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PUBLIC POLICY
INSTITUTE OF CALIFORNIA

Achieving Universal Broadband in California

Technical Appendices

CONTENTS

Appendix A. Interview Design

Appendix B. Additional Tables and Figures

Appendix C. Sample Interview Protocols

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Appendix A. Interview Design

Interview development

Our qualitative data collection relied on semi-structured interviews with individuals responsible for local broadband expansion efforts. We first developed separate interview protocols for each of the major types of respondents we targeted for the survey: County Offices of Education, regional broadband consortia, and leaders of broadband expansion initiatives such as tribal organizations, municipal governments, and non-profit organizations. In the process, we realized the considerable overlap in the nature of questions directed at each type of respondent, and integrated our questions into a master interview guide (Appendix C) Questions were adjusted based on organizational type, focus, size, and location.

The process of identifying respondents began with contacting the Chief Technical Officer (CTO), or the equivalent position, at each of California’s 58 County Offices of Education. Next, we prioritized reaching out to individual entities that had mounted a campaign to expand broadband access in their communities, of the types mentioned above. We included in the interview guide a solicitation to provide contact information for anyone the respondent thought we should speak with: counterparts in similar organizations, partners with whom they had worked, experts they had consulted with, etc. In this way, our eventual sample emerged from a combination of convenience sampling and snowball sampling.

Table A1 lists our total analytic sample. In sum, we conducted 41 interviews with representatives from organizations serving 54 of California’s 58 counties. We completed 12 interviews with County Office of Education staff; 10 with representatives of county, municipal, or state government agencies; 3 with tribal governments or affiliated organizations; 10 with regional consortia; and 6 with foundations, regional booster organizations, or private companies. Interviews ranged from 30 minutes to 1 hour in length and took place between June 2022 and September 2022. All interviews were conducted virtually via Zoom and transcribed through Zoom audio transcription.

TABLE A1

Total Analytic Sample of Interviews

County Offices of Education:
Colusa County Office of Education
Glenn County Office of Education
Imperial County Office of Education
Inyo County Office of Education
Kern County Office of Education
Los Angeles County Office of Education
Monterey County Office of Education
Riverside County Office of Education
San Bernardino County of Superintendent of Schools
Santa Clara County Office of Education
Santa Cruz County Office of Education
Ventura County Office of Education
Municipal/County/State Govt. or Agencies:
Community Coalition of the Antelope Valley

City of Chico
California Public Utilities Commission
Coachella Valley Economic Partnership
Fresno Unified School District
Los Angeles County Internal Services Department
Nevada County Information and General Services
#OaklandUndivided
Office of Santa Clara County Supervisor Cindy Chavez
Tehama County Department of Education
Tribal Governments/Agencies:
Ewiiapaayp Band of Kumeyaay Indians
Hoop Valley Public Utilities District
Southern California Tribal Chairmen's Association
Regional Consortia:
Broadband Consortium of the Pacific Coast
California Center for Rural Policy
Digital Equity Coalition
Inland Empire Regional Broadband Consortium
Monterey Bay Economic Partnership
Rural County Representatives of California
San Diego Association of Governments
Southern California Association of Governments
Sonoma County
Valley Vision
Foundation/Booster Organization/Private Concern:
California Community Foundation
BizFed Institute
California Forward
CENIC
California Foundation on the Environment and the Economy
Inyo Networks

Analytic Strategy

Analysis occurred in two primary stages. First, the authors constructed a generalized codebook based on the interview guide and conducted a round of deductive coding of all interview transcripts in Dedoose. The authors applied a total of 56 codes, including ones that focused on geographic variation (“Urban/suburban/rural” and “terrain description”), broadband initiatives (“Broadband past/present”), and SB 156 engagement and funding, towards excerpts in all interview transcripts. The authors ensured inter-coder reliability through subsequent quality checks and peer review. A copy of the deductive codebook is available below in Table B1.

Second, the authors used Dedoose to analyze code application and to identify emerging themes (see Table B2). The authors also exported excerpts from Dedoose to categorize into analytic memos for each major “parent” code. These memos were used to inform the policy recommendations and individual regional variations described in this paper.

Appendix B. Additional Tables and Figures

TABLE B1

Types and frequencies of codes applied

Parent Code	Subcode	Frequency
2. Organizational Characteristics	--	--
	2.1 Function/role	25
	2.2 Size of organization	3
3. Geography and topography	--	13
	3.1 Urban	9
	3.2 Suburban	5
	3.3 Rural	43
	3.4 Tribal lands	15
	3.5 Terrain description	33
	3.6 Natural disasters	7
4. Population characteristics	--	--
	4.1 Unserved and underserved	124
	4.2 Prominent industries and jobs	16
	4.3 Race & ethnicity	14
	4.4 Migration and immigration	8
	4.5 Landlords and tenants	3
	4.6 General SES	31
	4.7 Other population characteristics	40
5. Broadband (general)	--	--
	5.1 Past broadband (middle mile)	22
	5.2 Past broadband (last mile)	21
	5.3 Current broadband (middle mile)	34
	5.4 Current broadband (last mile)	43
	5.5 COVID-related broadband	16
	5.6 K-12 related broadband	72
	5.7 Cross-sector partnerships	177
	5.8 Digital literacy	31
	5.9 Success and positive sentiment	75
	5.10 Challenges and negative sentiment	94
	5.11 ISPs	87
	5.12 Develop broadband plans	44
	5.13 Technical assistance	16

Parent Code	Subcode	Frequency
	5.14 Permitting	26
6. SB 156	--	17
	6.1 Engagement with SB 156 projects	41
	6.2 Application process	29
	6.3 Government advocacy	17
	6.4 CPUC Map	40
	6.5 Positive sentiment/potential for improvement	26
	6.6 Negative sentiment/no potential for improvement	48
	6.7 Community partners and ISPs	32
	6.8 Short timing	17
	6.9 Insufficient funds	20
7. Funding	--	38
	7.1 Federal funds	69
	7.2 State funds – middle mile	30
	7.3 State funds – last mile	32
	7.4 County/city funds	20
	7.5 Private funds	22
8. Data collection	--	14
	8.1 Self-organized data collection	29
	8.2 Data limitations	36
	8.3 Engagement with large datasets	11

TABLE B2

Frequency of co-occurring codes from our analytic sample. (Top co-occurring in terms of frequency)¹

Code #1	Code #2	Frequency of co-occurrence
Cross-sector partnerships	ISPs	49
Cross-sector partnerships	Success and positive sentiment	45
Unserved and underserved	Challenges and negative sentiment	37
Cross-sector partnerships	Challenges and negative sentiment	34
ISPs	Challenges and negative sentiment	32
Other population characteristics	Unserved and underserved	26
Rural	Unserved and underserved	25
ISPs	Unserved and underserved	23

¹ The table above informs our policy recommendations on the importance of pursuing cross-sector partnerships. High frequencies of “co-occurrent” codes show that among the variation of broadband projects interviewees described, issues around unserved and underserved populations, ISP involvement, and the need for collaboration are intertwined.

TABLE B3

OLS coefficients of community factors on maximum advertised download speed

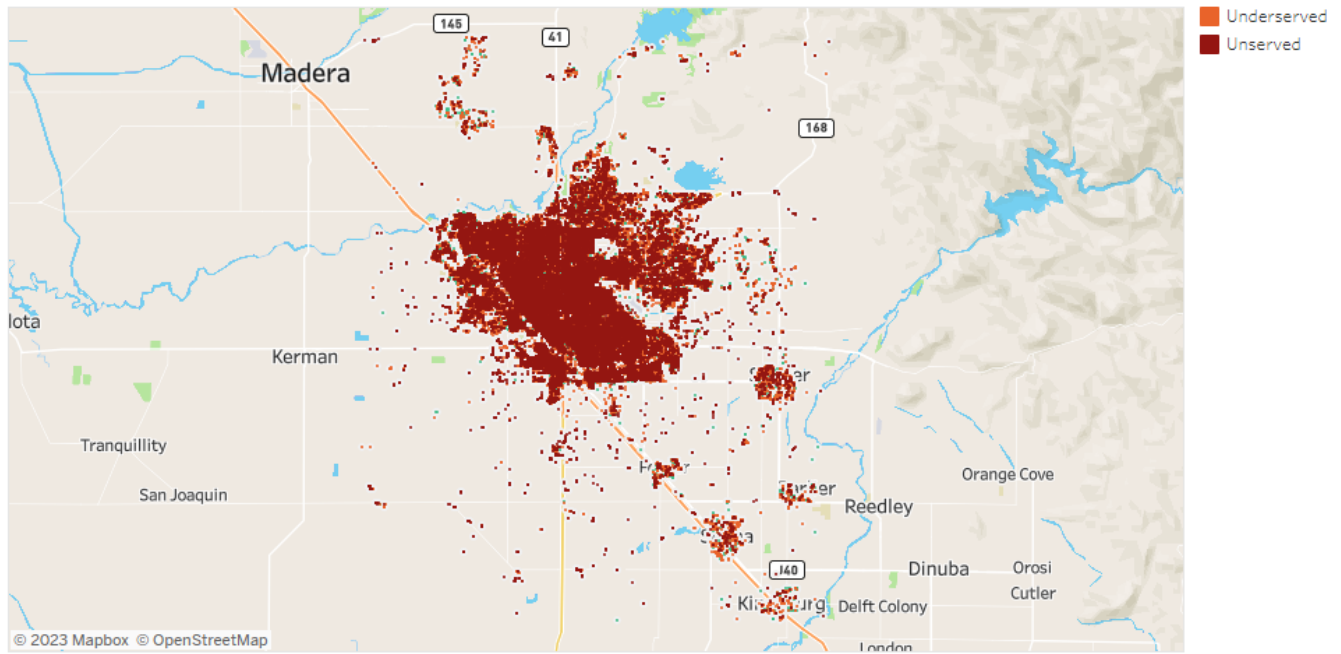
Community factors	Coefficient
Percent of population Black	3.3855 ***
Percent of population Latino	0.1118
Percent of population Native	-3.69 ***
Percent of population at < 150% FPL	-1.1146 ***
Population density	-298.154

SOURCES: Authors' calculations using CPUC census block-level advertised maximum download speeds aggregated to Census tract level, and Census Bureau 2015-2019 ACS census tract-level data on demographic characteristics. *** p < 0.01

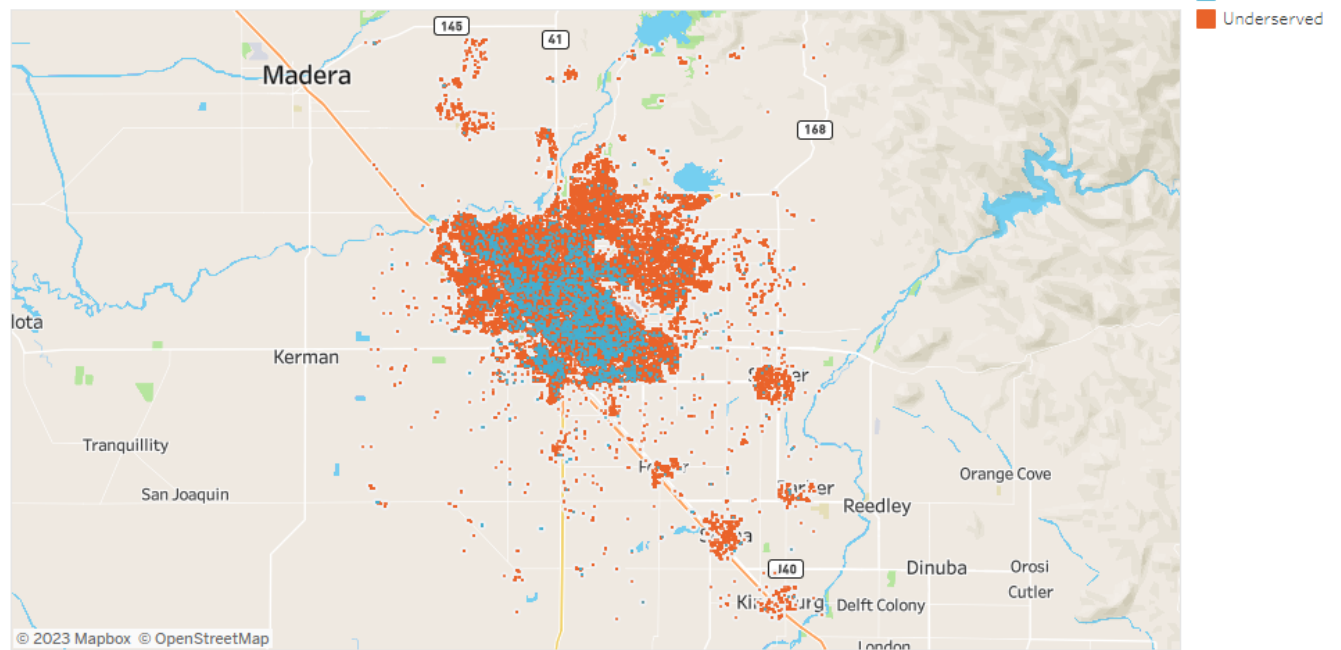
FIGURE B1

Results of Fresno Unified School District’s speed testing: download, latency, and unconnected students
(Interactive versions of these maps are [available here](#))

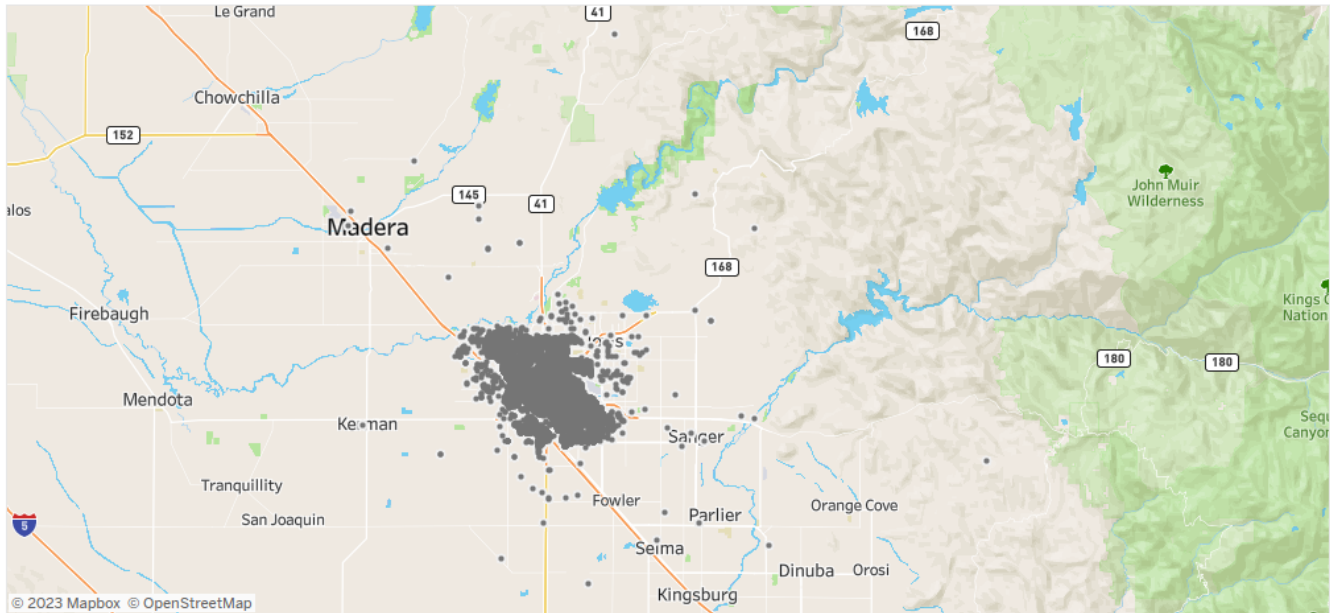
Download speeds



Latency



Unconnected



SOURCE: Fresno Unified School District Information Technology Department, 2022.

NOTES: Download speed testing results are in megabits per second (Mbps) and latency speed testing results are in milliseconds. In accordance with the California Public Utilities Commission's and Federal Communications Commission's categorizations of broadband speeds, locations are considered served when their network speed is at least 100 Mbps for downloads and no greater than 100 milliseconds (ms) for latency. "Unconnected students" are those who have devices that have never connected beyond their school's network, thus they have no speed testing results. All speed testing results are averages for the areas surrounding their coordinates and locations are approximated to protect households' privacy. For this reason, the same locations may display multiple categories of speed testing results due to high variation in localized areas. Due to the large quantity of underlying data, this map may take a long time to load and refresh after clicks. Interactive versions available here:

<https://public.tableau.com/app/profile/public.policy.institute.of.california/viz/FresnoSpeedTesting/Downloadspeeds>

Appendix C. Sample Interview Protocol

Note: we do not show the skipping patterns.

Section 1. Background/identifying information

1. Can you tell us a little about the unserved and underserved households in your area? Where are they and what kind of communities do they live?
2. Historically, what has broadband access looked like in ___ location ___?

Section 2. Broadband efforts/initiatives

Thank you for that information. We'll move onto questions about broadband access more specifically now.

3. Can you tell us about the local efforts to expand broadband access in your area?
4. Are you or your organization involved in any last-mile projects?
 - a. Are you partnering with any local organizations, consortiums, or businesses to do so?
 - b. If not, what is preventing these partnerships from happening?
 - c. If so, what has enabled these partnerships to form and continue?
 - d. Are you planning on applying for SB 156 grants? Do you feel as if you have the resources and the means to propose a successful grant? Why or why not?
5. Are you or your organization involved in any middle-mile projects?
 - a. Do you think that the CPUC/FCC map accurately captures the un/underserved populations in your district? Why or why not?
 - b. Do you feel as if you have the resources and the means to propose a successful grant? Why or why not?
 - c. How about federal funding opportunities, e.g. NTIA?

Section 3. Success and challenges

6. What has worked well or gone smoothly in helping to connect communities that you're striving to serve?
7. Do you foresee any challenges with SB 156 implementation statewide? What about specifically in _____your location_____? What needs to be done to address this?

Section 4. Conclusion

Thank you so much for your insights. We have two final questions before we wrap up:

8. Is there anything else you'd like us to know that we haven't discussed yet?
9. Do you know of anyone else working on these topics who we should speak with?



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