

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)	
)	
Public Safety and Homeland Security Bureau Seeks)	PS Docket No. 18-339
Comment on Hurricane Michael Preparation and)	
Response)	

COMMENTS OF CTIA

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CTIA¹ submits these comments in response to the *Public Notice* issued by the Public Safety and Homeland Security Bureau (“Bureau”) regarding stakeholders’ readiness, preparation and response with respect to Hurricane Michael.²

I. INTRODUCTION AND SUMMARY.

CTIA’s member companies take seriously their commitment to provide robust and resilient wireless services and networks that American consumers rely on during storms, natural disasters, and other wide-spread emergencies, and in their aftermath as well. Consistent with this commitment, wireless providers invested billions of dollars in recent years to strengthen and harden networks and to improve network resiliency planning and practices. For this reason, CTIA welcomes this opportunity to recount the wireless industry’s vigorous efforts to enable millions of American consumers to communicate with emergency services, connect with family, and help their neighbors in the face of Hurricane Michael.

¹ CTIA® (www.ctia.org) represents the U.S. wireless communications industry and the companies throughout the mobile ecosystem that enable Americans to lead a 21st- century connected life. The association’s members include wireless carriers, device manufacturers, suppliers as well as apps and content companies. CTIA vigorously advocates at all levels of government for policies that foster continued wireless innovation and investment. The association also coordinates the industry’s voluntary best practices, hosts educational events that promote the wireless industry, and co-produces the industry’s leading wireless tradeshow. CTIA was founded in 1984 and is based in Washington, DC.

² *Public Safety and Homeland Security Bureau Seeks Comment on Hurricane Michael Preparation and Response*, Public Notice, DA 18-1176 (rel. Nov. 16, 2018) (“*Public Notice*”).

Despite the unprecedented conditions presented by Hurricane Michael, consumers were largely able to rely on wireless services to seek help and aid their recovery. For instance, the percentage of cell sites in service in the total affected areas never fell below approximately 81 percent on a given day.³

Millions of consumers thus were able to rely on wireless service to call and text loved ones, connect with emergency personnel, receive important safety alerts, and engage with others through social media. And in those instances where networks were affected by Hurricane Michael, the wireless industry worked around the clock to restore service in the days and weeks following the storm.

The availability of mobile wireless networks was due principally to two factors: (1) investments by wireless providers based on lessons learned from past storms – most notably Hurricane Katrina and Superstorm Sandy – and (2) the successful implementation of the Wireless Resiliency Cooperative Framework (“Wireless Resiliency Framework” or “Framework”).⁴ First, investments by wireless providers in recent years to strengthen and harden networks and improve resiliency planning and practices contributed significantly to the performance of networks. With network resources pre-positioned and dedicated teams standing by as the storm approached, wireless providers were able to maintain service continuity and expedite the restoration of service where infrastructure was affected by the storm.

And second, the actionable steps taken by wireless providers pursuant to the Wireless Resiliency Framework, a voluntary initiative developed by industry in collaboration with

³ As explained in more detail below, a cell site outage does not necessarily result in a lack of wireless service in the immediate area, given the overlapping nature of cell site service areas. *See infra* p. 5-6.

⁴ Letter from Joan March, AT&T Services, Inc.; Charles McKee, Sprint; Grant Spellmeyer, U.S. Cellular; Scott Bergmann, CTIA; Steve Sharkey, T-Mobile USA; and William H. Johnson, Verizon, to Marlene H. Dortch, Secretary, Federal Communications Commission, PS Docket Nos. 11-60 & 13-239 (Apr. 27, 2016) (“Wireless Resiliency Framework Letter”) (submitted for filing by CTIA).

Congressional leaders and the Federal Communications Commission (“Commission”), proved effective in enhancing service continuity and information sharing during and immediately after Hurricane Michael. And where cell sites were affected by the unprecedented strength of Hurricane Michael, the Framework offered wireless providers tools to expedite the restoration of service to consumers and government and public safety officials. These tools were complemented by the inherent flexibility of the Framework, which enabled wireless providers to deploy new and innovative technologies for the restoration of service and to make other targeted contributions to the communities affected by this storm.

To further promote service continuity in the aftermath of future storms, CTIA and its member companies are already taking stock of lessons learned in the days following Hurricane Michael’s impact. This storm demonstrated that the restoration efforts of other infrastructure stakeholders can significantly impact wireless network resiliency and restoration—for example, by the inadvertent cutting of fiber lines by electric utility companies. CTIA is thus looking forward to further addressing these challenges in the future as part of its work on the Disaster Response and Recovery Working Group of the Commission’s Broadband Deployment Advisory Committee (“BDAC”).

II. CONSUMERS RELIED UPON WIRELESS SERVICES DURING AND AFTER HURRICANE MICHAEL.

When Hurricane Michael made landfall on October 10, 2018, the high-end Category 4 hurricane was the third-strongest to ever strike the United States mainland, and the most powerful ever recorded in the Florida panhandle.⁵ Hurricane Michael, with sustained winds of 155 miles per hour, inflicted tornado-like damage on communities at ground zero.⁶

⁵ See Gina Martinez, *Hurricane Michael Is the Third Most Powerful Storm to Ever Hit the U.S. Mainland*, TIME (Oct. 10, 2018), <http://time.com/5421189/hurricane-michael-category/>; *Hurricane Michael is the most powerful*

Overall, despite these unprecedented conditions, consumers were largely able to rely on wireless services to seek help and aid their recovery. For example, the percentage of cell sites in service in the total affected areas never fell below approximately 81 percent on a given day.⁷ The percentage of cell sites in service in affected areas in Alabama, a state which experienced an estimated \$307 million in damage, remained above 90 percent in the days following the storm.⁸ Similarly, in the impacted areas of Georgia, a state in which more than 400,000 residents lost power due to Hurricane Michael, the percentage of cell sites in service never fell below 85 percent in the aftermath of the storm.⁹ As noted above, and discussed in detail below, a cell site outage does not necessarily result in a lack of wireless service in the immediate area, given the overlapping nature of cell site service areas.¹⁰ Thus, the availability of wireless services, as a geographic percentage of the affected area, likely exceeded the percentages stated above.

Yet, the experiences in those communities located directly in Hurricane Michael's path reflected the unprecedented nature of this storm. For example, the ground-zero location of

storm to hit Florida Panhandle on record, CBS NEWS (Oct. 10, 2018), <https://www.cbsnews.com/news/hurricane-michael-is-the-most-powerful-storm-to-hit-florida-panhandle-on-record/>.

⁶ See Matthew Cappucci, *How Hurricane Michael's devastating wind damage is reminiscent of Andrew in 1992*, WASH. POST (Oct. 15, 2018), https://www.washingtonpost.com/weather/2018/10/15/hurricane-michaels-devastating-wind-damage-is-reminiscent-andrew/?utm_term=.5adf25f55417; Brandon Miller & Brandon Giggs, *Michael is the strongest hurricane to hit the continental US since Andrew*, CNN (Oct. 11, 2018), <https://www.cnn.com/2018/10/09/weather/hurricane-michael-stats-superlatives-wxc-trnd/index.html>.

⁷ See, FCC, Communications Status Report for Areas Impacted by Hurricane Michael, at 1 (Oct. 13 2018), <https://docs.fcc.gov/public/attachments/DOC-354533A1.pdf> (noting that the percentage of cells sites out of service dropped from 18.8% to 7.8% in the three days following Hurricane Michael's landfall).

⁸ See Dennis Pillon, *Hurricane Michael cost Alabama estimated \$307 million, 2,500 jobs*, AL.com (Nov. 1, 2018), <https://www.al.com/news/2018/11/hurricane-michael-cost-alabama-estimated-307-million-2500-jobs.html>; FCC, Communications Status Report for Areas Impacted by Hurricane Michael, at 3 (Oct. 11 2018) ("FCC Oct. 11 Status Report"), <https://docs.fcc.gov/public/attachments/DOC-354510A1.pdf>.

⁹ See Arielle Kass, *'Catastrophic damage' to power grid in Georgia after Hurricane Michael*, ATLANTA JOURNAL-CONSTITUTION (Oct. 11, 2018), <https://www.ajc.com/news/local-govt--politics/more-than-300-000-are-without-power-georgia-after-hurricane-michael/wJrbPoaiGfgSjqaLL4m01K/>; FCC Oct. 11 Status Report at 6.

¹⁰ See *supra* n. 3; *infra* pp. 5-6

Mexico Beach, Florida was almost completely “flattened” by the storm’s winds.¹¹ Most infrastructure, including buildings and electric lines, and many wireless equipment installations, were significantly affected by Hurricane Michael.¹²

In those instances where networks were affected by Hurricane Michael, the wireless industry worked around the clock to restore service in the days and weeks following the storm. These efforts proved successful. The percentage of total cell sites in service in the total affected areas rose from approximately 81 percent on October 11 to approximately 94 percent on October 14 and to 97 percent on October 17.¹³ Even in Florida’s Bay County and Gulf County – the two counties most severely affected by Hurricane Michael – approximately 88 percent and 86 percent of cell sites, respectively, were operational by the time the Commission deactivated the Disaster Information Reporting System (“DIRS”) for Florida on October 26, 2018.¹⁴ In the face of the type of devastation wrought by Hurricane Michael, any assessment of wireless networks should account for both resiliency and speed of restoration.

Of note, the actual availability of wireless services likely exceeded that suggested by DIRS data. As CTIA has explained previously, because wireless networks are designed with numerous, overlapping cell sites that provide maximum capacity and continuity of service even when individual sites are inoperable, and because wireless providers utilize cellular base stations on wheels (“COWs”) and cellular base stations on light trucks (“COLTs”) in the aftermath of a

¹¹ Jay Reeves & Tamara Lush, *It’s ‘Gone’: How Hurricane Michael Swiftly Flattened One Florida Town*, YAHOO (Oct 11, 2018), <https://www.yahoo.com/news/apos-apos-gone-apos-hurricane-212442398.html>.

¹² *Id.*

¹³ FCC Oct. 11 Status Report at 4; FCC, Communications Status Report for Areas Impacted by Hurricane Michael, at 1 (Oct. 14, 2018), <https://docs.fcc.gov/public/attachments/DOC-354534A1.pdf>; FCC, Communications Status Report for Areas Impacted by Hurricane Michael, at 1 (Oct. 17, 2018), <https://docs.fcc.gov/public/attachments/DOC-354617A1.pdf>.

¹⁴ FCC, Communications Status Report for Areas Impacted by Hurricane Michael, 3 (Oct. 26, 2018) (“FCC Oct. 26 Status Report”), <https://docs.fcc.gov/public/attachments/DOC-354814A1.pdf>.

storm, the number of permanent cell site outages is not the exclusive determining factor in whether consumers can access mobile wireless services.¹⁵ This appears to have been the case in the aftermath of Hurricane Michael. For example, T-Mobile reports that it “was able to achieve a solid layer of coverage throughout the impacted areas relatively quickly” by deploying COWs and COLTs which were operational just five days after Hurricane Michael struck land.¹⁶

The Commission significantly aided these efforts in the critical days following Hurricane Michael. As noted in the *Public Notice*, Commission staff provided a number of public safety functions, including granting requests for special temporary authority and waivers of its rules to, among other things, facilitate service continuity and restoration efforts.¹⁷ CTIA commends the Commission for these actions.

Of course, other communications networks also faced challenges. For example, according to the Commission’s DIRS data, fewer than two-thirds of FM radio stations in the affected service area were operational the day after Hurricane Michael made landfall, as compared to approximately 81 percent of cell sites.¹⁸ When the Commission deactivated DIRS for counties in Florida, approximately 20 percent of FM radio stations in the affected area remained out of service compared to only 2 percent of cell sites in that same area.¹⁹ Indeed, unlike a broadcaster using a single location for transmissions, a wireless provider will often have multiple cell sites covering a particular geographic area, meaning there is no single point of failure; and the

¹⁵ See Comments of CTIA, PS Docket No. 11-60, at n.20 (July 16, 2018); Reply Comments of CTIA, PS Docket No. 17-344, at 12 (Feb. 21, 2018) (“CTIA Reply Comments”); Comments of CTIA, PS Docket Nos. 13-239 & 11-60, at 4 (Jan. 17, 2014).

¹⁶ See Response of T-Mobile USA, Inc., PS Docket No. 11-60, at 7 (Nov. 26, 2018) (“T-Mobile Resiliency Response”).

¹⁷ *Public Notice* at 2.

¹⁸ FCC Oct. 11 Status Report at 3-6 (showing number of cell site outages); *id.* at 7 (showing that 32 of the 93 FM broadcast radio stations reported out of service or down).

¹⁹ FCC Oct. 26 Status Report at 3-4.

redundancy of each individual network is further enhanced by roaming and other cooperative efforts between wireless carriers pursuant to their Framework commitments.

As a result of the resiliency and restoration of wireless networks, millions of consumers were able to rely on wireless service to call and text loved ones, connect with emergency personnel through social media, and receive important safety alerts.²⁰ For example, more than 170 Wireless Emergency Alerts were sent with life-saving information to consumers in the affected areas before, during and after the storm hit.²¹ CTIA and its member companies are pleased that wireless services provided a lifeline for consumers when they needed it most during and after Hurricane Michael. CTIA expects that the wireless industry will continue to work to strengthen networks in preparation for future disasters and emergencies.

III. INVESTMENTS BY THE WIRELESS INDUSTRY BASED ON LESSONS LEARNED FROM PREVIOUS STORMS HELPED ENHANCE RESILIENCY AND PREPAREDNESS.

The resiliency of wireless networks and preparedness of wireless providers in the face of Hurricane Michael was years in the making. Following Hurricane Katrina and Superstorm Sandy, wireless providers identified lessons learned from those catastrophic storms and developed practices to prepare for future storms. In turn, the wireless industry has invested billions of dollars to strengthen and harden networks and to improve network resiliency planning and practices by wireless providers.

As part of these investments, wireless network operators have designed, deployed, and managed robust, resilient networks using a regional approach to tailor network deployments and restoration plans as appropriate for that environment. For example, operators in the southern

²⁰ See *The Wireless Industry Responds to Hurricane Michael*, CTIA Blog, (Oct. 16, 2018), <https://www.ctia.org/news/the-wireless-industry-responds-to-hurricane-michael>.

²¹ *Id.*

regions of the United States design specifically for hurricanes, flooding, and other similar disasters that are more common in this region. Likewise, restoration plans and assets are positioned based on an operator's specific network deployment in a region as well as its associated disaster-relief plans. In the majority of cases, practices were developed based on lessons learned from previous storms.

Wireless providers recently described some of their investments in resiliency and preparedness in response to the letter inquiry sent by the Bureau seeking feedback on implementation of the Wireless Resiliency Framework.²² AT&T has “invested billions of dollars in [its] network to help plan and prepare for emergencies.”²³ This investment includes more than \$600 million in AT&T's National Disaster Recovery (“NDR”) program, which facilitates recovery of AT&T voice and data service network elements to an area affected by a disaster.²⁴ To date, team members working on AT&T's NDR program have spent more than 145,000 working hours on field exercises and deployments over the last two decades.²⁵ This preparation helped AT&T, in the run-up to Hurricane Michael, coordinate placement and deployment of disaster recovery resources and assets, including generators for cell towers and satellite COLTs and COWs.²⁶ Indeed, numerous Florida officials, both at the state and county level, recognized AT&T for its responsiveness during and after Hurricane Michael.²⁷

²² See, e.g., Letter from Lisa M. Fowlkes, Bureau Chief, Public Safety and Homeland Security Bureau, Federal Communications Commission, to Joan Marsh, Executive Vice President of Regulatory and State External Affairs, AT&T, PS Docket No. 11-60 (Nov. 6, 2018).

²³ Letter from Joseph P. Marx, Assistant Vice President, AT&T Services, Inc., to Lisa M. Fowlkes, Chief, Public Safety and Homeland Security Bureau, Federal Communications Commission, PS Docket No. 11-60, at 1 (Nov. 26, 2018) (“AT&T Resiliency Response”).

²⁴ *Id.*

²⁵ *Id.*

²⁶ *Id.* at 3.

²⁷ *Id.*

Sprint “maintains significant resources to help respond to disasters, including on-the-ground, trained technicians, portable diesel generators, specialized repair vehicles, [COWs], and predesignated strategic locations for staging equipment and other resources.”²⁸ In response to Hurricane Michael, Sprint deployed numerous satellite COLTs throughout the impacted areas providing cellular voice and LTE data for public safety first responders, medical facilities and the general public.²⁹

T-Mobile “pre-stages assets (including mobile generators, COWs, and COLTs), temporary microwave/satellite communications, and supplies (including fuel)” and “mobilizes expert recovery and restoration teams, completes internal preparedness checklists to ensure readiness, and coordinates with vendors that may be used in the recovery process” in advance of major storms.³⁰ As Hurricane Michael approached, T-Mobile pre-positioned assets such as COWs, COLTs, and mobile generators, which were deployed by recovery teams on the ground in the immediate aftermath of the storm.³¹

Verizon’s approach includes “preparing for disasters before they hit; communicating with [its] customers and government policyholders before, during, and after such disasters; and restoring and repairing [its] networks as quickly and safely as possible.”³² In advance of

²⁸ Letter from Charles W. McKee, Vice President, Government Affairs, Sprint, to Lisa M. Fowlkes, Bureau Chief, Public Safety and Homeland Security Bureau, Federal Communications Commission, PS Docket No. 11-60, at 2 (Nov. 26, 2018) (“Sprint Resiliency Response”).

²⁹ *Id.*

³⁰ T-Mobile Resiliency Response at 7.

³¹ *Id.*

³² Verizon’s Response to Letter from Lisa M. Fowlkes, Chief, Public Safety and Homeland Security Bureau, to William H. Johnson, Senior Vice President., Verizon, PS Docket No. 11-60, at 1 (Nov. 26, 2018) (“Verizon Resiliency Response”).

Hurricane Michael, Verizon staged assets throughout Florida, Georgia, and the Carolinas and deployed these resources to repair and restore service in the days following the storm.³³

Non-nationwide wireless providers are also deeply involved in network resiliency and restoration efforts. For example, Southern Linc has created an incident support team, which is comprised of subject matter experts from all of its departments, that convenes as severe weather approaches.³⁴ This team implements processes and procedures before and during severe weather incidents, and these processes and procedures are reviewed and adjusted, as appropriate, after each such incident.³⁵

Although not directly impacted by Hurricane Michael, U.S. Cellular's normal operating procedures include initiating contact with other carriers prior to a significant weather event to discuss mutual aid.³⁶ Similarly, GCI developed and deployed its wireless network based on its familiarity with the unique demands of the Alaskan environment and its understanding of the needs of Alaskans.³⁷ Among other things, GCI performs network maintenance and support during Alaska's 3-5 month build season and has safeguards in place for resolving service disruptions due to severe weather conditions.³⁸

³³ *Id.* at 19.

³⁴ Southern Linc Wireless Resiliency Framework Response, PS Docket No. 11-60, at 1 (Nov. 26, 2018) ("Southern Linc Resiliency Response").

³⁵ *Id.*

³⁶ Letter from Grant B. Spellmeyer, Vice President – Federal Affairs & Public Policy, U.S. Cellular, to Marlene H. Dortch, Secretary, Federal Communications Commission, PS Docket No. 11-60, at 1 (Nov. 26, 2018). U.S. Cellular also notes that it does not provide network operations in any of the area impacted by Hurricane Michael. *Id.*

³⁷ Letter from Kara Leibin Azocar, Regulatory Counsel, Federal Affairs, GCI Communication Corp., to Public Safety and Homeland Security Bureau, Federal Communications Commission, PS Docket No. 11-60, at 2 (Nov. 26, 2018). GCI also notes that it does not provide network operations in any of the area impacted by Hurricane Michael. *Id.* at 1.

³⁸ *Id.* at 1.

These investments, based on lessons learned from previous storms and tailored to the unique needs of particular regions, help to advance resiliency in response to significant events – and in this case, Hurricane Michael. Moreover, just as the wireless industry has done following earlier storms, wireless providers already are reviewing the performance of networks in response to Hurricane Michael and making investments to prepare for the challenges posed by the next storms.

IV. THE WIRELESS RESILIENCY FRAMEWORK FURTHER ADVANCED WIRELESS SERVICE CONTINUITY AND RESTORATION DURING AND AFTER HURRICANE MICHAEL.

The resiliency of wireless networks is due not only to investments in network infrastructure and lessons learned from previous storms, but also is the result of key actions facilitated by the Wireless Resiliency Framework. The Framework was developed in the aftermath of Superstorm Sandy when House Energy and Commerce Ranking Member Frank Pallone, Jr. (D-NJ), Commission staff, and CTIA convened to find ways to improve the resiliency of the nation’s wireless communications networks. Through months of discussions, the parties developed the Wireless Resiliency Framework, a voluntary initiative which contains five prongs to improve safety and enhance coordination during and after emergencies.

Specifically, the Framework:

- Provides for reasonable roaming among wireless providers under disaster arrangements when technically feasible;
- Fosters mutual aid among wireless providers during emergencies;
- Enhances municipal preparedness and restoration by committing to convene with local government public safety representatives to develop best practices, and to provide contact information for a provider/Public Safety Answering Point contact database;
- Increases consumer readiness and preparation through development and dissemination with consumer groups of a “Consumer Readiness Checklist;” and

- Improves public awareness and stakeholder communications on service and restoration status through Commission posting of data on cell site outages on an aggregated, county-by-county basis in the relevant area through its DIRS reports.

The nation's five largest facilities-based wireless providers, AT&T, Sprint, T-Mobile, U.S. Cellular, and Verizon, all voluntarily committed to adopt the Framework at the time of its announcement in 2016, and others have signed on as well (including GCI and Southern Linc).³⁹ Notably, the flexibility in the Framework has allowed non-signatory wireless providers to benefit as well, as was the case in the aftermath of Hurricane Maria.⁴⁰

As CTIA previously has described, the benefits of the Framework's approach were brought into clearer focus in 2017 when four historic hurricanes hit communities across Texas, Louisiana, Florida, Mississippi, the U.S. Virgin Islands, and Puerto Rico.⁴¹ During and after Hurricane Michael, the Framework once again proved a critical tool for helping to maintain and restore wireless communications.

A. Wireless Providers Supported Roaming and Offered Aid to Further Service Continuity and Expedite Service Restoration.

The Framework commits signatories to implement reasonable disaster-based roaming arrangements in the event wireless providers do not already have existing commercial roaming agreements in place. Wireless providers typically rely on existing commercial roaming

³⁹ See Wireless Resiliency Framework Letter; Letter from Kara Azocar, Regulatory Counsel, Federal Affairs, GCI Communication Corp., to Marlene H. Dortch, Secretary, Federal Communications Commission, PS Docket No. 11-60 (Sept. 1, 2017); Letter from Michael Rosenthal, Director of Legal & External Affairs, Southern Linc, to Marlene H. Dortch, Secretary, Federal Communications Commission, PS Docket No. 11-60 (Sept. 5, 2017); *see also* Letter from Rebecca Murphy Thompson, EVP & General Counsel, Competitive Carriers Association, to Marlene H. Dortch, Secretary, Federal Communications Commission, PS Docket Nos. 11-60 & 13-239, at 1 (May 31, 2016).

⁴⁰ See, e.g., FCC, Communications Status Report for Areas Impacted by Hurricane Maria, at 2-3 (Oct. 12, 2017), https://transition.fcc.gov/Daily_Releases/Daily_Business/2017/db1012/DOC-347207A1.pdf (noting that the four wireless providers serving Puerto Rico coordinated and prioritized the recovery of cell sites and placement of temporary assets to maximize the coverage for all subscribers).

⁴¹ See, Reply Comments of CTIA, PS Docket No. 17-344, (Feb. 21, 2018); Comments of CTIA, PS Docket No. 17-344, (Jan. 22, 2018).

arrangements in instances in which networks are affected by a disaster or emergency. In any roaming arrangement, wireless providers address issues such as handoff between networks, ensuring that handsets select the right network in the right area, and capacity management.

Here, wireless providers relied on existing commercial roaming agreements and, in at least one instance, a disaster-based roaming arrangement, to assist their broader efforts in maintaining service to consumers in the aftermath of Hurricane Michael. T-Mobile noted that, while it neither received nor requested any disaster-based roaming, it experienced an increase in network traffic from an existing commercial roaming partner following Hurricane Michael.⁴² Separately, AT&T granted a request for disaster-based roaming in the days following Hurricane Michael's landfall.⁴³ Most importantly, responses to the Bureau's letter inquiry reflect that no party was denied any request for disaster-based roaming.

The Framework also commits wireless providers to provide mutual aid to one another to help with service restoration and continuity. Given the advance notice of Hurricane Michael's arrival, and the availability of resources and the accessibility of staging areas in close proximity to the areas affected, there was little demand for formal mutual aid arrangements. Yet, wireless providers nonetheless worked together informally to minimize service disruptions for consumers. For example, T-Mobile recounted how it reached out to wireless carriers serving the areas of predicted impact to coordinate potential disaster recovery scenarios.⁴⁴ Similarly, Verizon noted that cooperation with other service providers is a standard component to its approach to service restoration and that it worked extensively with the Framework signatories to coordinate access to

⁴² T-Mobile Resiliency Response at 4.

⁴³ AT&T Resiliency Response, App. at 45.

⁴⁴ *Id.*

the affected areas.⁴⁵ And Sprint noted that carriers informally discussed the status of restoration efforts and shared information about what was occurring on the ground during Chairman Ajit Pai's visit to Tallahassee.⁴⁶ These examples highlight the spirit of mutual cooperation encouraged by the Framework and implemented by wireless providers. Moreover, they highlight the benefits of a flexible, outcome-based approach that encourages such informal cooperation rather than incentivizing arbitrary metrics. Responses to the Bureau's letter inquiry reflect that – just as was the case with disaster-based roaming – no party was denied any request for mutual aid.

B. Implementation of the Municipal Best Practices Enhanced Preparedness and Restoration.

Recognizing that effective initiatives for wireless network resiliency and recovery require coordination among key municipal stakeholders, signatories to the Framework have developed a set of best practices aimed at facilitating such coordination. CTIA and its member companies worked collaboratively with local government stakeholders in 2017 to produce the Best Practices for Enhancing Emergency and Disaster Preparedness and Restoration (“Municipal Best Practices”). The Municipal Best Practices are a set of tools to help coordinate joint efforts by wireless carriers and local governments to maintain service continuity, promote resiliency efforts, and expedite restoration activities during and after a disaster. CTIA, its members, and its local government partners have disseminated these best practices through social media and by

⁴⁵ Verizon Resiliency Response at 7.

⁴⁶ Sprint Resiliency Response at 3.

working with third party organizations affiliated with local government representatives across the country.⁴⁷

Wireless service providers implemented the Municipal Best Practices before, during and after Hurricane Michael. For example, T-Mobile and Verizon engaged in regular contact with state and local emergency management teams and staged critical network assets prior to the hurricane's landfall, continued coordination and information sharing with other wireless providers and state and local emergency management officials during the storm, and engaged in public information campaigns to update consumers on matters like network status, store openings, charging stations and other mobile support locations, and the availability of free service to affected customers in the impacted area following the storm.⁴⁸ AT&T remained in regular communication with state and county Emergency Operating Centers to facilitate ongoing recovery work and coordinate AT&T's efforts in response to state and local priorities,⁴⁹ and Sprint similarly worked closely with local governments to help speed restoration and coordination efforts.⁵⁰ Southern Linc also implemented the Municipal Best Practices through a variety of actions aimed at both facilitating disaster preparedness and response efforts and raising consumer awareness and education.⁵¹ These best practices are improving joint efforts to maintain service continuity, promote resiliency, and expedite restoration during and after an emergency or disaster.

⁴⁷ See, e.g., CTIA, *Wireless Network Resiliency Cooperative Framework: Best Practices for Enhancing Emergency and Disaster Preparedness and Restoration*, <https://www.ctia.org/the-wireless-industry/industry-commitments/wireless-network-resiliency-cooperative-framework> (last visited Dec. 10, 2018); Francisco Sanchez (@DisasterPIO), Twitter (Dec. 21, 2017, 12:02 PM), <https://twitter.com/DisasterPIO/status/943934745418895360> ("We recently worked with @CTIA to develop new list of best practices to help to maintain #wireless service during natural disasters. Click here for full article bit.ly/CTIABestPractices ...").

⁴⁸ See T-Mobile Resiliency Response at 8; Verizon Resiliency Response at 19-20.

⁴⁹ See AT&T Resiliency Response at 3.

⁵⁰ See Sprint Resiliency Response at 3.

C. Wireless Providers Demonstrated Their Commitment to Raising Public Awareness Regarding the Status of Service Restoration.

Another key element of the Framework is raising public awareness regarding the availability of communications services during and in the immediate aftermath of emergencies and disasters. Such efforts are an important resource to help consumers understand the communications services available to them and develop contingency plans in the event of outages.

To help further public awareness, the signatories to the Framework support making certain DIRS data available to the general public, including the total number of cell sites out of service on an industry-aggregated, county-by-county basis for any geographic area defined in a DIRS activation notice. And wireless providers did so for each of the areas impacted by Hurricane Michael. And, of course, CTIA and its member companies will continue to engage in extensive public campaigns to keep consumers apprised of service restoration efforts – just as the wireless industry has done in past disaster and emergency situations.

D. Wireless Providers Found Other Ways to Aid Communities with Services, Devices, and Dollars.

The effectiveness of the Wireless Resiliency Framework during Hurricane Michael can also be attributed to its inherent flexibility. Rather than tying down resources with unworkable and unnecessary mandates, the Framework allows providers to tailor their relief efforts where resources would have the most positive impact for consumers and communities. And wireless providers have used this flexibility to make resources available to consumers in effective and targeted ways.

⁵¹ See Southern Linc Resiliency Response at 4-5.

In the aftermath of the storm, wireless providers offered free data, text, voice and credits to customers across the region to help consumers connect with loved ones. And, in addition to services on the ground, wireless providers pledged millions of dollars to Hurricane Michael relief efforts and made in-kind donations, including electricity generators, chargers, devices, water, blankets, baby supplies, and hygiene products, in some of the hardest hit areas.

Providers also used new and innovative technologies to expedite the restoration of wireless services. For example, AT&T deployed a flying cell on wings, or a drone cell site, to expedite the restoration of LTE services in Mexico Beach, Florida.⁵² Similarly, Verizon deployed a manned cell site throughout various locations in Bay County, Florida in the days after the storm.⁵³ These flying cell sites can extend coverage farther than other temporary cell sites and are ideal for providing coverage in devastated and remote areas. Thanks to the flexibility provided under the Framework, the wireless industry will continue to develop and utilize these and other new and innovative solutions to restore connectivity in the aftermath of a disaster.

V. HURRICANE MICHAEL IDENTIFIED THE NEED FOR FURTHER COOPERATION BETWEEN THE COMMUNICATIONS AND ELECTRICITY UTILITY INDUSTRIES.

Each disaster presents its own set of unique challenges and opportunities to assess and continually fine tune approaches to resiliency. In the aftermath of Hurricane Michael, the wireless industry is taking stock, identifying lessons learned, and working collaboratively to develop practices to prepare for the challenges posed by future storms. Hurricane Michael demonstrated that the restoration efforts of other infrastructure stakeholders can dramatically

⁵² AT&T, Response to Hurricane Michael, *AT&T's Flying COW Deployed to Hard-Hit Mexico Beach*, (Oct. 17, 2018) https://about.att.com/pages/hurricane_michael.

⁵³ Verizon, Hurricane Michael network updates, *Network Update* (Oct. 17, 2018, 10:00 AM) <https://www.verizon.com/about/news/hurricane-michael-network-updates>.

impact wireless network resiliency and restoration—for example, by electric utility companies inadvertently cutting the critical fiber lines upon which wireless services rely for backhaul services.⁵⁴

In furtherance of addressing this issue, both CTIA and Verizon representatives recently were selected by Chairman Pai to serve on the Disaster Response and Recovery Working Group of the BDAC, whose broader membership includes additional representatives from the wireless industry, including representatives from AT&T and Sprint. This working group is charged with, among other things, developing best practices for coordination among wireless providers, backhaul providers, and power companies during and after a disaster. By closely examining the lessons learned during Hurricane Michael, this working group and the broader BDAC can make recommendations that will enhance wireless network resiliency and the continuity of service in the years to come.

VI. CONCLUSION.

The performance of wireless networks during and after Hurricane Michael shows that CTIA's member companies are committed now more than ever to deploying robust and resilient wireless services and networks that millions of consumers can rely upon during and in the aftermath of storms, natural disasters, and other wide-spread emergencies. Investments by wireless providers based on lessons learned from previous storms and the successful implementation of the Wireless Resiliency Framework enabled this performance. The Disaster Response and Recovery Working Group of the BDAC can further improve resiliency and enhance the continuity of service in years to come by closely examining the lessons learned

⁵⁴ Brendan Carr, *Rebuilding After Michael: Lessons Learned from 48 Hours with Telecom Crews*, MEDIUM, (Nov. 6, 2018) <https://medium.com/@BrendanCarrFCC/rebuilding-after-michael-65b0eed44f26> (noting the need for better coordination among utility companies to minimize unnecessary cuts to fiber lines).

during Hurricane Michael, including the need for better coordination between the communications and electrical utility industries.

Respectfully submitted,

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