Provider Perspective on the Future of California's Communications Grid

En Banc Hearing Summary
March 4, 2020

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California Public Utilities Commission
Communications Division

DISCLAIMER

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Introduction

On March 4, 2020, the California Public Utilities Commission's (CPUC) Communications Division held a workshop in San Francisco. This workshop was the second in a series of stakeholder engagement opportunities to address how the current processes and regulations that will need to evolve to stay relevant to Californians. Although a quorum of Commissioners, their advisors or other decision-makers were present, no action was taken at this event. This En Banc was independent of any CPUC proceeding.

This summary is a distillation of the discussion at the En Banc and includes written comments submitted by stakeholders following the event. A video recording of this event is archived and should be used as the primary source when referring to comments made at the hearing.

The URL for the archived video (in 2 parts) is:
http://www.adminmonitor.com/ca/cpuc/en_banc/20200304/

Panel Discussions

Affordability Panel (10:20 a.m. – 11:10 a.m.)

Moderator: Travis LeBlanc, Partner and Vice Chair, Cyber/Data/Privacy Practice, Cooley LLP; and Member, U.S. Privacy and Civil Liberties Oversight Board

Panelists: Fassil Fenikile, Assistant Vice President. Regulatory Affairs, AT&T
John Gutierrez, Senior Director, Government Affairs, Comcast
Kimberly McKinley; Chief Marketing Officer, UTOPIA Fiber
Preston Rhea, Director of Engineering, Policy Program, Monkeybrains

The Affordability panel focused on the communications needs of underserved communities (e.g. low income and disabled populations) in California. The panel touched upon relevant considerations for closing the broadband adoption gap and how to make communications services more affordable. In addition, the panel discussed the need for increased collaboration between public, private and community-based organizations to develop and implement integrated, holistic programs to improve broadband accessibility.

Discussion Points:

- Based on the 2010 Federal Communications Commission's (FCC) National Broadband Plan, the challenges to broadband adoption by underserved communities are: cost (primary), digital literacy, and sufficient belief that broadband is relevant in daily life. (Fenikile) Similarly, Comcast's National Broadband Adoption Program focuses on cost, relevancy, and connectivity (through devices). (Gutierrez)

- To address the issue of cost, AT&T offers discounted broadband service plans to qualifying low income households. Eligibility is based on enrollment in the state-administered Supplemental Nutrition Assistance Program [SNAP] and/or receipt of Supplemental Security income [SSI]) and waives the fees associated with equipment installation. Eligible households are provided with the fastest internet speeds available in their service area at costs between $5.00 to $10.00 per month. (Fenikile)

- Comcast's approach varies slightly from that of AT&T, by offering qualifying customers (eligibility based on enrollment in SNAP, receipt of SSI, and veteran status) a standard cost of $9.95 per month for a fixed (download/upload) speed of 15/2 Mpbs. In addition, eligible customers are provided with a voucher towards the purchase of a computer (connectivity). (Gutierrez)

- AT&T partners with over 1,000 national, state and local groups to promote and educate low income communities about its broadband affordability programs. In addition, AT&T's digital literacy and broadband relevance efforts focus on awareness of programs, language as a mechanism of communication, and personal interaction. Specific programs include AT&T's Digital U of online tips, "apps", and guidance as well as community education and enrollment events. (Fenikile)

- Comcast offers digital literacy training online; training more people (nationally) than subscribed customers. Comcast's digital literacy outreach started with children who receive free/reduced lunches in school, progressed to senior citizens and veterans, and evolved to also include low income households. Comcast experienced outreach challenges resulting from school district policies that prohibited corporate advertisements at schools. This situation encouraged partnership with local government and community-based organizations (CBOs) for the distribution of digital literacy information. The panel identified the need for local government and CBOs digital literacy information packets to be an aggregate of information from all service providers. This would provide the public with a comprehensive "one stop" source of information across all service providers. (Gutierrez/McKinley)

- Geography of existing (or planned) network infrastructure is a major factor in broadband service availability, access and quality. The FCC's Connect America Fund has enabled expansion of AT&T's service network to increase access to broadband in rural communities. As of 2019, primarily using fixed-wireless technology, AT&T's buildout has reached an additional 127,000 homes and businesses in over 40 counties throughout California. AT&T intends to achieve its originally planned target of 141,500 homes and small businesses in 2020. AT&T is examining the FCC's newest program, the Rural Digital Opportunity Fund (RDOF), to improve broadband service quality in rural communities. (Fenikile)

- UTOPIA Fiber (UTOPIA) is considered an infrastructure agency, formed in 2004 by 11 cities to provide municipal broadband to homes and customers. Utopia's current fiber optic broadband network supports 14 cities and speeds up to 200 Mbps throughout the entire network. Rural and urban customers have equal access the same high-speed connection. Using the concept of an Open Access Market, UTOPIA has increased competition between broadband service providers by addressing the challenge of developing a robust network infrastructure. This has increased service quality, while decreasing prices for customers. Currently within UTOPIAs fiber optic network, standard broadband service of 100 Mbps costs $65.00 per month. For underserved populations, broadband service providers participate in FCC sponsored grant programs to further lower costs for eligible households. (McKinley)

- To address the problem of broadband affordability and access, Monkeybrains has partnered with the City and County of San Francisco (CCSF) and other local housing providers through the CCSF's Fiber-to-Housing Program. Through this program, the CCSF builds public, open-fiber up to the main service connection point of multi-unit affordable housing/deed restricted buildings. In addition, the CCSF has developed appropriate wiring standards to ensure multiple, open-ended modes of wireline transmission throughout the building are available. This construction design enables an internet service provider (ISP) to more easily connect to fiber optic network infrastructure and provide high-quality broadband service to each unit throughout the building. Currently, using this construct, Monkeybrains is able to offer standard broadband service of 20 Mbps (minimum) for $35.00 per month to any household or customer within the affordable housing building. (Rhea)

- Monkeybrains cautioned that incumbent ISPs have formed "fiber ponds" in 100 percent internet accessible buildings, which allow only specific ISPs to provide service to the units in the affordable housing building. This situation is exacerbated when landlords of affordable housing buildings enter into revenue-sharing agreements with ISPs which extract additional costs from building residents. (Rhea)

- CCSFs Fiber to Housing Program involves a Chief, Digital Equity Officer, who administers digital literacy outreach and education programs and programs that offer routers and related equipment at reduced or no-cost to eligible households. (Rhea)

- The panel surmised that the Commission is well-positioned to provide direction to and oversight of efforts throughout the State for network infrastructure investment. UTOPIA and Monkeybrains advocated for publicly owned/controlled open-fiber as the mechanism to increase broadband accessibility by addressing the affordability component. (Rhea / McKinley) Reform of the California Advanced Services Fund (CASF) could be the instrument for the Commission to achieve the Governor's plans for broadband for all. (Rhea/Gutierrez) In addition, addressing community interest in and relevance of broadband adoption, the Commission should consider aggregating broadband access and affordability information from all ISPs permitted to operate in the State. (Gutierrez/ Fenikile)

<u>Commissioner Interaction:</u>

- AT&T clarified that the FCC's National Broadband Plan, which discussed broadband adoption by low income communities and customers, was challenged by the lack of interest in the service speeds provided through ISP products. (Fenikile) Speaking to this point further, neither AT&T nor Comcast have specific goals or targets for service enrollment within low income communities; available data only depicts actual enrollments. (Fenikile /Gutierrez) However, a February 2020 meta-study of the research conducted to inform the National Broadband Plan raises questions

about true message of the data collected as a result of biased research methods. Deeper analysis posits that the true reason for a lack of interest in broadband adoption, is due to the high cost of broadband, and the belief that people with low incomes could not afford it. (Rhea)

- UTOPIA was formed in 2002, when eleven cities joined together, because incumbent telecommunications providers failed to offer high speed broadband service. So Utopia worked with the eleven cities to build a fiber optic network that serves urban and rural communities equally. UTOPIA's business model focuses on building fiber optic infrastructure throughout entire cities/communities. Utopia stated that it is a proper function of government to build a public high speed broadband network, to enable access for all and set the conditions for open competition, which also improves affordability for all. UTOPIA is witnessing high penetration rates in economically disadvantaged communities within its network, as a result of households prioritizing broadband as a necessity of daily life. Original funding for UTOPIA came from municipal bonds backed by sales tax revenue. Since 2009, UTOPIA has been funding activities through project-based municipal bonds, backed by subscriber revenue. (McKinley)

Rural, Tribal Growth, and Prosperity Panel (11:15 a.m. – 12:25 p.m.)

Moderator: Forest James, Chief Executive Officer, EnerTribe
Panelists: Mariel Triggs, Chief Executive Officer, MuralNet
Michael Ort, Ph.D., Chief Executive Officer, Inyo Networks
Phillip Deneef, Chief Strategy Officer, GeoLinks

The Rural, Tribal Growth, and Prosperity Panel focused on the uneven availability and options of broadband in California between urban centers and tribal and rural areas. The panel discussed the impact of insufficient broadband service on families and businesses outside of California's major cities on growth and development. Specific emphasis was placed on highlighting tribal and rural community engagement, service provider solutions, and funding considerations for increasing broadband availability in these areas.

Discussion Points:

- With assistance from the broadband consortiums, GeoLinks works through partnerships with rural and tribal communities to identify broadband needs and develop solutions for anchor institutions (K-12 schools and libraries) and community-based projects. Many of GeoLinks' projects involve bringing giga-bit speed fixed-wireless solutions to anchor institutions, which then enable other service providers to offer fixed wireless or aerial fiber optic service to the local community via GeoLinks' backbone network. The ability of regional broadband consortiums to communicate the broadband needs of rural and tribal communities has been essential. (Deneef)

- As a non-profit agency, MuralNet is focused on assisting tribal communities to build their own high-speed internet networks. MuralNet is usually vetted through an outside agency or organization that initially introduces MuralNet with the community in need. Once trust is built in the community relationships, MuralNet relies on word-of-mouth to expand their outreach throughout geographic regions. Some of these expanded outreach efforts include creating and funding opportunities for regional stakeholders to gather and discuss relevant broadband topics. (Triggs)

- Initially, Inyo Networks worked directly with established regional networks of broadband stakeholders (counties and tribal nations) for engagement and outreach. Inyo Networks now works with the regional broadband consortiums, who introduce Inyo to rural and tribal communities and other businesses and organizations that are focused on closing the digital divide. (Ort)

- GeoLinks highlighted the fact that many rural and tribal community broadband projects span multiple jurisdictions and municipalities. The regional broadband consortiums are key to understanding where projects can find the path of least resistance in the shortest amount of time. In addition, the regional broadband consortiums can be a resource for engagement of key stakeholders. (Deneef)

- MuralNet illustrated that communication and cultural competency are significant challenges to broadband projects in rural and tribal communities. Projects should be purposefully designed with the understanding of a community's specific cultural, language, and service needs in mind. This involves the ability to have all the right stakeholders represented and translation of each stakeholder's message (i.e. engineering, legal, tribal culture, telecommunications, economics, federal, state, local, etc.) into an easily understood language. Patience through the process is tantamount to a positive outcome. (Triggs)

- Inyo's approach to increasing broadband access in rural and tribal communities focuses on addressing cost, as a function of infrastructure. The Digital 395 project is an example of how investment in middle mile infrastructure can significantly lower broadband costs by creating an open-access network for service providers to use. A significant challenge with these large infrastructure projects is "right of way" and the various permitting processes amongst the stakeholder agencies; each one has it's own culture and way of doing business. Funding is another key obstacle to these infrastructure projects. (Ort)

- MuralNet and Inyo focus on innovative funding solutions that are specific to the use case (capital vs operational expenditures). (Triggs and Ort) GeoLinks uses a combination of federal and state funding from various telecommunications programs (Connect America Fund, California Teleconnect Fund, California Advanced Services Fund). However, there is no perfect solution to funding, as each funding source is separate and distinct, which sometimes causes confusion with funding rules. A wholistic approach to community planning may assist in addressing current broadband accessibility and affordability needs. (Deneef) Related to this, Inyo described how community access to quality broadband can influence housing behaviors and increase property values. (Ort)

<u>Commissioner Interaction:</u>

- The panel emphasized that each tribal community has its own unique culture and governance structure. They all have in common the need for high speed broadband service. However, a "one size fits all package" often will not adequately address each tribal community's specific needs. Stakeholder engagement is necessary to provide an understanding each tribe's needs. (Deneef/Triggs) The concept of a tribal liaison is noteworthy. With this fact in mind, having only one tribal liaison to engage with the numerous tribes is often not enough. Comcast stated that it

does not have a tribal liaison. (Triggs / James / Guiterrez) To a tribe, profitability is not usually the goal. Tribes focus on service provided to their community. When working with tribes, service providers should plan to heavily invest in building local relationships and expect to operate at a loss for the first two years. (James)

- MuralNet noted that among the many funding programs available for rural and tribal community broadband projects, a continual pain point is the varying, different application processes for funding. Efforts to translate the program language and processes into messages that effectively speak to the communities of interest are invaluable (e.g. hosting webinars with rural and tribal communities about the need for broadband in rural and tribal communities). (Triggs)

- GeoLinks is currently partnering with Pacific Gas and Electric Company and Southern California Edison for deployment of fire detection cameras for wildfire contingency planning and response. Since these cameras utilize broadband service, GeoLinks builds extra capacity and resiliency into the wildfire detection network to enable broadband access to rural and tribal communities in remote areas of California. (Deneef)

Piloting Service-Based Competition (1:30-2:20)

Moderator: Ernesto Falcon, Senior Legislative Counsel, Electronic Frontier Foundation
Panelists: Ben Bawtree-Jobson, Chief Executive Officer, SiFi Networks;
Nathan Patrick, Chief Technology Officer, Sonic.net;
Kimberly McKinley; Chief Marketing Officer, UTOPIA Fiber

The Piloting Service-Based panel focused on open and competitive markets. It also addressed issues relating to deploying last mile broadband infrastructure to customers. It also described opportunities for open-access and public/private partnerships. The panel also described obstacles faced by new market entrants.

Discussion Points:

- UTOPIA and SciFi Networks provide fiber optic backbone networks in an open-access model, which enables ISPs to use them to compete and offer last mile Internet access to end users.

- UTOPIA and SciFi Networks' fiber networks enable cities and counties to use the same fiber networks to carry the cities' broadband traffic in addition to Smart City applications. Examples of Smart City applications include: controlling traffic signals, street lights, 5G mobile broadband radios, and networks supporting autonomous cars.

- There are several different funding approaches that these three organizations have used to obtain the capital required to construct the open-access networks they operate:
    - SciFi NETWORKS is privately funded.
    - UTOPIA is a public-private partnership. UTOPIA explained how cities have used municipal bonds, some backed by sales tax revenue, to obtain the initial construction capital.
    - SONIC is a privately funded company.
    - SONIC described a model that was used to build the network in Brentwood California in 1999. Approximately 50% of Brentwood households have access to SONIC's network.

- UTOPIA said that a 35% take rate (adoption rate) covers the construction and operational costs of the networks they install.

- Both UTOPIA and SONIC said that getting access to utility poles is often a problem and can take between 6 months to several years. SONIC said that in many situations they are not allowed access to utility poles at all due to overloading old wood utility poles and other safety

issues.

- SONIC explained that increasingly they construct their own last mile fiber optic networks, due to difficulty getting access to telephone company copper networks, utility poles or underground joint trenches and/or the high costs associated with those.

- Due to difficulty accessing utility poles in a timely and cost-effective manner, SONIC said it often must reduce the area to which they can offer fiber-to-the-home Internet services by approximately 50%.

- Joint trenching is an alternative to open access networks that seems fraught with problems. SONIC says that the CPUC's Rule 20 would have SONIC pay the same percentage of costs as an electrical utility to be part of a joint trench project. SONIC said that if joint trenching costs were allocated using an "incremental cost approach," SONIC's costs would be lower, thereby attracting them to join in the same trench, instead of building their own parallel network.

Commissioner Interaction:

- The largest fiber owner in Utah is the Utah Department of Transportation. They install fiber and conduit everytime they do road construction. It is part of a synergistic effort to enable broadband deployment throughout the entire state of Utah. (McKinley)

- Deployment of fiber by the Utah Department of Transportation has made Utah one of the leaders in autonomous vehicle deployment. UTOPIA connects Governmental facilities including schools, many of which have 10 Gbps fiber. (McKinley)

- SONIC is a story of organic growth. SONIC began as a dial-up Internet Service Provider, then evolved into a DSL provider reselling services on the incumbent's network. Next, SONIC deployed its own equipment in central offices and became a CLEC. Then, SONIC deployed its own Digital Subscriber Line equipment in central offices and became a facilities-based voice carrier. Now, SONIC has evolved into a CLEC that constructs its own outside plant-based fiber optic networks. (Patrick)

- SONIC has 100,000 customers with fiber deployments in San Francisco, Berkeley and Albany, with a large number of additional cities coming on-line soon. SONIC is unique in it's focus on residential services. In addition, SONIC serves "quite a bit" of businesses too. E-rate and carrier-to-carrier services are also aspects of SONIC's business. Due to it's focus on residential customers, SONIC is in many central offices that are not served by other typical business-

oriented CLECs.

- Rule 20 – The cost for SONIC to join an active rule 20 project, sharing a trench in the ground with other service providers, is substantially more expensive than SONIC not joining the rule 20 project. SONIC says it is significantly less expensive for it to build a completely separate parallel build, instead of joining in a trench and sharing the costs with other utilities, as described in rule 20. SONIC said they would strongly prefer that in areas where electric utilities have already decided to underground their facilities, an incremental-cost approach would be used, instead of cost sharing based on rule 20. (Patrick)

- Sci-Fi comes from the European Union. There is a vibrant open-access industry in the EU. This is due to a number of regulations imposed by the European Union. One benefit that this model provides is long-term low-interest financing. Most of Sci-Fi's financing comes from investors that look for long term investment returns. (Falcon)

Using Technology to Improve Network Resiliency (2:25-3:15)

The panel presented alternatives to diesel engines as a supply of back-up power for telecommunications networks, when power is cut off. Traditionally, telecommunications providers have relied on diesel generators and batteries as the main source for back-up power. This panel consisted of three companies that manufacture alternatives to diesel generators and traditional lead-acid batteries.

Moderator: Joyce Steingass, Senior Utilities Engineer, Energy Division, CPUC
Panelists: John Ahrens, Program Director, US West, Schneider Electric (microgrids)
Andrew Skumanich, Ph.D., Founder and Chief Executive Officer, SolarVision Consulting (microgrids)
Darin Painter, Director of Sales and Product Management, Stationary Power, Plug Power (hydrogen fuel cells)
Ray Schnell, Vice President, Global Business Development, NantEnergy (zinc-air and lithium ion batteries)

Discussion Points:

- All three companies stated that a big obstacle facing providers of alternatives to diesel generators, is the fact that diesel generators require significantly less up-front capital investment, compared to alternatives.

- Newer technologies are often fighting against the lower capital costs of existing technologies, in this case the relative low capital cost of diesel generators. The panelists want more consideration for new technologies, which all three panelists said are available today and are continuing to evolve.

- Each of the three panelists stated that if service providers would base investment decisions on long-term total cost of ownership, the alternative solutions that their companies offer, would be significantly less expensive than diesel generators. They stated that all of their alternative solutions generate significantly less carbon dioxide emissions than diesel generators.

- All Tier One telecommunications providers have deployed zero-emission hydrogen fuel cells in their networks to provide back-up power. Hydrogen fuel cells have been deployed in rural areas to back-up base stations and fixed wireless networks. (Plug Power/Painter).

- To put these claims into context, the author of these notes found that the U. S. Dept. of Energy, National Renewable Energy Lab published a study in September 2014 analyzing the costs of three different back-up power technologies. The table below shows the relative cost comparisons of each technology, **assuming each would supply 72 hours** of back-up power during an outage:

	Diesel Generator	**Battery**	**Fuel Cell**
Up-front Capital Cost	$28,300	$88,600	$47,600
Annual Cost of Ownership	$4,900 (assumes diesel cost of $3.89 / gallon)	$31,300	$6,100
Maintenance Visits Per Year	2 to 12	4	1

- The PlugPower panelist said that if there is no other incentive/requirement, back-up power decisions are going to be made based solely on the lowest up-front capital cost solution. Not the lowest cost over 5 years or 10 years, not what is best for the environment (Painter).

- Duke Energy installed a 12.6 kW microgrid photovoltaic solar system, combined with 95 kW zinc-air battery storage to power a remote wireless communication tower in Great Smoky Mountain National Park. The zinc-air batteries provide 100 hours (one week) of storage. (NantEnergy/Schnell).

- NantEnergy has provided electricity to over 200,000 people in very remote parts of Indonesia and Africa by using photovoltaic cells and 24 to 48 hours of back-up storage using batteries. One problem in those countries is that diesel generators are stolen.

<u>Commissioner Interaction:</u>

- In response to Commissioner Shiroma's question, AT&T said "all our cell towers have up to 8 hours of back-up battery power….In a certain percentage we use diesel generators." All AT&T cell towers have the capability to connect portable generators, where they do not already have back-up generators operating. An AT&T representative said AT&T will brief Commissioner Offices on details. (AT&T)

- Plug Power said that Hydrogen fuel cells today use liquid hydrogen created from natural gas, not renewable sources of energy. They use the same type of liquid hydrogen in cannisters that are used to power fork lifts. Plug Power uses compressed gas cylinders provided by industrial gas providers like PraxAir. Plug Power said they are focused on trying to find a way

to move towards using renewable energy sources to create the hydrogen they use. (Painter)

- Hydrogen has an advantage over diesel, because hydrogen provides an uninterrupted supply of fuel to back-up power systems. During electricity outages, many entities rely on diesel generators and diesel fuel, causing shortages. During hurricanes in the South Eastern states, hydrogen has been plentiful, even when diesel fuel has not been available. During hurricanes, Plug Power's hydrogen back-up power systems were in continuous operation for over 2 weeks. California has a good hydrogen infrastructure for refilling hydrogen fuel cells. Back-up generators are designed to be stationary. However Plug Power said there is no reason mobile solutions cannot be provided. (Painter)

- NantEnergy has installed 3,000 mixed systems of zincAir and lithium using over 120,000 fuel cells. They are installed at 1,500 rural electrification telecom sites providing energy from low loads of 1 Kilowatt to 300 kilowatts. 1,350 of these are telecommunication sites. There are 119 Community sites that range from 10 to 300Kw. Typical size is 50 to 70 Kw. (Schnell)

- The Duke Energy microgrid in the Smokey Mountains is a 20 Kilowatt system with 100 hours of storage. The majority of systems are for grid back-up. Some are paired with photovoltaic panels. ZincAir systems are stationary. Lithium fuel cells can be mobile. Systems are deployed in 5 counties in Central America, Mexico, Indonesia, Culver City CA. and West Virginia. (NantEnergy/Schnell)

- Solar Vision Consulting's products are still in the process of going from concept into an artificial intelligence algorithm. The first prototype customer will be Cinnamon Energy in Los Gatos for a small 20 kW microgrid. It will take five years of funding before commercialization will occur. (Skumanich).

- Schneider Electric's optimization software is currently being deployed today. Currently Schneider Electric is deploying portable microgrids of different types on a single 20 foot enclosure that can be dropped off and plugged in and be ready to go. In areas with difficult terrain, portable microgrid systems would need to be flown into areas with difficult terrain. (Ahrens)

- Public Comment - Ken Biba (Novarum Consulting) told the panel that Space X will soon launch a new satellite system called Starlink. Biba said Starlink will deliver fast broadband, offering a redundant network in space. If true, that could make back-up power and middle mile infrastructure unnecessary. Biba said "all you would need instead is an antenna on the roof." Will it work? Biba said yes. Will it scale? Biba said, probably. Biba said testing of the system would begin in 2021. Biba urged the Commission to consider a risk investment in Space X.