Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Public Safety and Homeland Security Bureau	)	PS Docket No. 11-60
Seeks Comment on Wireless Service	)	
Providers' Safety Measures for Their	)	DA 18-612
Customers During Disasters in Connection	)	
with the Consolidated Appropriations Act of	)	
2021	)	

COMMENTS OF T-MOBILE USA, INC.

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REPLY COMMENTS OF T-MOBILE USA, INC.

T-Mobile USA, Inc. ("T-Mobile")[1] hereby files comments in response to the *Public Notice*[2] issued by the Public Safety and Homeland Security Bureau ("Bureau") seeking comment on recent efforts by mobile wireless service providers to improve network resiliency in order to inform a report to Congress. As discussed below, T-Mobile has taken numerous steps to ensure network reliability and, based on its long experience as a wireless service provider, has learned that cooperative industry efforts and network design flexibility are the most effective tools for ensuring network reliability.

INTRODUCTION AND SUMMARY

Natural disasters such as hurricanes and wildfires can destroy homes, government buildings, and businesses. Although wireless networks are not immune from the destructive effects of these events, wireless carriers continuously are taking steps to prevent outages and ensure the reliability and resiliency of their networks. T-Mobile takes these steps as part of its

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[1] T-Mobile USA, Inc. is a wholly-owned subsidiary of T-Mobile US, Inc., a publicly traded company.

[2] *See Public Safety and Homeland Security Bureau Seeks Comment on Wireless Service Providers' Safety Measures for Their Customers During Disasters in Connection with the Consolidated Appropriations Act of 2021*, PS Docket No. 11-60, Public Notice, DA 21-362 (rel. Mar. 26, 2021) ("*Public Notice*").

strong commitment to customers and in response to market forces – rather than government mandates – because the competitiveness of the wireless market makes network reliability and service quality essential to attracting and maintaining customers.

Although network investment strategies vary by carrier, T-Mobile alone has invested billions of dollars to deploy 5G wireless services, expand network coverage, harden its network, and ensure resiliency. These efforts have resulted in T-Mobile having the largest, fastest, and most reliable 5G network in the U.S.[3] T-Mobile's Extended Range 5G covers 287 million people across 1.6 million square miles.[4]

T-Mobile's competitors also have made investments to promote network resiliency, but these investments are unique to each carrier and vary depending on each carrier's network deployment. As a result, no two wireless networks are identical and flexible approaches are essential to account for these network differences and properly ensure network resiliency.

The Commission's current approach of relying on voluntary carrier efforts driven by competitive forces is successfully ensuring resilient wireless networks. Indeed, as events over the past several years demonstrate, wireless service in many disaster-affected areas was either minimally affected (if affected at all) or quickly restored to pre-disaster levels. Carriers, for the most part, have demonstrated their exceptional ability to pool resources and work cooperatively under very challenging circumstances. However, the Commission should continue to encourage efforts for cooperation across dependent industries. For example, loss of backhaul facilities remains a major cause of loss of mobile coverage during a disaster and efforts to improve the

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[3] News Release, T-Mobile, *New Data from Ookla Confirms T-Mobile Is America's Fastest 5G Network* (Apr. 15, 2021), https://www.t-mobile.com/news/network/5g-leader-fastest-ookla-q1-2021; 2021/04 5G Audit Report (Umlaut April 2021), https://www.umlaut.com/en/benchmarking/USA.

[4] News Release, T-Mobile, *New Report Finds T-Mobile 5G is America's Most Reliable* (Apr. 06, 2021), https://www.t-mobile.com/news/network/umlaut-most-reliable-5g.

resiliency of backhaul, including by burying fiber, and to develop a more comprehensive

framework for backhaul providers to cooperate and provide transparency during disasters would

significantly improve recovery efforts.

DISCUSSION

I.   T-MOBILE HAS TAKEN NUMEROUS STEPS TO ENSURE NETWORK RELIABILITY IN THE WAKE OF NATURAL DISASTERS

T-Mobile is proactive in its development of a resilient network that can withstand or

recover quickly from numerous types of natural disasters, including wildfires, hurricanes, and

other types of weather events. T-Mobile devotes significant funding and other resources on an

annual basis to network improvements such as: comprehensive planning and implementation of

network hardening; continuously adding capacity to its network to anticipate the future needs of

consumers or possible network-impacting events; investing in equipment dedicated to emergency

response efforts; pre-staging equipment, such as fuel, generators, and transmission equipment;

conducting regular year-round testing of its incident command system; engaging in continuous

assessments throughout the year; conducting annual planning exercises; and coordinating with

other carriers, vendors and industry partners regarding mutual aid, such as backhaul and roaming

support, in advance of potential disasters.

A.   T-MOBILE HAS UNDERTAKEN A NUMBER OF RECENT NETWORK RESILIENCY AND HARDENING INITIATIVES

Network design plays a critical part in network hardening and T-Mobile has designed its

network to minimize potential service disruptions that may accompany any type of disastrous

event. The network is reinforced by building a layered network with numerous overlapping cell

sites to provide a base layer of coverage in the event a subset of cell sites become inoperable due

to a disaster.

T-Mobile also has designed its mobile switching offices to significantly reduce the chance of network failure due to third party fiber damage, equipment failures, or other potential causes of service interruptions. Further, T-Mobile has tools that allow the network to self-optimize under certain conditions to maintain coverage and capacity as best as possible when certain sites become inoperable.

T-Mobile has invested heavily over the past few years in a range of network back-up equipment to minimize service interruptions for our customers and help our teams respond quickly. As a result, all of T-Mobile's network switches, Network Operations Centers ("NOCs"), data centers, points of presence, and other key sites have permanent, on-site backup generators that will keep the network running if commercial power is not available. Redundant fixed generators also have been installed at critical switch and data center locations.

Further, T-Mobile's NOCs and data centers are geo-redundant and diverse across the country. The NOC teams also practice transferring operations across NOCs on a regular basis to be ready in the event a disaster impacts a facility. T-Mobile also utilizes geo-diverse and redundant teams of experts across engineering, facilities, NOCs, IT, Network Support, and Data Centers.

Moreover, T-Mobile has implemented a distributed architecture for interconnection redundancy utilizing dual fiber facilities at switch locations. Communications from T-Mobile cell sites are backhauled with various combinations of Ethernet, copper, fiber, and microwave systems. In hurricane-prone areas, T-Mobile would like to obtain more buried backhaul connectivity because buried lines are less vulnerable to damage from hurricanes. Backhaul options along the coastline are limited, however, and many backhaul providers in these areas are

reluctant to move away from aerial connectivity. Nevertheless, T-Mobile continues to press for more resilient backhaul options.

T-Mobile also has hardened its IP network by utilizing multiple logical adjacencies over physically diverse paths. Essentially, there are multiple diverse paths between any two nodes on the backbone. Equipment also is installed in secure T-Mobile facilities that are built to withstand natural disasters.

These examples represent only a fraction of the network hardening efforts undertaken by T-Mobile to ensure its network remains resilient and that customers will have wireless service when they need it the most.

B.   *T-MOBILE CONTINUES TO IMPROVE UPON ITS ALREADY ROBUST EMERGENCY RESPONSE CAPABILITIES*

Following its merger with Sprint, T-Mobile increased its already robust network emergency response capabilities and now has more resources to quickly support hurricane and wildfire-prone communities after an event. T-Mobile has added thousands of generators – both fixed and portable – to facilitate rapid power restoration.[5]

Further, T-Mobile has doubled the size of its emergency management fleet of satellite enabled vehicles, including mobile command centers, Cells on Wheels ("COWs"), and Cells on Light Trucks ("COLTs"). Additionally, T-Mobile has specialized, satellite-equipped vehicles that have the capacity to provide basic services like texting, calling, and limited data functionality to these hard-hit areas. These capabilities are especially important for first responders who rely on connectivity for their recovery and rescue efforts. This fleet of vehicles

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[5] T-Mobile remains committed to power its business and network with 100% renewable energy by the end of the year. *See* News Release, T-Mobile, *Road to 100% Renewable: T-Mobile Is on Track to Reach Its Industry-Leading Environmental Commitment* (Apr. 15, 2021), https://www.t-mobile.com/news/community/road-to-renewable-energy.

can be driven to affected areas to quickly restore system coverage and/or capacity. The emergency management fleet also includes:

- RVs outfitted with monitors, self-contained Wi-Fi access, small kitchens, beds, restrooms, and workspaces to be used as Emergency Operations Centers. T-Mobile allows first responders to utilize these vehicles as well.

- Jeeps with specialized capabilities, such as the ability to provide Wi-Fi, cell coverage, and charging stations for the community.

Such efforts by T-Mobile and the industry are routinely acknowledged by localities and public officials as critical to response and recovery.

C. T-MOBILE HAS DEVELOPED A VARIETY OF EMERGENCY RESPONSE PLANS AND REGULARLY TESTS AND ASSESSES ITS EMERGENCY RESPONSE CAPABILITIES

In addition to financial investments, T-Mobile has established policies designed to facilitate network resiliency. For example, it has an Enterprise Continuity Program designed to provide effective responses to a wide variety of disruptive events. This program, largely based on current industry best practices, involves all sectors of the company to ensure rapid response during crisis situations. A team of dedicated, certified, and seasoned Business Continuity professionals work with all lines of business to help ensure that continuity plans are current, comprehensive, and effective. The Enterprise Continuity Program is reviewed annually and regularly updated with the daily goal of maintaining operations of T-Mobile's network across the country during emergency/disaster situations.

T-Mobile also has a well-defined Emergency Management Process which is implemented under the auspices of the Business Continuity Plan. Pursuant to this process, personnel are trained and drilled to handle disasters and critical outages.

Further, T-Mobile has developed an Emergency Operations Plan and Checklist that provides detailed instructions regarding the steps that should be taken to prepare for and respond

to many emergency situations, including floods, hurricanes, winter storms, volcanos, wildfires, tornados, earthquakes, power outages, and terrorist attacks. For many of these scenarios, the checklist sets forth steps that should be taken at least 72 hours in advance of the anticipated disaster. Among the key steps set forth in the plan are the establishment of restoration priority lists for key network elements, mobilization of field/construction crews, testing backup power systems, staging key equipment and supplies (such as replacement parts, generators, fuel, *etc.*).

D.   *T-MOBILE COORDINATES WITH ALL STAKEHOLDERS BEFORE, DURING, AND AFTER DISASTERS*

T-Mobile has worked with public safety experts and industry stakeholders to develop best practices to facilitate coordination before, during, and after emergencies and disasters to maintain and restore service continuity. These efforts include work with CTIA (which resulted in best practices specifically targeted toward coordination with governmental entities), the National Institute of Standards and Technology, and the Network Reliability Steering Committee.

Additionally, T-Mobile tests the strength of its response plans by conducting disaster preparedness exercises alongside other industry emergency management personnel that focus on the unique challenges each region may face during a disaster. These exercises also improve coordination and collaboration with state and local government agencies in disaster prone areas. Through its membership in the Communications Information Sharing and Analysis Center ("ISAC"), Communications Sector Coordinating Council, and multiple Industry Associations, T-Mobile actively participates in meetings hosted by industry and government personnel to collaborate, including DHS Cybersecurity and Infrastructure Security Agency and the FEMA Regional Emergency Communications Coordination Working Groups. For example, last Spring and Fall, T-Mobile also participated in two separate Cross-Sector Resiliency Forums sponsored by CTIA and the Edison Electric Institute. As recently as last month, T-Mobile participated in

the Emergency Support Function 2 – Spring Training Exercise organized by the Department of Homeland Security. In a few weeks, T-Mobile will participate in a DHS Hurricane Preparedness seminar.

The T-Mobile Emergency Management Team also partners closely with the National Weather Service and other partners, like StormGeo, to track the projected paths and areas of impact for storms. T-Mobile uses this information to inform preparations and decide if and where equipment and response teams are needed. Based on this information, T-Mobile proactively sends people, supplies, and equipment to locations close to the projected areas of impact.[6]

Similarly, T-Mobile proactively deploys assets in advance of wildfire season by analyzing historic trends to identify sites likely to be impacted by wildfires and strategically coordinates its preparations accordingly. In California, for example, T-Mobile utilizes forecasts and historical data about site locations previously subject to frequent public safety power shutoff notices to pre-deploy emergency equipment in high-risk areas. T-Mobile also has designed its network so there is overlapping coverage between sites where possible, which enables minimum service levels to be maintained in many cases when individual site outages do occur.

During times of crisis, disasters, and emergencies, T-Mobile National Emergency Management personnel who are coordinating recovery seek to remain in lockstep with Emergency Management, Homeland Security, and Public Safety officials. Through collaboration with the National Communications Coordination Center and through State and Local Emergency Operations Centers, T-Mobile representatives gather and share information,

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[6] These resources are not pre-deployed in the projected areas of impact to avoid the potential for a storm or wildfire to damage the equipment.

mitigate environmental and operational concerns, facilitate protective measures, and enhance rapid response and recovery capabilities.

E.   T-MOBILE PROACTIVELY ENGAGES WITH CONSUMERS BEFORE, DURING, AND AFTER DISASTERS

Before the start of each hurricane season and wildfire season, and before major storms, T-Mobile updates its website with materials designed to provide consumers with information on how to prepare for major storms and to preserve communications capabilities. Additionally, expertly trained technicians, engineers and community relief teams and trucks are proactively deployed in the aftermath of storms to ensure the right people are where they are most needed after a disaster and that hard hit communities not only have minimal service disruptions but also know T-Mobile is there to support them with charging stations and much-needed personal supplies.

When communities are in need, T-Mobile deploys Community Support Vehicles ("CSVs") to evacuation shelters to provide a range of supplies and services, including bottled water, pre-lit devices, charging stations, Wi-Fi and more.[7] The company currently has several CSVs strategically placed across the country. T-Mobile also has Retail Support Trucks that serve as store replacements and are deployed to assist customers in areas where our local stores may be closed due to damage after a storm.[8]

In sum, by making internal, targeted investment and resource allocation decisions and working collaboratively with other carriers to facilitate disaster recovery, T-Mobile's disaster responses are robust, prepared, and effective.

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[7] *See* News Release, T-Mobile, *Gearing Up: A Look at T-Mobile's Emergency Response Equipment* (Oct. 22, 2020), https://www.t-mobile.com/news/community/emergency-response-equipment.

[8] *Id.; see* News Release, T-Mobile, Dealing with Disaster Season (Oct. 16, 2020), https://www.t-mobile.com/news/community/dealing-with-disaster-season-2020.

II. NETWORK DESIGN FLEXIBILITY AND COOPERATIVE INDUSTRY EFFORTS ARE THE MOST EFFECTIVE TOOLS FOR ENSURING NETWORK RELIABILITY

Like the Commission, T-Mobile is committed to ensuring high network reliability and competes with other wireless carriers daily to deliver on this commitment. T-Mobile lauds the Commission's approach for relying largely on market forces, best practices, and cooperative industry efforts to ensure network resiliency, rather than prescriptive mandates. Reliance on market forces has demonstrated that flexibility in network design and cooperative industry efforts produces highly resilient wireless networks.

A. NETWORK DESIGN FLEXIBILITY

The competitive market in which wireless service providers operate creates strong incentives for providers, like T-Mobile, to deliver quality service to their wireless consumers and protect their significant network investments from harm. Carriers compete based upon consumer confidence in their networks. If a carrier's network has a high incidence of failure, customers will quickly become dissatisfied and switch to a different carrier. Network "hardening" and resiliency efforts thus will continue in response to competition.

The absence of rigid government mandates has permitted wireless carriers to take flexible, effective approaches to network design. Generally, investments to promote resiliency will vary significantly depending upon the network design and requirements of individual wireless carriers. For example, investments can be targeted toward cell sites with significant overlapping coverage. This approach minimizes the impact on service availability if certain sites become inoperable. Investments also can be made in temporary assets, such as temporary backhaul and generators, which can be deployed in areas where cell sites experience service disruptions. T-Mobile generally uses a combination of these approaches to ensure a resilient

network based on the unique circumstances of an area. Every wireless carrier strikes a different balance, however, in making these investments.

Not only will network investment strategies vary by carrier, they will also vary by geography with resiliency addressed differently in areas prone to large scale natural disasters versus areas generally not subject to such events. Further, even in areas prone to disasters, the investments will vary depending upon the type of event. For example, investments in networks subject to hurricanes often will differ from investments in networks more prone to earthquakes. There simply is no "one-size-fits all" solution to resiliency.

The Commission should continue to afford wireless carriers the flexibility to determine the best method for ensuring continuity of service. The Commission's flexible approach to date is consistent with conclusions reached by the Communications Security, Reliability, and Interoperability Council ("CSRIC"). Specifically, when CSRIC studied whether best practices could be created and applied to all wireless networks it concluded that it would be impractical if not impossible, to craft best practices that would apply to each participant in the communications industry based on, among other things, the wide variety of network and system designs, technologies, and capabilities characteristic of the industry.[9]

Like wireless networks, disasters also are unique. The unique nature of these events can create impacts that affect certain carriers' networks differently than others. Remediating those unique harms is necessarily tied to carrier-specific considerations, such as network design and resource allocation strategies. Carriers should not be compelled to orient their recovery resources to comply with regulatory mandates that may not be properly tailored to the network

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[9] CSRIC, *Working Group 6: Best Practice Implementation*, Final Report (Jan. 2011), available at http://transition.fcc.gov/pshs/docs/csric/WG6-Best-Practice-Implementation-Final-Report.pdf.

design strategies of a carrier or the impact of particular disasters on an individual carrier. For example, backup power is not a panacea for network outages because it does not necessarily improve continuity of service. If permanent, fixed backup power is mandated such that wireless carriers can no longer rely on a mix of permanent and mobile generators based on network design, a wireless carrier may be forced to dedicate its capital in an inefficient way that has an overall negative impact on network resiliency. Wireless carriers instead should be able to utilize the optimal combination of network resiliency elements based on their network design.

B.   COOPERATIVE INDUSTRY EFFORTS

In addition to the efforts of individual providers, the wireless industry works cooperatively to develop processes, procedures, and best practices designed to improve network resiliency. A few of these efforts are summarized below.

1.   WIRELESS RESILIENCY COOPERATIVE FRAMEWORK

The Wireless Resiliency Cooperative Framework ("Framework") is a voluntary initiative that imposes cooperation and mutual aid obligations upon declaration of the Emergency Support Function 2 and the activation of the FCC's Disaster Information Reporting System ("DIRS") in the wake of network impactful events. The Framework has improved coordination and communication among carriers and with national, state, and local emergency officials, which has advanced wireless service continuity and facilitated restoration efforts. Among other things, signatories to the Framework commit to:

- o Reasonable roaming among wireless providers under disaster arrangements when technically feasible;[10]
- o Mutual aid among wireless providers during emergencies;

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[10] T-Mobile has finalized or is in the process of finalizing VoLTE roaming agreements, which will further service continuity for customers in disaster situations.

- o Coordination with local government public safety representatives to develop best practices, and to provide contact information for a provider/Public Safety Answering Point contact database; and
- o Development of a "Consumer Readiness Checklist."

The Framework, which recognizes that cooperation will be provided when necessary and feasible, has been utilized since its creation to successfully advance wireless service continuity and restoration. It has allowed T-Mobile to allocate resources effectively and dynamically to better align with the circumstances of a particular event, thereby improving disaster recovery overall.

Given the success of the Framework and importance of backhaul facilities for wireless service continuity, the Commission should encourage backhaul providers to work together in developing a consensus agreement similar to the Framework. Such an arrangement would continue to allow backhaul providers flexibility to prioritize their own network needs, while providing wireless providers with more comprehensive visibility into the state of the broader networking ecosystem. As the GAO correctly noted, one "key dependency" for wireless networks is backhaul facilities that transport voice and data traffic from end users to major networks.[11] Because of this dependency, transparency between backhaul providers and wireless carriers is essential. It is also, in T-Mobile's experience, sometimes lacking.[12]

2. COLLABORATIVE CROSS-SECTOR RESILIENCY ACTIVITIES

In addition to individual carrier efforts to promote the resiliency of their wireless networks, carriers generally participate in a number of collaborative cross-sector resiliency activities forums such as:

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[11] U.S. Government Accountability Office, GAO-18-198, Telecommunications: FCC Should Improve Monitoring of Industry Efforts to Strengthen Wireless Network Resiliency, at 6 (2017), https://www.gao.gov/assets/690/688927.pdf.

[12] *See* T-Mobile Comments, PS Docket No. 11-60 at 8-9 (July 16, 2018).

- CSRIC;
- The Broadband Deployment Advisory Committee, including its Disaster Response and Recovery Working Group;
- The Alliance for Telecommunications Industry Solutions, Network Reliability Steering Committee;
- The Cybersecurity and Infrastructure Security Agency's National Coordinating Center for Communications;
- FEMA Regional Communications Coordination Working Groups; and
- The Cross-Sector Resiliency Forum established by CTIA and the Edison Electric Institute.

These collaborative cross-sector resiliency activities help ensure network resiliency by allowing all stakeholders to share information regarding network needs, restoration strategies, best practices, and post-disaster assessments.

CONCLUSION

As discussed above, wireless carriers continuously are taking steps to prevent outages and ensure the reliability and resiliency of their networks. These steps are taken in response to market forces – rather than government mandates – because the competitiveness of the wireless market makes network reliability essential to attracting and maintaining customers. The competitive nature of the wireless market also has fostered a variety of approaches to network design such that no two wireless networks are identical. As a result, no single approach to network resiliency will produce the same results in all wireless networks. Flexible approaches thus are necessary to account for network differences and properly ensure network resiliency.

Respectfully submitted,

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