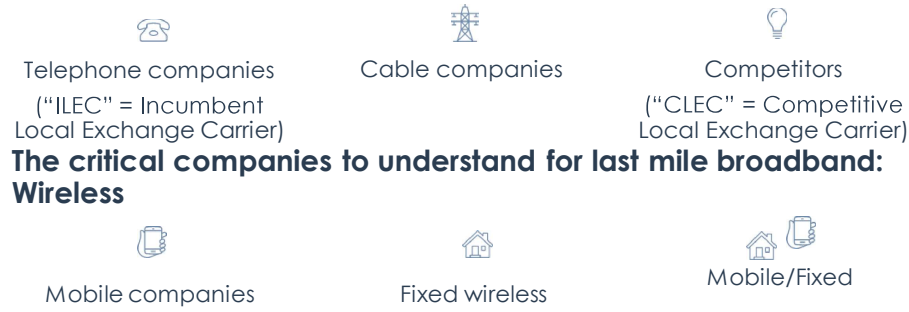
Dark fiber:

- Fiber strands that have not been "lit" with electronics
- The dark fiber owner maintains the fiber and guarantees access
- The ISP buying dark fiber access "lights" and operates it

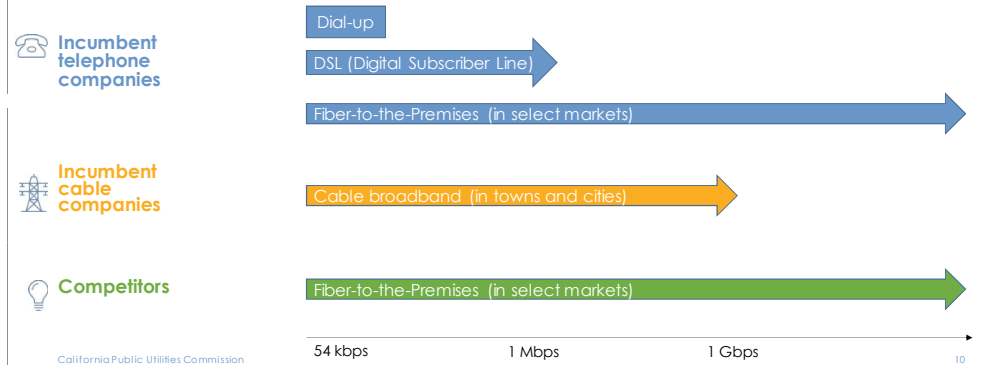
Last Mile and Middle Mile Discussions

- Who are the service providers in your area for these services?
 - Long Haul, Middle Mile, Last Mile
 - Consumer-grade, business-grade, and enterprise-level services
 - Transport, Commodity Internet Bandwidth
- Does your jurisdiction own any infrastructure that is used for provision of internet service? (Telephone pole, ROW, wireless towers)
- Follow-up questions can always be sent to: BroadbandCaseworkers@Cpuc.Ca.Gov

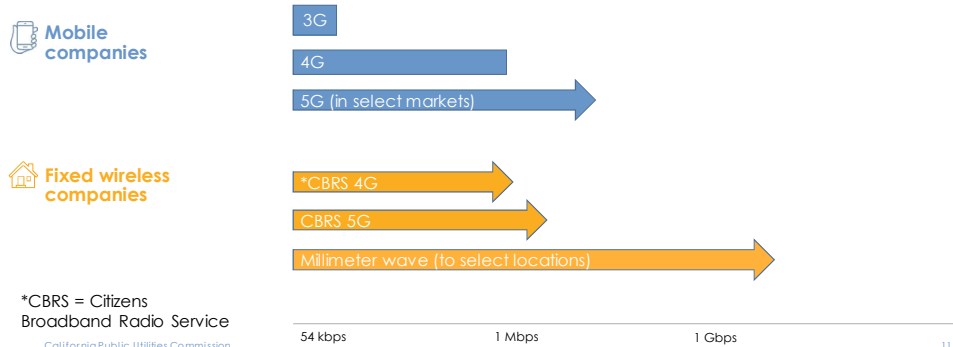
The critical companies to understand for last mile broadband: Wireline



Last mile wireline



Last mile wireless



*CBRS = Citizens Broadband Radio Service

Last Mile Companies Discussion

- Who are the last-mile providers in your community?
- What technologies do they use?
- What services they provide?

Follow-up Questions Can be sent to:
StatewideBroadband@Cpuc.Ca.Gov.

California Interactive Broadband Map

SEARCH PROVIDERS BY MAP

Near: Corning, California 96021

Clear

Fixed Broadband | Mobile | Boundaries

Calaveras Telephone Company
 Maximum Advertised Downstream Speed (Mbps): 10
 Maximum Advertised Upstream Speed (Mbps): 1
 Technology Type: ADSL2, ADSL2+
 Contact: <http://www.caltel.com>

Cal.net Inc.
 Maximum Advertised Downstream Speed (Mbps): 25
 Maximum Advertised Upstream Speed (Mbps): 5
 Technology Type: Terrestrial Fixed Wireless
 Contact: <http://www.cal.net>

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California Interactive Broadband Map

SEARCH PROVIDERS BY MAP

Near: 601 W Almond St, Compton, CA, 90220, USA

Clear

Fixed Broadband | Mobile | Boundaries

Charter Communications Inc
 Maximum Advertised Downstream Speed (Mbps): 940
 Maximum Advertised Upstream Speed (Mbps): 35
 Technology Type: Cable Modem DOCSIS 3.1
 Contact: <http://www.charter.com>

AT&T California
 Maximum Advertised Downstream Speed (Mbps): 100
 Maximum Advertised Upstream Speed (Mbps): 20
 Technology Type: VDSL
 Contact: <http://www.att.com>

AT&T California
 Maximum Advertised Downstream Speed (Mbps): 100
 Maximum Advertised Upstream Speed (Mbps): 20
 Technology Type: Asymmetric xDSL
 Contact: <http://www.att.com>

AT&T California
 Maximum Advertised Downstream Speed (Mbps): 18
 Maximum Advertised Upstream Speed (Mbps): 2
 Technology Type: ADSL2, ADSL2+
 Contact: <http://www.att.com>

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Interactive Broadband Map Discussion

- Please enter your favorite address in the search bar on the left hand side of the map.
- Please see the tabs on the left for the ISP offering service
- Do you know if there are companies or services missing from the map in your community?

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Overview of the Full Market

Learning objectives

- Understand the relationships between middle mile and last mile market segments, services, providers, customers
- Understand where a community network might fit in



PROVIDERS, CUSTOMERS, AND PRODUCTS

	Infrastructure company	Enterprise Service Provider	Incumbent	Competitor	Community Provider
	Leverages real estate and infrastructure to support ISPs	Sells high-end services to sophisticated end users and ISPs	Uses legacy networks to serve multiple market segments	Builds new networks to compete with incumbents	Offers community-focused solutions at the micro-level
Middle mile	1. Middle Mile Sells to ISPs				
	2. Wireless Backhaul Sells to Wireless ISPs				
	3. Enterprise Sells to businesses & institutions				
Last mile	4. Business Class Sells to small/medium businesses				
	5. Consumer-Grade Sells to homes and small businesses				
	Extenet Crown Castle	Zayo Lumen	AT&T Comcast	Sonic Netly	The Internet Archive

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Full Market Discussion

- Who are the incumbents or cable providers in your area?
- What role do you imagine your community playing in this market?
 - What services will you be buying?
 - From whom?
 - What services will you be selling?
 - To whom?

Follow-up Questions can be sent to: StatewideBroadband@Cpuc.Ca.Gov.

Introduction to Public-Private Partnerships

Learning objectives

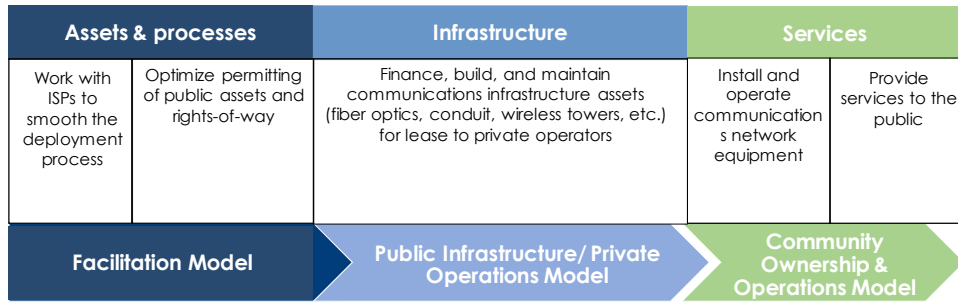
Initial overview of partnership and collaboration structures

Familiarity with range of partnership models

Overview of business models

Traditional model of full ownership & operations	The traditional way that incumbent (and competitive) providers operate Many local governments, given no alternatives, have also adopted the fully integrated, full risk model for municipal broadband networks
Public ownership/private operations	Separation of fiber ownership & operations/service
Public facilitation of private efforts	Public sector role does not involve ownership or risk, but does involve effort and commitment—in return for commitments in return by the private partner

Framework for community roles



Summary of models and roles

Network Element	Facilitation Model		Public Ownership/ Private Operations Model		Public Ownership & Operations Model	
	Optimize use of existing real estate	Optimize existing and build/acquire new real estate	Invest in fiber	Invest in fiber & network equipment	Maintain fiber & network equipment	All network responsibilities incl. marketing & customer service
1. Real Estate						
2. Fiber infrastructure						
3. Network equipment						
4. Network operations						
5. Service provision						

Public-Private Partnerships Discussion

- What questions do you have already about public-private partnerships?
- What questions would you like answered when we dive deeper into this topic in the next seminar?
- Do you already have a sense for what your community's relationship with the private sector will be? What challenges are you considering?

Follow-up Questions can be sent to: StatewideBroadband@Cpuc.Ca.Gov.

Introduction to Broadband Business Planning

Learning objectives

- Understand the key concepts related to broadband demand and revenues: take-rate, ARPU (Average Revenue Per User), churn, and ramp.

Take rates: Demographics & competition

Market competition	DSL only
	Cable & DSL
	Cable & partial fiber or VDSL
	Cable & FTTP
Demographics	Age
	Income
	Education
Brand, localism, & other local factors	ISP characteristics & capabilities
	Local brand a factor in smaller markets
	Customer service & consumer experience
	All slightly offset by bundling

Take-rate timing and elements

Take-rate ramp for competitive FTTP providers

- 25% of year 5 take-rate in year 1
- 50% in year 2
- 75% in year 3

Take-rate elements

- Number & identity of competitors
- Demographics
- Execution by ISP

Factors in ramp

- Speed of network activation & drop installation—may lag construction & requires available capacity & logistics
- Incumbent tools: lock-in, promotions
- Early word-of-mouth

Business Planning Discussion

- What take-rate would you expect for a new fiber provider in your community?
- What questions would you like answered when we dive deeper into this topic in the next seminar?
- Do you already have a sense for what your community's broadband business plan will look like? What challenges are you concerned about? What unique opportunities are available in your community?

Follow-up Questions can be sent to: StatewideBroadband@Cpuc.Ca.Gov.

Preview of Parts 2 and 3 of The Business of Broadband

Part 2: Broadband public-private partnerships

- Models
- Opportunities
- Strategies for next steps

Part 3: Broadband business planning

- Revenues
- Operating costs
- Financial modeling

please contact us at BroadbandCaseworkers@Cpuc.Ca.Gov

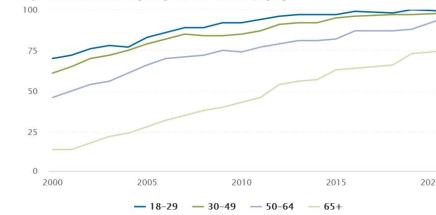
Appendix

More detail regarding companies in the California broadband market

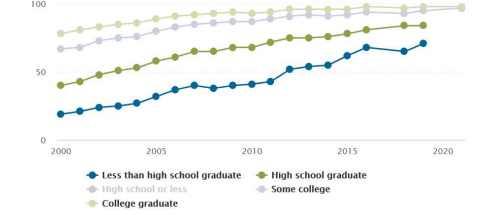


Understanding the interplay of demographics and take rate #1

% of U.S. adults who say they use the internet, by age

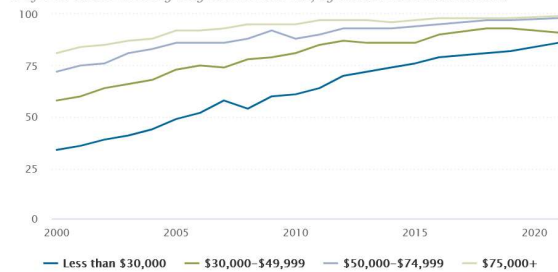


% of U.S. adults who use the internet, by education level



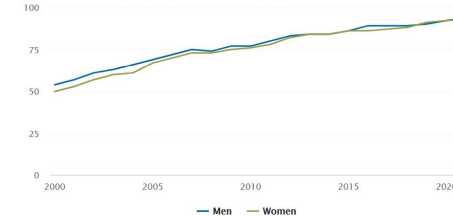
Understanding the interplay of demographics and take rate #2

% of U.S. adults who say they use the internet, by annual household income

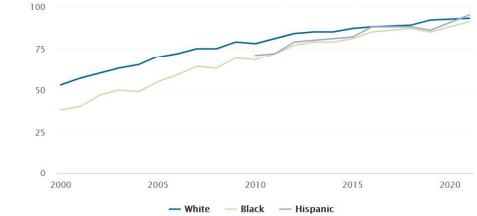


Understanding the interplay of demographics and take rate #3

% of U.S. adults who say they use the internet, by gender



% of U.S. adults who say they use the internet, by race/ethnicity



Understanding “Churn”: a particular challenge for small providers that don’t have pricing as tool to retain price shoppers

Churn a function of price shopping for residential & reliability for business	Incumbent churn is much lower on fiber than copper
	For business customers, the fiber industry average is 6-8%/year
Incumbents address churn through pricing	For residential customers, the fiber industry average is 8-18%/year (25% and more for copper)
	Promotional pricing to attract & retain customers
Small providers challenged to limit residential churn	Lock-in through multi-year contracts, particularly for small and medium businesses
	Special incentives that can change weekly or more: “free” streaming services, gift cards
	Residential churn is a function of price shopping and customer service frustration
	Churn is particularly costly because of the sunk cost of installing the “drop” and equipment at the customer’s location
	Customer service is the critical retention tool to reduce churn

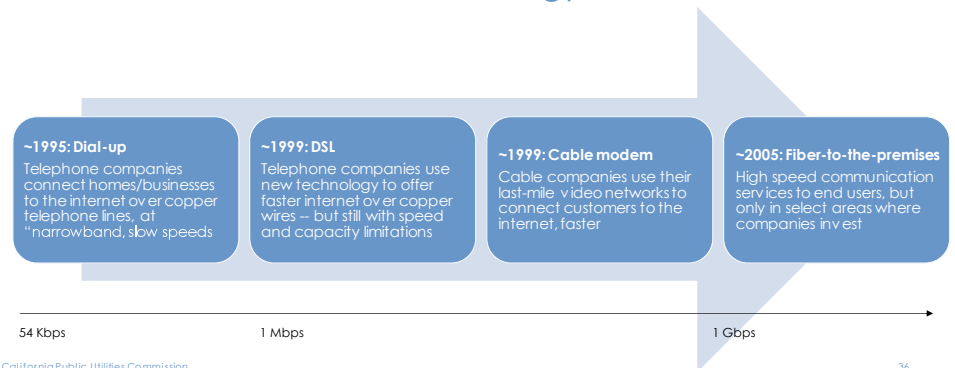
Consumer and Small Business Market

Wireline network operators	Telcos: AT&T, Frontier, Consolidated, small rural cos.
	Cable companies: Comcast, Cox, Charter/Spectrum
	Cooperatives & competitors: Anza, Southern California
Mobile network operators (MNO)	AT&T, Verizon, T-Mobile
	Emerging: DISH
Fixed wireless operators	Generally, small, local operators in rural areas
	Verizon & T-Mobile using mobile network to offer rural FWA
Mobile virtual network operators (MVNO)	Verizon urban FWA underperformed
	Starry & WeLink pioneering new urban FWA technology
Satellite	Boost, Google Fi, Tracfone, Cricket (AT&T), Metro (T-Mobile)
	Viasat, HughesNet, Starlink

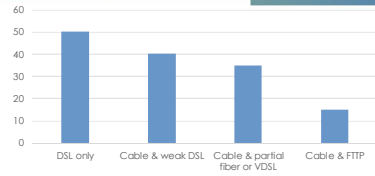
Business and Enterprise Market

Middle mile (backhaul, fronthaul, enterprise)	AT&T, Verizon, Zayo, Lumen, Crown Castle, Infiniti, etc.
Tower/wireless infrastructure	Crown Castle, American Tower, Extenet, Mobililitie
Long-haul	AT&T, Verizon, Comcast, Charter, Crown Castle, Hurricane Electric, etc. Google, Facebook, Amazon
Undersea	AT&T, Verizon, China Telecom etc. (generally, consortia of national telecom companies & investors) Google, Facebook, Amazon

How does this relate to Broadband Technology 101? Recall the evolution of technology



Take-rates: competition



Number of competitors Take rate range
for new competitor

Telco: Weak DSL	High '40s & above
Telco: Weak DSL Cable: DOCSIS 3.1	35-40%
Telco: Partial fiber or VDSL Cable: DOCSIS 3.1	30-40%
Telco: Extensive fiber Cable: DOCSIS 3.1	12-30%