CENIC
Connecting California

Report on Opportunities to Expand Broadband Coverage in the Central Sierra Regional Broadband Consortia

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February 19, 2020

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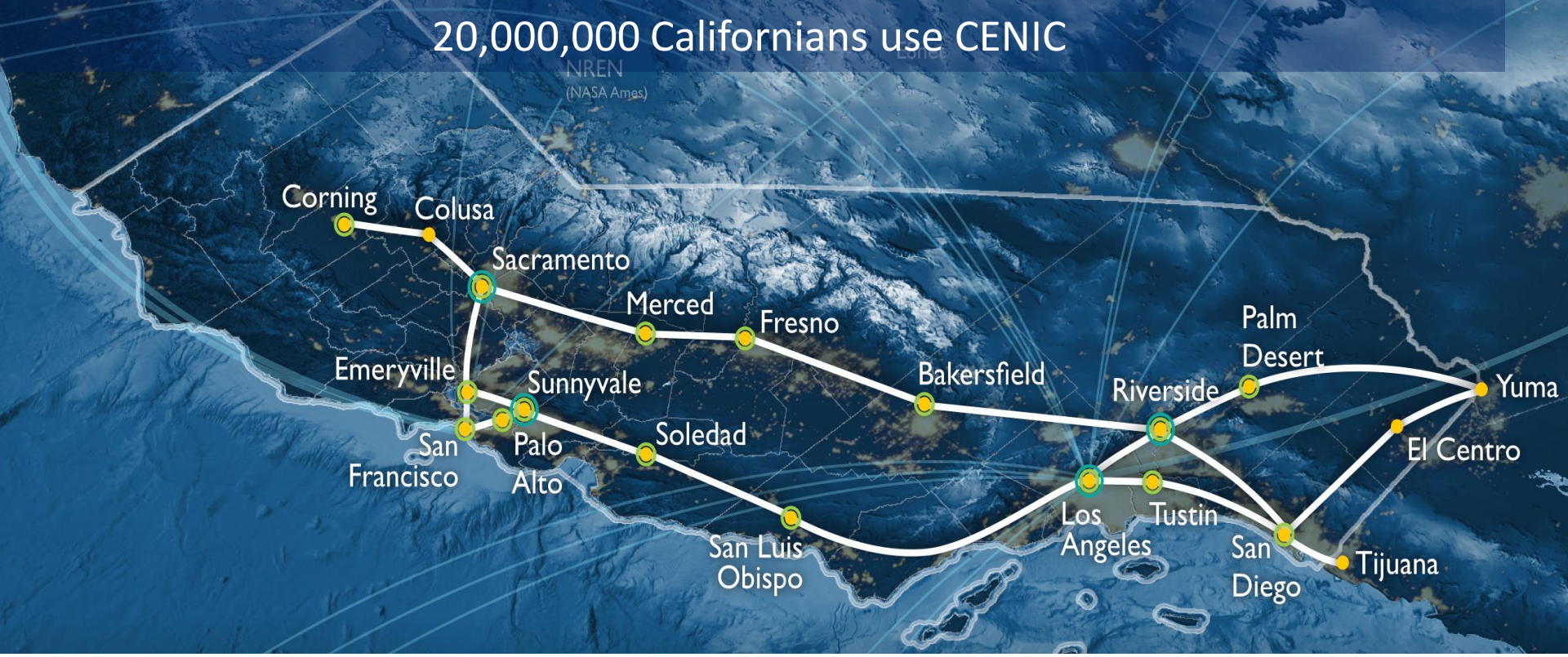
Connecting California

CENIC is a 501(c)(3) with the mission to advance education and research statewide by providing the world-class network essential for innovation, collaboration, and economic growth.

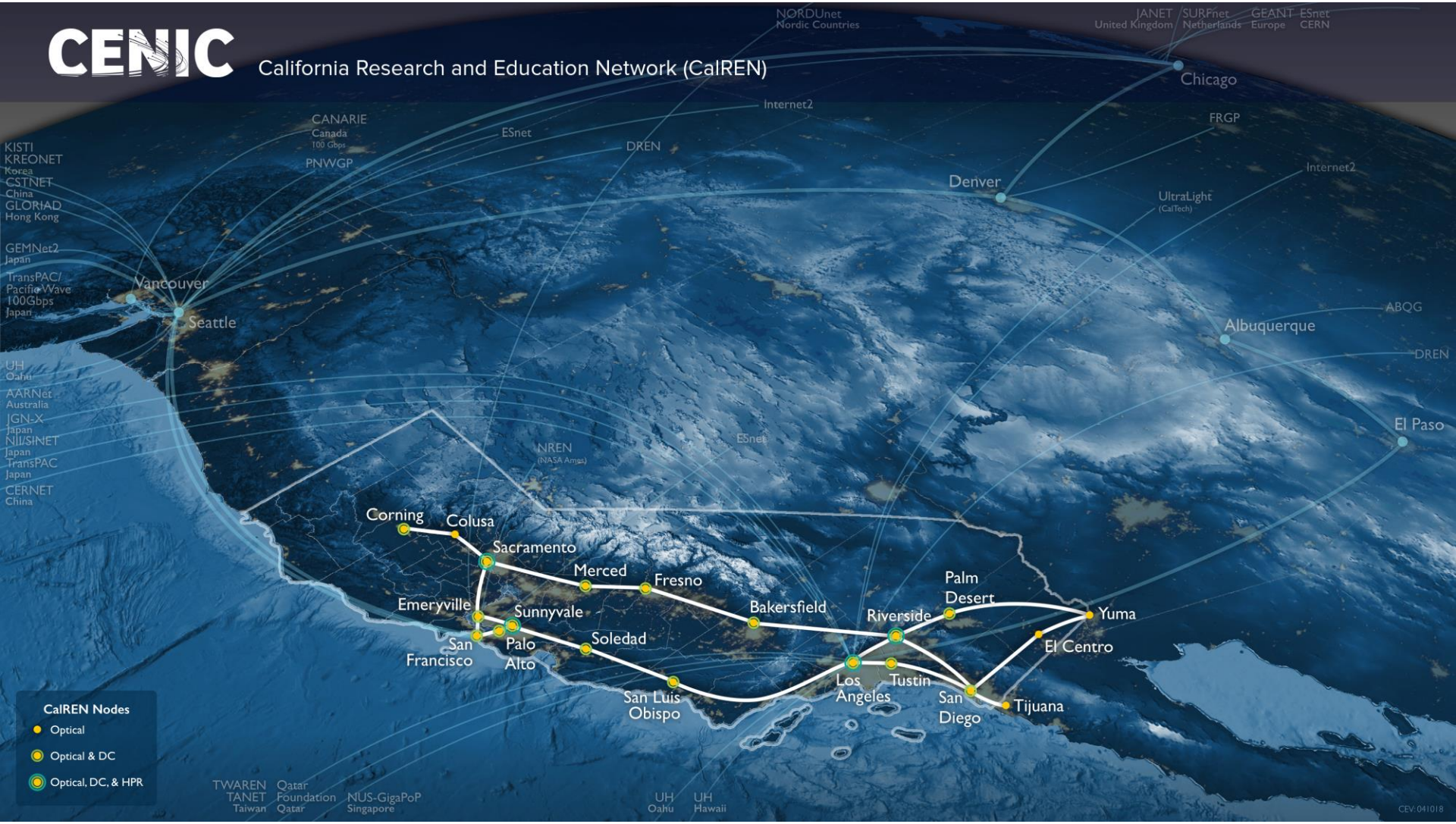
Charter Associates:

- California K-12 System
- California Community Colleges
- California State University System
- Stanford, Caltech, USC
- University of California
- California Public Libraries
- Naval Postgraduate School

20,000,000 Californians use CENIC



- **8,000+** miles of optical fiber
- **Members in all 58 counties** connect via fiber-optic cable or leased circuits from telecom carriers
- **Over 12,000 sites** connect to CENIC
- **A non-profit** governed by its members
- Collaborates with over **750 private sector partners and contributes > $100,000,000** to the CA Economy
- **20 years** of connecting California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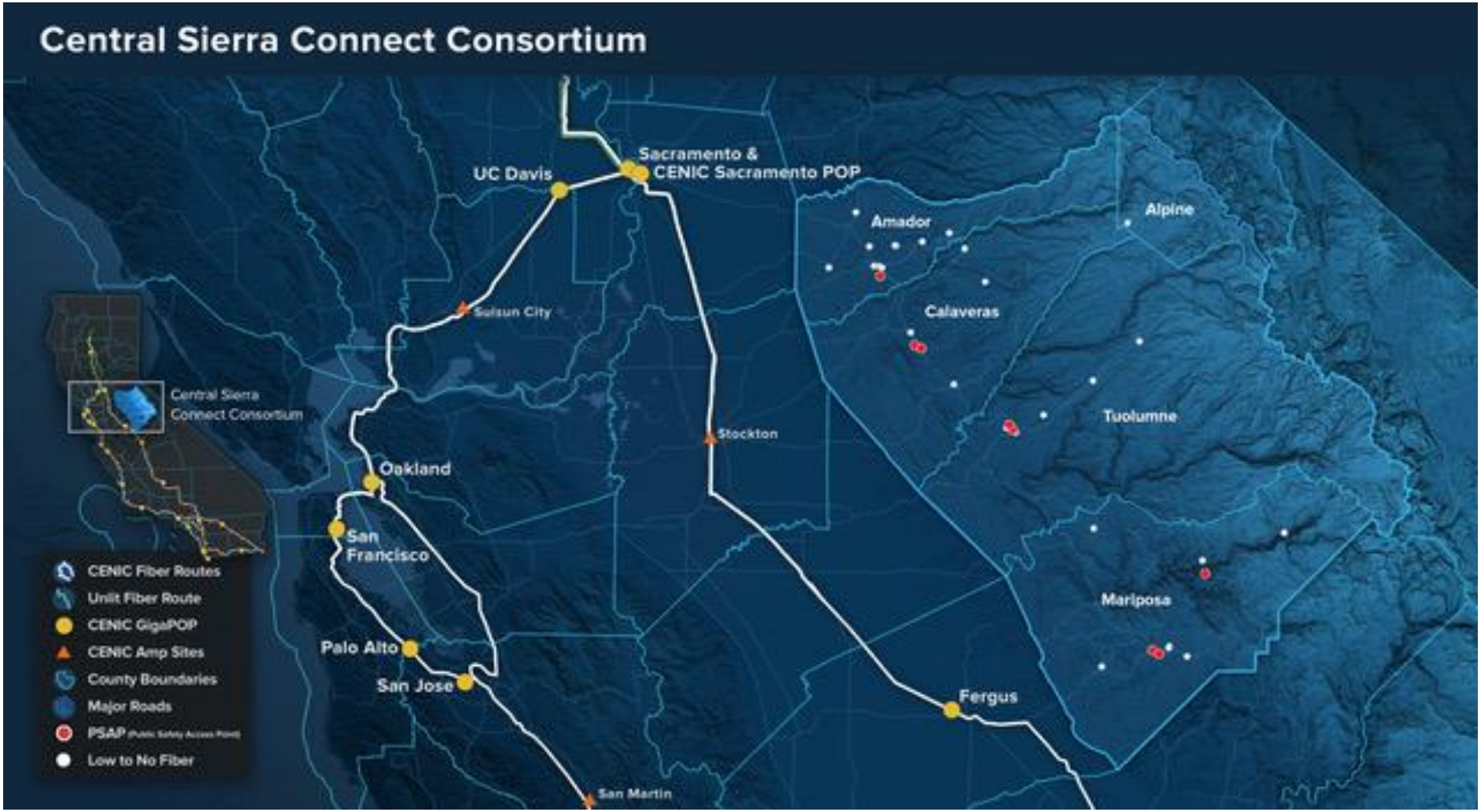
California Research and Education Network (CalREN)
NORDUnet
Nordic Countries
JANET
United Kingdom
SURFnet
Netherlands
GEANT
Europe
ESnet
CERN
Chicago
Internet2
CANARIE
Canada
100 Gbps
ESnet
DREN
PNWGP
FRGP
KISTI
KREONET
Korea
CSTNET
China
GLORIAD
Hong Kong
Denver
Internet2
UltraLight
(CalTech)
GEMNet2
Japan
TransPAC/
Pacific Wave
100Gbps
Japan
Vancouver
Seattle
ABQG
Albuquerque
DREN
UH
Oahu
AARNet
Australia
JGN-X
Japan
NII/SINET
Japan
TransPAC
Japan
CERNET
China
El Paso
NREN
(NASA Ames)
ESnet
Corning
Colusa
Sacramento
Merced
Fresno
Bakersfield
Palm
Desert
Riverside
Yuma
El Centro
Emeryville
Sunnyvale
San
Francisco
Palo
Alto
Soledad
San Luis
Obispo
Los
Angeles
Tustin
San
Diego
Tijuana
CalREN Nodes
Optical
Optical & DC
Optical, DC, & HPR
TWAREN
Taiwan
TANET
Taiwan
Qatar
Foundation
Qatar
NUS-GigaPoP
Singapore
UH
Oahu
UH
Hawaii
CEV.041018

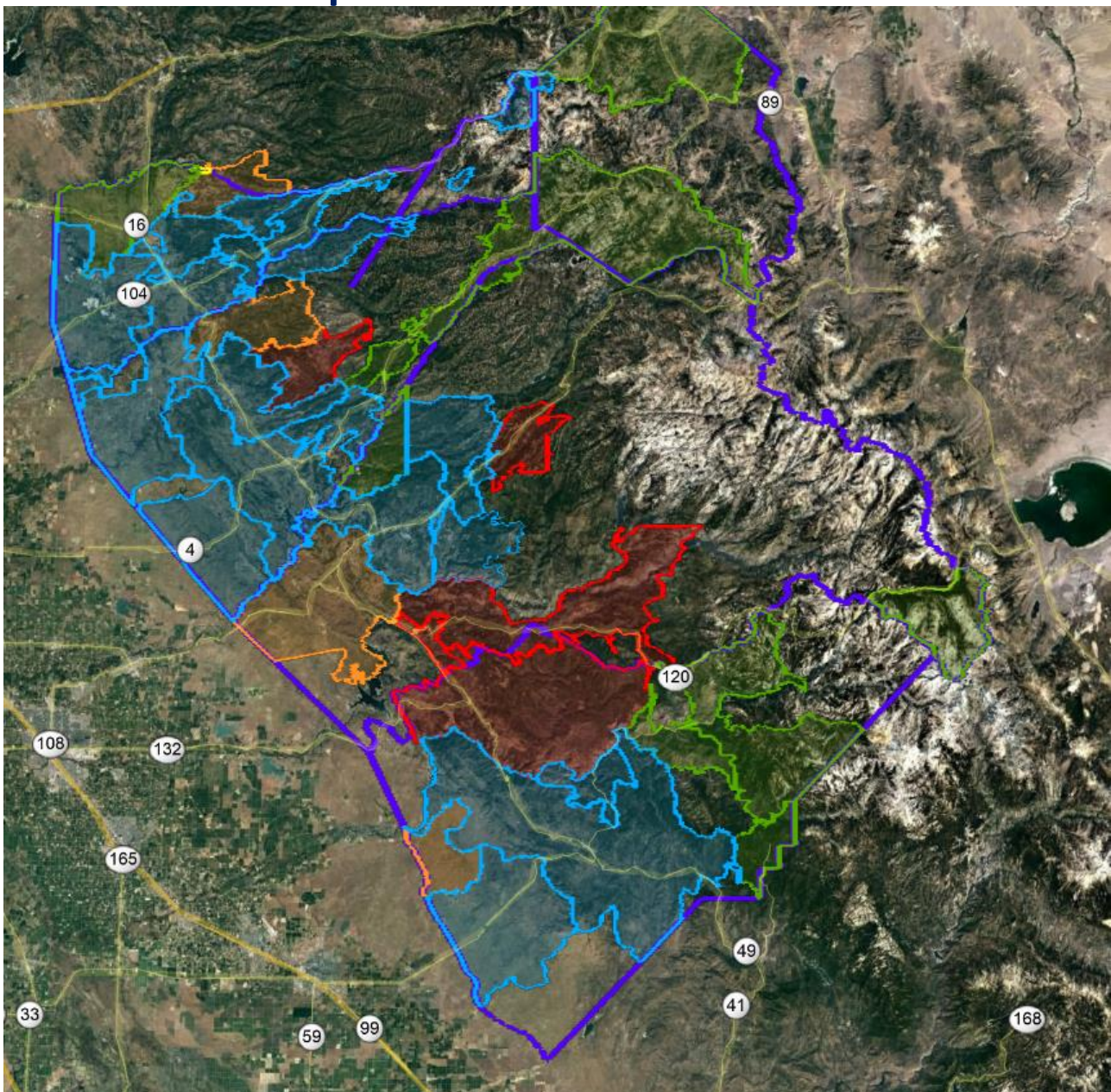

PACIFIC WAVE
INTERNATIONAL PEERING EXCHANGE
PACIFIC WAVE IS A PROJECT OF CENIC & PACIFIC NORTHWEST GIGAPOP
CSTNET
KISTI/KREONET
JGN (Seattle & Tokyo)
WIDE
TransPAC/Pacific Wave
GEMNet2
Korea
Japan
China
Taiwan
Hong Kong
Qatar
QATAR FOUNDATION
SINET
AARNET
UH
JGN/SingAREN
Guam
SingAREN/Internet2
PIREN
CERNET
TWAREN/TANET
Oahu
Hawaii
Singapore
Australia
REANNZ
New Zealand
PACIFIC WAVE BACKBONE
Vancouver
Seattle
CANARIE
PNWGP
ESnet
DREN
Internet2
CENIC
NREN (NASA Ames)
San Francisco Bay Area
Los Nettos
Los Angeles
Tijuana
FRGP
Denver
UltraLight (Caltech)
Albuquerque
ABQG
El Paso
Transtelco
CUDI
México
StarLight
Chicago
NORDUNet
Nordic Countries
United Kingdom
Netherlands
JANET
SURFnet
GÉANT
ESnet
Europe
CERN
SPEEDS/POPS
1 - 2.5 Gbps
10 Gbps
100 Gbps
CURRENT
FUTURE
Pacific Wave POPs
Pacific Research Platform (PRP)
PRP Science DMZ Fabric
Software Defined Network
Commercial Peering Points
(Amazon, Google, & Microsoft)
WESTERN REGIONAL NETWORK
States served by WRN members:
- ABQG: New Mexico GigaPoP
- CENIC: California
- FRGP: Colorado and Wyoming
- PNWGP: Washington, Montana, Alaska, Oregon & Idaho
- UH: Hawaii
CEV- 09-11-17-01
WITH SUPPORT FROM THE NATIONAL SCIENCE FOUNDATION
NSF


Central Sierra Connect Consortium
Sacramento &
CENIC Sacramento POP
UC Davis
Amador
Alpine
Calaveras
Suisun City
Central Sierra
Connect Consortium
Stockton
Tuolumne
Oakland
San
Francisco
Mariposa
Palo Alto
San Jose
Fergus
San Martin
CENIC Fiber Routes
Unlit Fiber Route
CENIC GigaPOP
CENIC Amp Sites
County Boundaries
Major Roads
PSAP (Public Safety Access Point)
Low to No Fiber

Central Sierra BB Gap

- Large gaps exist along Highways 120 and 49
- Open Access Middle Mile routes would facilitate collaboration
- Diverse Middle Mile routes would enable broadband access equitably across the region

Source: 2019 Census data by zip code cross referenced to FCC broadband penetration analysis



Central Sierra Zip Code Maps
Red 80% Gap
Orange 60 - 80% Gap
Yellow 40 - 60% Gap
Green 20-40% Gap
Blue 0 -20% Gap

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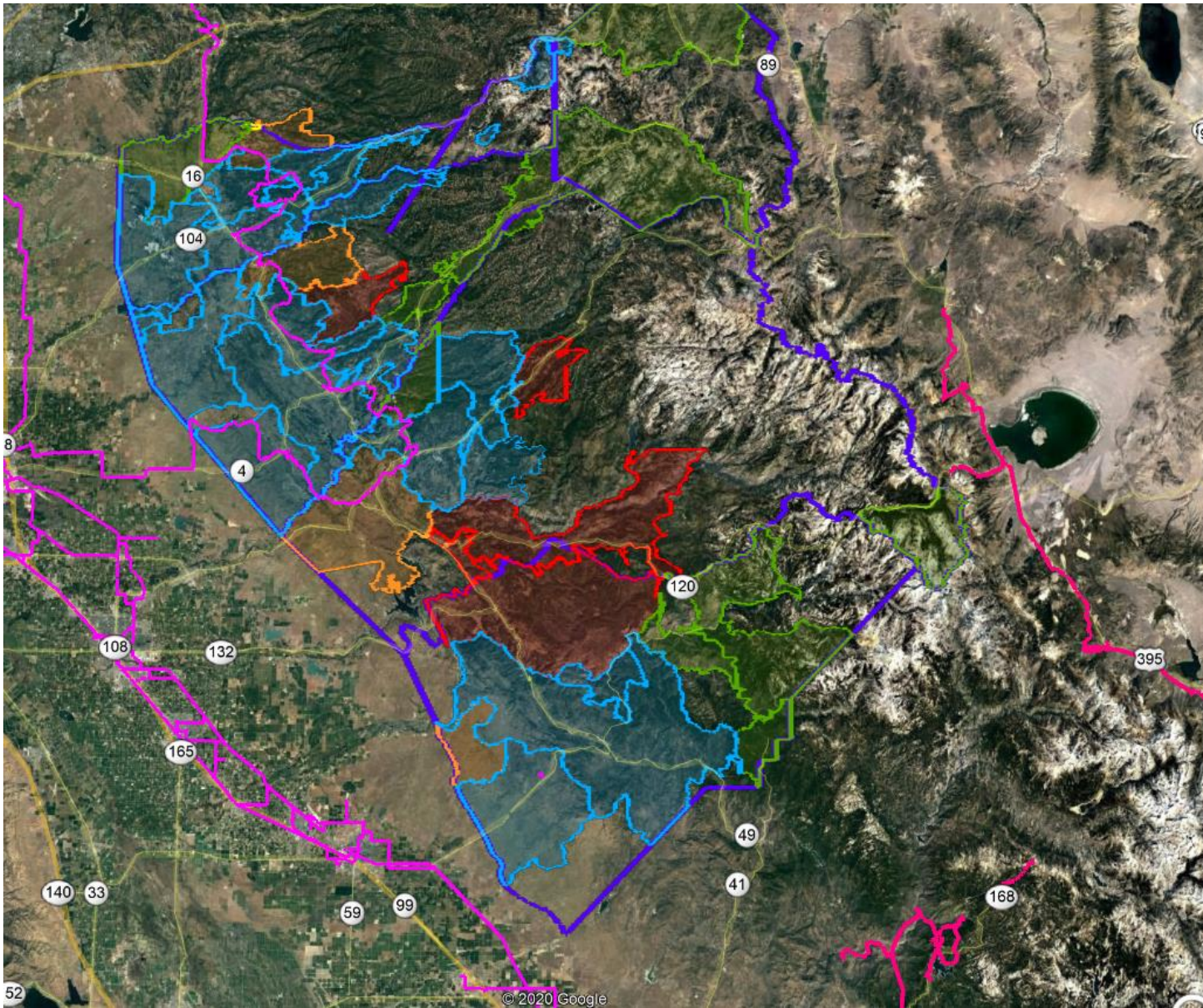
Existing Fiber for Middle Mile Partnerships

(Pink Routes)

- Three carriers actively offer middle mile infrastructure for last mile providers
- Proprietary networks service the most densely populated pockets typically do not offer middle mile access
- Middle mile infrastructure could offer very resilient diversity options



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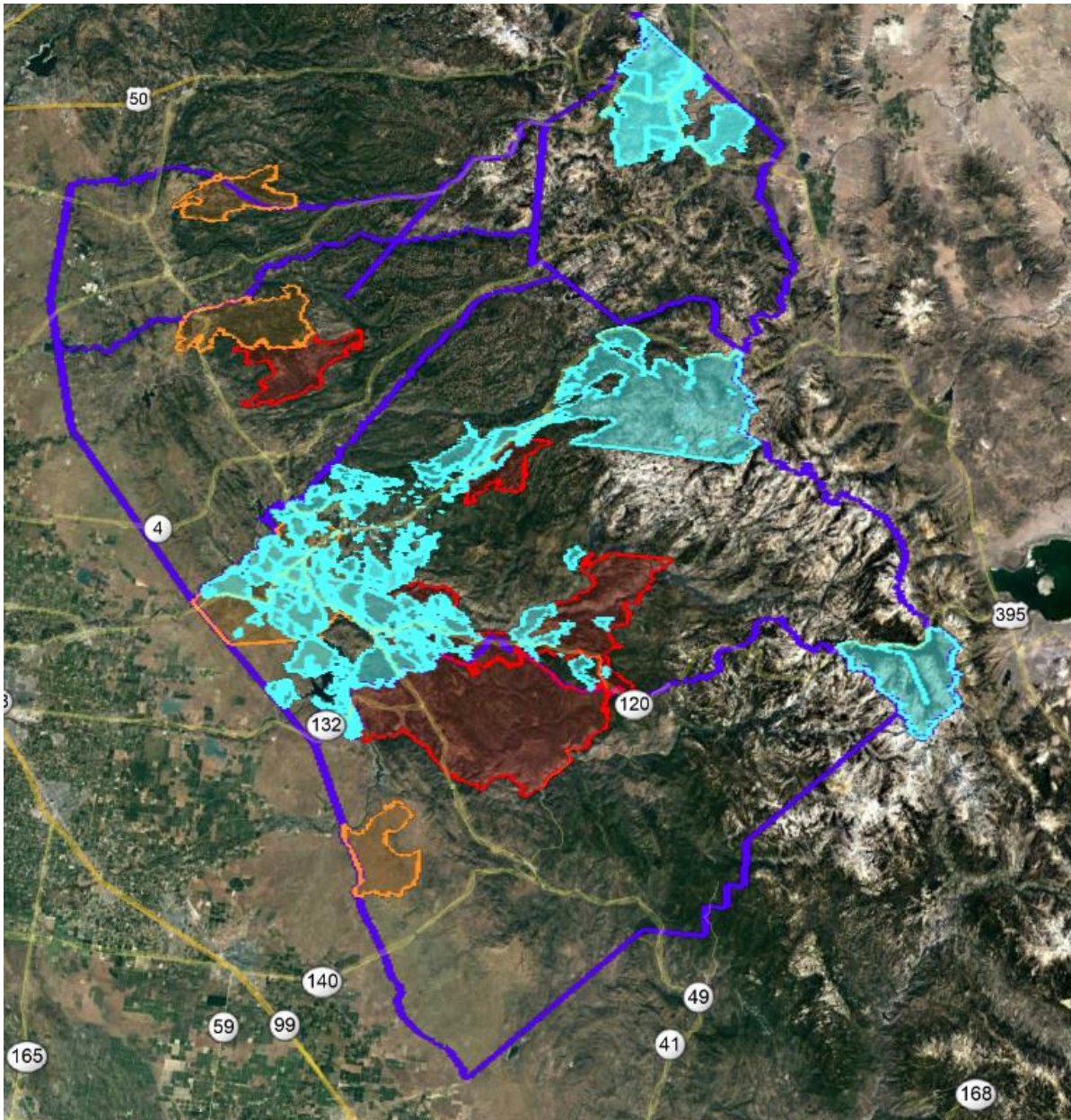
Connect America Fund II 2019 overlay on areas with the largest gaps

The goals of the plan are described on broadband.gov:

- At least 100 million U.S. homes should have affordable access to actual download speeds of at least 100 by the year 2020.
- Every American should have affordable access to robust broadband service, and the means and skills to subscribe if they so choose.
- Every American community should have affordable access to at least 1 gigabit per second broadband service to anchor institutions such as schools, hospitals, and government buildings.
- To ensure the safety of the American people, every first responder should have access to a nationwide, wireless, interoperable broadband public safety network.



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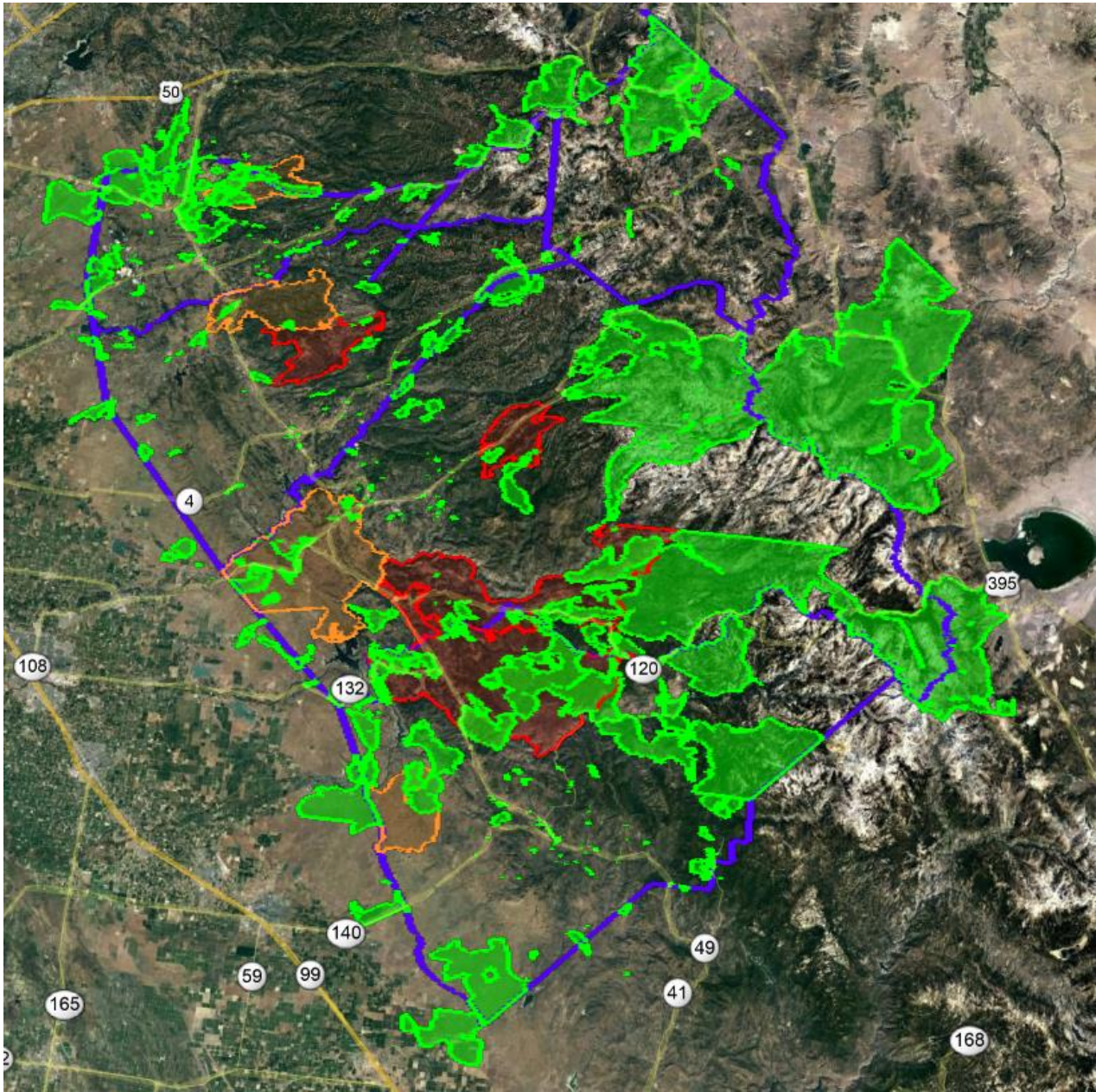
CA Advanced Services Fund

- Potential investment by the State in the region
- State is targeting all areas of the region with strategic focus on very hard to service pockets of need
- Starting July 1, 2020



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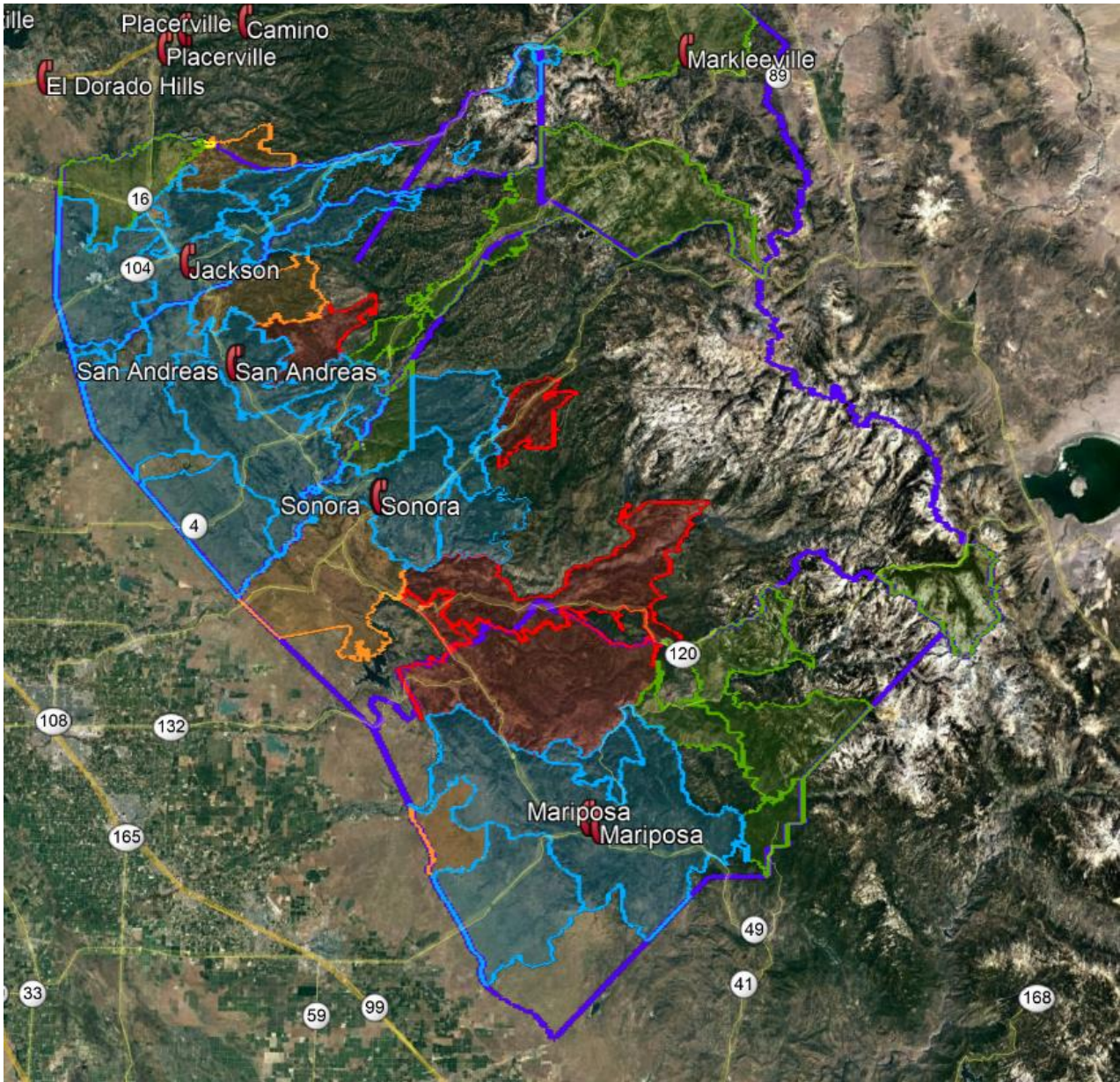
PSAP Locations

- Next Gen 9-1-1 fiber deployment locations
- Physically and contractually diverse fiber connections
- And wireless connections



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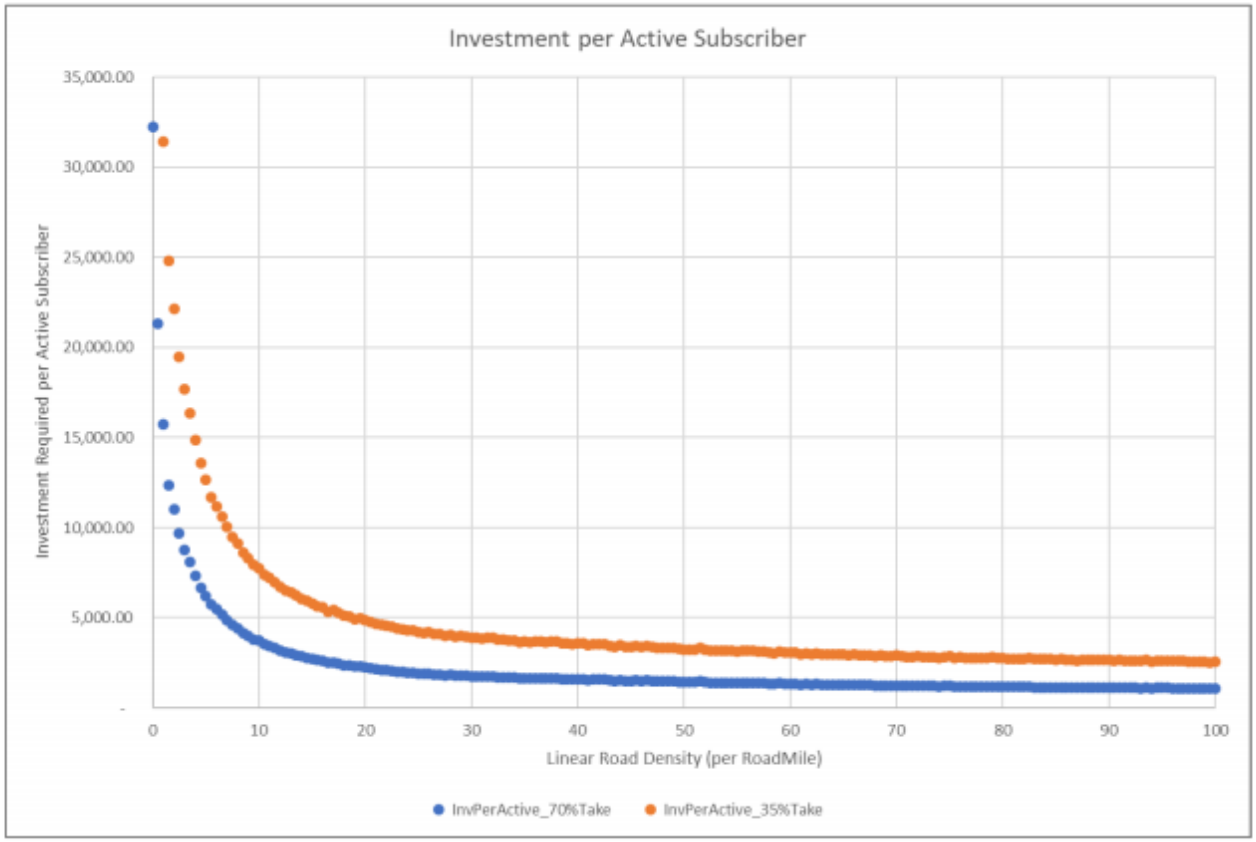
Rural Broadband Deployment Cost Per Subscriber

According to Rural Broadband Association (NCTA.ORG) a household "take" rate of 35%, the investment per active subscriber is approximately $5,000 even with linear density levels of 20 houses per road mile. There are vast regions of the U.S. with linear density below that level.



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FCC Recommended State Model for Accelerating Broadband Infrastructure

- Rights of access to existing network support infrastructure
- Special provisions for rights of access to poles in the communications
- Special provisions for railroad crossings
- New and modified infrastructure to be broadband ready
- State franchise agreements incorporating open/neutral carrier access
- Rural broadband deployment assistance fund
- Rural and Municipal-owned broadband networks

https://www.fcc.gov/broadband-deployment-advisory-committee

https://www.fcc.gov/sites/default/files/bdac-12-06-2018-model-code-for-states-approved-rec.pdf

Central Sierra Connect & Gold Country Broadband

This report provides an overview of CENIC's current and prospective broadband network efforts within the catchment area for both Central Sierra Connect and Gold Country Broadband of the California Public Utility Commission's broadband consortia.

The following charts indicate the four phases of broadband project deployment, defined as:

- **Evaluation:** CENIC has been engaged, quotes and potential designs are being evaluated and chosen, and a request for proposals (RFP) has been developed.
- **Planning:** RFP has been distributed, responses evaluated, the contract awarded and completed, and planning for implementation is underway.
- **Implementation:** A circuit has been ordered and CENIC staff are in various stages of ordering hardware, configuring hardware, deployment, and testing.
- **Production:** Deployment is complete and the site is passing traffic to the CENIC network.

Thank You

For more information or questions please contact

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