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## OVERSIGHT HEARING

### Telecommunications Service Outages: Ensuring a Reliable Lifeline for Californians

#### BACKGROUND

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Telecommunications outages are not new; however, recent electric utility power shutoffs have increased awareness about the impacts of these telecommunications outages. In October 2019, the large investor-owned electric utilities (IOUs) shut off electric power to a number of customers in many counties across the state to limit the risk of electric utility infrastructure igniting fires during historically high-risk fire conditions. The loss of electric power impacted multiple downstream essential services that rely on electricity to operate, including telecommunications. While some customers may have been prepared to lose power, many Californians were not prepared to lose telecommunications service. Telecommunications outages limited Californians' ability to call 911, receive emergency notifications, and conduct business. News reports from October and November 2019 also indicate that telecommunications outages were not confined to areas that lost power due to power shutoff events. Customers outside of the power shutoff footprint also lost phone and internet services, and it is unclear if these outages were related to unplanned electric outages or physical damage.

In addition to telecommunications outages stemming from the loss of electric service, infrastructure damage, poor maintenance, and software failures can also cause outages. Federal and state law establish policies that support the expectation that the public will have access to reliable telecommunications services; however, little public information about the resiliency of these networks exists.



This hearing is intended to explore the reasons for the gap between Californians' expectations for a reliable telecommunications network and experience with recent outages, the major causes of outages, lessons learned from these outages, and opportunities to prevent and limit the occurrence and impact of future outages.

## **TELECOMMUNICATIONS NETWORKS**

*The development of telephone networks and their regulatory oversight.* Telephone networks evolved from telegraph systems, which carried messages over electrified lines. Unless they are undergrounded, telephone lines are attached to electric utility poles to reach customer's addresses. Until 1995, telephone service was generally provided by one local telephone utility. In 1995, the California Public Utilities Commission (CPUC) issued a decision that opened these local telephone exchanges to competition. This period of deregulation led to large expansions of telecommunications companies, followed by several large bankruptcies in which some telecommunications providers ceased operations. Most California communities are open for competition between telecommunications providers; however, disputes exist as to whether there is meaningful competition in many regions. Only a small number of largely rural local exchange areas remain closed to telecommunications competition.

Although a number of Californians may still receive telephone service through copper networks, many Californians have transitioned to Voice over Internet Protocol (VoIP) for their home telephone service. Generally, consumers using VoIP are receiving their phone service bundled onto their internet service. As of 2016, a majority of households nationwide no longer received their telephone service through copper wireline. A commensurate increase in VoIP customers occurred as wireline use decreased. However, most customers may be unaware as to whether they have copper line or VoIP phone service and may only distinguish between landline and wireless service.

While the wireless, wireline and cable industries are frequently comprised of separate companies, the combined infrastructure of these companies collectively comprise our telecommunications network. Unlike the electric grid, the telecommunications network delivers an essential service over an almost entirely privately owned and operated system with limited public oversight. Following large-scale de-regulation efforts in the 1990s, only a small number of telecommunications companies remain fully regulated at the state level and the Federal Communications Commission (FCC) has largely declined to enact strict regulations for telecommunications providers.

*Head-ends, central offices, and high-capacity cell sites: The nature of telecommunications networks.* Wireless telecommunications companies broadcast broadband data via cell sites. These sites can range in size from large base transceiver stations (cell towers) that include physical buildings and multiple antennas as part of their construction to small cell nodes, which are lower-power, lower-range receivers generally placed on municipal utility light and existing power poles. Wireless telecommunications uses radio frequency waves to transmit data between phones and cell sites. While consumers may use wireless devices differently from fixed, interconnected phones at home and work, wireless towers rely on fiber optic cables to provide high-speed broadband services.

Cable and copper wireline providers may use different technologies in their networks, however, both systems deliver fixed, interconnected services that supply home voice service. Wireline central offices and cable head-ends are generally analogous to each other since they both operate as facilities with a significant amount of infrastructure capable of receiving a high capacity of data across the back end of the telecommunications network and distributing it to other nodes and switching stations. Wireline facilities generally transmit data from a central office to a local exchange facility (switching stations and remote terminals) before it is delivered to the customer over lines known as the “last mile.” Cable providers use a network of fiber nodes to distribute data to the last mile infrastructure. Not all broadband networks are entirely comprised of fiber optic cable – a significant number of networks are comprised of copper in the last mile of service. According to a Fiber Broadband Association study submitted to the FCC, less than 40 percent of homes nationwide were capable of having fiber connected directly to the home in 2018.

## **BACKGROUND ON TELECOMMUNICATIONS SERVICE OUTAGES AND THEIR CAUSES**

*Recent telecommunications outages in California and their impacts.* Californians rely on telecommunications services for most activities, including access to health, public safety, educational, and financial services. While telecommunications outages have existed since the advent of phone service, Californians’ increasing reliance on telecommunications services has increased the dangers posed by telecommunications outages. Recent outages have also raised awareness about the extent to which telecommunications infrastructure is reliant on electric power for operation.

Between 2014 and 2015, California's North Bay and North Coast region experienced widespread telecommunications outages that left some communities without any form of communications services. These telecommunications outages impacted health facilities' ability to process patient information, prevented electronic payment transactions (including the use of CalFresh benefits), and limited 911 service. The impact to 911 service led local emergency responders to take special steps to protect public safety, including pre-positioning ambulances at highway intersections and mobilizing local fire stations to provide back-up 911 support.

Catastrophic wildfires have led to telecommunications outages, impacting emergency response coordination. After the 2017 North Bay Fires, the CPUC issued a report on the fires' impact on telecommunications services. According to this report, fires resulted in telecommunications outages to approximately 160,000 wireline customers and 85,000 wireless customers. A number of factors, including these telecommunications outages, may have limited residents' ability to receive warning messages about the fires.

Subsequent catastrophic wildfires, including the Woolsey (2018), Camp (2018), and Kincade (2019) fires, have underscored the challenges facing emergency personnel responding to disasters that occur while telecommunications infrastructure is unavailable due to damage and electric power losses. According to data from the FCC, up to 27 percent of Sonoma County's wireless cell sites were out of service during the period in which responders conducted evacuations and fire response for the Kincade Fire. These telecommunications outages may limit the degree to which emergency response coordinators can send emergency notifications to warn individuals in the area of potential safety risks or provide evacuation information.

Not all telecommunications outages are caused by circumstances within a provider's control. Physical damage from disasters, accidents, animals, and sabotage have also caused significant telecommunications outages. On December 21, 2019, a car crash damaged AT&T internet facilities serving Sacramento International Airport, leading to widespread flight cancellations on one of the busiest travel days of the year.

*Loss of electric power has been a leading cause of telecommunications outages.* Telecommunications services rely on electric power for operation. When electric power is lost, some facilities have back-up power; however, not all facilities have the same amount of back-up power and some facilities have no back-up power. As

a result, a number of sites are reliant solely on power from electric utilities. California is not the only region to experience telecommunications outages largely stemming from loss of electric power. Australia is currently experiencing large telecommunication outages related to the loss of electricity due to the catastrophic bushfires. States that have experienced large, destructive hurricanes have also seen widespread telecommunications outages. In 2005, Hurricane Katrina led to a near total collapse of the telecommunications network in areas hit hardest by the storm. Following the hurricane, the FCC convened a panel to investigate the causes of widespread telecommunications failures that occurred during the storm and make recommendations to limit such telecommunications outages in the future. The panel concluded that loss of electric power was the largest cause of telecommunications outages impacting cable and wireless facilities. While winds and flooding damaged infrastructure, the loss of electric power eliminated the use of any redundant cable networks and undamaged cell towers.

In June 2006, the panel made a number of recommendations, including recommending that telecommunications providers ensure that each facility includes a minimum amount of backup power. In June 2007, the FCC released the *Katrina Panel Order*, which required most telecommunications providers to install backup power ensuring, "... a minimum of 24 hours for assets inside central offices and eight hours for cell sites, remote switches and digital loop carrier system remote terminals that are normally powered from local AC commercial power." Telecommunications providers litigated this backup power requirement until the White House Office of Management and Budget rejected the FCC's rule, and the FCC ceased to pursue the requirement.

Subsequent disasters, including Hurricane Sandy, revived interest in establishing backup power requirements for telecommunications facilities; however, to-date, these requirements have largely focused on maintaining power to equipment on the customer-side of the network. Existing federal rules (47 CFR §12.5) require fixed, residential voice providers that do not have copper line power (e.g. fixed wireless service and VoIP) to offer customers a backup power option that can power facilities at the customer's residence for at least 24 hours. Under existing rules, providers can charge customers for any backup power supplied. Although maintaining power for telecommunications resources at the home is necessary for VoIP and fixed wireless services to operate, backup power purchased from telecommunications providers will not ensure access to telecommunications services in the event that the provider loses electric power at any other portion of the network.

## TELECOMMUNICATIONS OUTAGES DURING THE OCTOBER 2019 POWER SHUTOFFS

*Power shutoffs revealed the extent of telecommunications' reliance on electric power.* During California's October 2019 power shutoff events, the FCC activated the Disaster Information Reporting System (DIRS), which is a voluntary mechanism for wireless, wireline, and cable subscribers to report telecommunications outages. While the information in DIRS may not be complete due to its voluntary nature, the table below indicates that telecommunications outages extended beyond the duration of the power shutoffs and the scale of the telecommunications outages indicates that a significant number of facilities do not have extended backup power.

<b>PSPS Date</b>	<b>Wireless Cell Sites Out</b>	<b>Wireline/Cable Subscribers Out</b>	<b>Electric Customers Out</b>
10/24/19	51	11,476	36,301
10/25/19	32	1,476	940,170
10/26/19	630	393,735	952,373
10/27/19	874	454,722	980,639
10/28/19	463	223,973	473,139
10/29/19	476	173,058	388,644
10/30/19	263	117,577	129,980
10/31/19	110	54,463	400

*\*Data reported by the FCC and CalOES during power shutoff events – information may not reflect final outage figures reported to federal and state agencies.*

According to data from the CPUC, the three large IOUs shut off power for 1,144,575 customer accounts for varying durations between October 24, 2019, and October 31, 2019. While data on telecommunications outages is incomplete, it is likely that a larger number of telecommunications customers were impacted by telecommunications outages during the same period because some telecommunications outages extended beyond the footprint of the power shutoff events. Additionally, wireless telecommunications outages can affect a large population without impacting a large amount of infrastructure because many wireless devices can connect to a single wireless tower.

*Why were the outages significantly worse in certain regions?* The DIRS data show that the telecommunications outages disproportionately impacted certain

communities. For example, the data shows that wireless telecommunications outages in Marin County grew from 49.6 percent of cell towers out on October 26, 2019, to 57 percent of the county's cell towers out on October 27, 2019. However, it is unclear why Marin County experienced more pervasive wireless telecommunications outages than other counties that were equally impacted by the power shutoffs. Additionally, the size and scope of the telecommunications outages indicate that some communities had no telecommunications service due to simultaneous loss of wireless, wireline, and cable services. These significant losses of telecommunications service can impact public health and safety of communities by limiting the ability to call 911 and receive emergency notifications. Additionally, these telecommunications outages can limit the public's ability receive notifications from utilities about the status of electric power shutoffs and electric power restorations. Marin County issued a Wireless Emergency Alert (WEA) to inform the public about forthcoming power shutoffs; however, due to the loss of cell towers, the county was unable to update the message until electric power was restored to the towers.

*Wireless outages showed that companies did not effectively plan for large power shut offs.* On September 12, 2019, the FCC sent letters to the major wireless carriers requesting information about how the carriers intended to ensure the operation of wireless service during an electric power shutoff event. While several carriers noted the unpredictable nature and short time frame for power shutoff notifications, none of the companies indicated that they would have large-scale telecommunications outages from a power shutoff. All the companies' responses indicated that they had backup power integrated into their emergency plans. Despite these plans, telecommunications outage data shows that some communities lost cell service for a significant period of time.

While the number of wireless facilities out of service may have been lower than figures for wireline and cable providers, wireless telecommunications outages have the potential to impact a greater number of consumers because a larger percentage of the population relies on wireless communication as its primary means of communication. According to the Centers for Disease Control (CDC), more than 50 percent of all households rely exclusively on wireless telecommunications, and Latino and African-American adults are more likely to live in households that rely solely on wireless communications. The CDC's data also shows that 70 percent of renters between 25 and 34 years of age rely solely on wireless communications.

*Not all cell sites can accommodate generators.* All four large wireless companies in California (AT&T, Sprint, T-Mobile, and Verizon) provided information to the

Senate Committee on Energy, Utilities and Communications about the types of backup power supplied to their facilities. This information indicates that these companies generally ensure that major telecommunications hubs (e.g. high-capacity cell sites) have at least 48 to 72 hours of on-site power generation. These companies also deploy mobile generators to facilities where permanent electric generation cannot be installed. However, not all cell sites can accommodate mobile generators. These sites include cell facilities on building tops, cell facilities where the property owner does not permit the installation of generators, and facilities where space and topography limits the placement of a large generator. Small cell sites (such as 5G) do not currently have a viable solution for backup power technology.

*Cable telecommunications outages highlight the vulnerability of internet communications.* Increasing reliance on internet protocol (IP) communications means that telecommunications outages impact a greater scope of public, private, and social functions today than in the past. Telecommunications outage information from the FCC demonstrated that wireline and internet-based telecommunications outages were significant during power shutoffs. These telecommunications outages highlighted consumers' lack of awareness about the distinctions between copper-based phone service and internet-based phone service. In the event of a loss of electric power, copper-based communications can retain service with backup power at central offices and remote terminals – regardless of whether there is electricity at customer's residence or business. However, IP-based communications must have electricity at all points of the network, including at the customer's address. Many Californians were unaware that their home phone services were provided through an internet connection and were unprepared to lose communications.

Internet communications' reliance on electricity provided by utilities also increases the likelihood of internet and cable outages outside the footprint of a power shutoff event. If an internet provider's facilities lose power, all the customers served by those facilities will lose telecommunications services – regardless of whether those customers have their power shutoff. For residents, this loss of communications frequently means the absence of home phone, television, and internet service. For businesses, it can mean loss of electronic payment systems, access to electronic records, and other internet-based services.

Little public information exists about the use of backup power by cable and internet providers. Telecommunications outage data indicate that a large number of cable and internet facilities may have no backup power and that cable and



internet facilities may face additional hurdles re-powering after a telecommunications outage. During the power shutoffs, some cable and internet providers acknowledged that telecommunications outages could persist beyond the power shutoff event. In news reports, representatives for Comcast acknowledged that their customers may experience internet outages lasting longer than power shutoffs and occurring outside the geographic area for which the utilities shut off power. Data from DIRS show that even after electric utilities completed power restorations, large telecommunications outages persisted. Comcast representatives also stated that the company did not deploy generators except in a limited number of circumstances, such as a request by the Federal Emergency Management Agency (FEMA). Internet outages posed challenges for emergency responders; Sonoma County's emergency operations center indicated that it experienced difficulties with its internet service during emergency response operations due to telecommunications outages from its internet service provider.

Cable and fiber internet outages can also create challenges for maintaining wireless services because wireless towers rely on IP telecommunications infrastructure to transmit broadband data. In the event that major fiber backhaul facilities lose service, wireless facilities may also lose service – regardless of whether those wireless towers have back up power.

## **OBSTACLES FACED BY PROVIDERS AND AGENCIES DURING TELECOMMUNICATIONS OUTAGES**

*Emergency responders lack sufficient real-time information about telecommunications outages.* The recent power shutoff events highlighted the need for more verifiable information about the resiliency of telecommunications networks as well as the need for inclusion of telecommunications planning in power shutoff preparations and emergency response coordination. During the power shutoffs, the California Office of Emergency Services (OES) opened an emergency state operations center (ESOC) to coordinate emergency response assistance. Generally, telecommunications providers have some presence in the ESOC; however, companies may rely on associations (such as the California Utilities Emergency Association (CUEA)) for representation – instead of each company sending a representative.

Local emergency response managers have also faced obstacles to getting consistent, timely information. Frequently, information regarding telecommunications outages is reported in an aggregated format that does not identify which companies and infrastructure is most affected. Additionally,

emergency managers have experienced difficulty obtaining a reliable point of contact with some telecommunications providers, limiting their ability to obtain and relay information during emergencies.

*The CPUC faces statutory limitations on its ability to share telecommunications outage information.* The CPUC is the only state agency with any degree of regulatory authority over telecommunications providers, and existing law provides the CPUC with broad authority to request data from these providers. However, existing law does not provide a process for the CPUC to share or transmit this data to first responders or the public. The CPUC maintains rules governing public access to information submitted by utilities to the CPUC through General Order (GO) 66-D; however, existing statutes limit the CPUC's ability to disclose this information without conducting a proceeding. The proceeding must determine which information meets the standard of "confidentiality" set forth under existing law and GO 66-D. Public Utilities Code §583 prohibits the CPUC from publicly disclosing any confidential information submitted by a utility, including a telecommunications company, without first adopting an order or conducting a hearing to make the information public. Under Public Utilities Code §583, any CPUC employee that discloses confidential information without a CPUC order or hearing may be charged with a misdemeanor. With the CPUC limited in its ability to share utility data, emergency responders rely on the utilities to share real-time information.

*Telecommunications providers face challenges coordinating outage response at the state and local level.* While telecommunications outages indicated that telecommunication providers had not sufficiently planned for the scope and duration of potential power shutoffs, they also highlighted challenges in addressing telecommunications outages during dynamic power shutoff events with little specific notification. Multiple communications providers sought to deploy additional mobile backup generators; however, they had not fully anticipated the logistical challenges to transporting and repositioning a large number of out-of-state diesel and propane generators as well as the re-fueling of these generators. These challenges included, but were not limited to, the following:

- A lack of reliable advance notifications and maps from electric utilities identifying areas targeted for power shutoffs.
- Restrictions on the size of vehicles that can be used to transport mobile generators from outside of California.
- The rapidly changing scope of power shutoff activities.

- The absence of a centralized and streamlined process for coordinating with local officials responsible for coordinating and permitting the placement of emergency generators.
- Local restrictions on the placement and run time of generators.
- A lack of consistent local permitting requirements for telecommunications infrastructure to harden existing sites and install new infrastructure for resiliency and redundancy.

## **TELECOMMUNICATIONS PROVIDERS' RESPONSE TO OUTAGES**

*Not all telecommunications providers are in the same place.* Differing technologies, service territories, and regulatory oversight contribute to differing needs and responses between telecommunications companies. Varying accounts exist regarding telecommunications providers' responsiveness to local and state emergency responders; however, all accounts make it clear that each company has taken a different approach to addressing emergency response – especially regarding public disclosure of telecommunications outage related information. For example, accounts indicate that Verizon responded to emergency responder requests for company-specific telecommunications outage information more readily than many other companies. Verizon also provided significantly greater detail in its public responses to requests for information from the CPUC. Communication from Verizon indicates that the company is willing to commit to some degree of public disclosure of telecommunications outage information and some standard for ensuring network operations during electric power losses moving forward. When asked by the CPUC whether they were willing to make similar commitments, some companies (largely wireless providers) were willing to agree to an element of telecommunications outage reporting and a standard for network hardening; however, some companies are unprepared to commit to any regulatory requirements for public disclosure of telecommunications outage information or backup power standards.

*Rate-regulated telecommunications providers face unique challenges and costs.* Unlike cable and wireless companies, small independent local exchange companies (ILECs) are fully rate-regulated by the CPUC, and they operate largely in hard-to-serve rural communities more frequently impacted by PSPS events and weather-related losses of electricity. These companies are subject to significantly greater network scrutiny than other telecommunications providers, and they have acquired multiple forms of backup power. While these companies have taken steps to place backup power along their networks, they face challenges unique to rate-regulated telecommunications companies. While rate-regulated electric utilities have an

established process for tracking wildfire expenses with the CPUC outside a general rate case, no process currently exists for small ILECs to track unanticipated costs for purchasing backup power and fuel for electric power losses and ensure that the companies can recover those costs. Like other telecommunications providers, these companies frequently receive specific information of PSPS events no more than two hours before their commercial power is turned off; however, these companies are smaller and operate almost entirely in areas with long distances between switching stations and remote terminals. As a result, PSPS notifications frequently do not provide ILECs with sufficient time to travel to these remote terminals and place mobile generators before they lose power. Even when small ILECs have kept copper lines fully energized during power shutoffs, they have incurred unanticipated maintenance costs related to damage caused by power surges occurring when their electric utility re-energizes their lines.

## **THE STATUS OF ACTIONS TAKEN BY THE LEGISLATURE AND CPUC ON TELECOMMUNICATIONS OUTAGES**

*Status of legislative actions.* Prior to the October 2019 outages, the Legislature passed the following bills to address telecommunications outages:

- SB 670 (McGuire, Chapter 412, Statutes of 2019) requires telecommunications providers to report telecommunications outage information to OES within 60 minutes of identifying a telecommunications outage that effectively cuts off communications for an entire community. Under the bill, OES must adopt regulations identifying the outage threshold that would trigger reporting and transmit telecommunications outage information to affected county emergency personnel. OES released a notice of proposed rulemaking on December 20, 2019, and OES will hold a public hearing for stakeholders on February 4, 2020.
- SB 560 (McGuire, Chapter 410, Statutes of 2019) requires facilities-based wireless providers to develop protocols to respond to telecommunications outages during a power shutoff and designate a point of contact to receive information about power shutoffs. The bill also required these providers to provide information necessary for situational awareness to electric utilities and public safety personnel.
- Additional legislation addressing telecommunications outages is pending.

*Status of CPUC regulatory actions.* Between 2017 and 2020, the CPUC has taken a number of steps to address telecommunications outages and telecommunications consumer issues, including providing fee and billing relief to individuals displaced by wildfires. In addition to adopting two resolutions (M-4833 and M-4835) to provide relief to utility customers affected by the 2017 wildfires, the CPUC also took the following actions on telecommunications outages.

- In August 2019, the CPUC adopted a decision (D.19-08-025), which made the disaster relief requirements in its earlier resolutions a standard requirement for utilities, including telecommunications providers.
- On November 13, 2019, CPUC President Batjer sent letters to major telecommunications providers, which requested that each provider attend a hearing to discuss its actions to ensure the operations of communications services during wildfires and power shutoffs, its efforts to be responsive to OES and California Department of Forestry and Fire Protection (Cal FIRE), and its compliance with disaster relief requirements in D.19-08-025.
- On November 20, 2019, the CPUC held the pre-hearing conference to discuss the actions of the telecommunications providers and explore the potential scope of a second phase for the disaster relief proceeding to address service gaps.
- On December 18, 2019, the CPUC issued a ruling to propose additional topics that will be considered in a proceeding on telecommunications reliability during disasters and power shutoffs. The ruling indicated that the CPUC will consider which system requirements would ensure telecommunications networks can operate when electricity is lost, what requirements should be set to ensure timely communication of information with first responders, and the types of penalties that should be assessed on companies that violate disaster relief requirements.

## **ONGOING TELECOMMUNICATIONS RELIABILITY ISSUES UNRELATED TO POWER SHUTOFFS**

*Redundancy and resiliency are statewide concerns and not solely related to loss of electricity.* While power shutoff and wildfire-related telecommunications outages have been concentrated in communities with higher fire risks, urban communities with limited fire risk have not been exempt from telecommunications outages. Some communities have experienced telecommunications outages related to poorly

maintained infrastructure and a lack of redundant networks. The CPUC establishes service quality requirements for telecommunications providers in GO 133-D. These service quality requirements apply to basic telephone service, which is generally provided through copper telephone lines. In response to reports indicating that AT&T and Frontier consistently failed to meet service quality requirements contained in GO 133-D, the CPUC initiated an investigation into the causes of these networks' lack of reliability. The CPUC contracted with an independent consulting firm (ETI) to examine data related AT&T's and Frontier's respective networks.

In July 2019, the CPUC released a redacted version of the executive summary of the consultant's report. Data has been redacted from the report pursuant to confidentiality claims under Public Utilities Code §583. Despite the absence of redacted information, the executive summary implies that poorly maintained wireline infrastructure makes telecommunications networks in the Los Angeles vulnerable to telecommunications outages during heavy rain. The report states, "After analyzing the service quality data from AT&T and Frontier/Verizon, ETI identified a strong relationship between the level of precipitation and the number of service outages. This compels the conclusion that both carriers' networks are not as robust as they should be." Communities in which legacy copper telecommunications facilities are poorly maintained may also be communities in which high quality broadband investments are low. As a result, the communities may face total telecommunications outages without experiencing power shutoffs or major disasters. Additional information about these network exams may be available once the CPUC completes the process of identifying data that can be disclosed publicly.