Comments by Michael J. Logan 02/11/2018 in response to FCC docket 17-344

A. Questions Regarding Impacts to Communications Infrastructure

1. What were the major causes of communications outages due to the hurricanes? Were there unique factors that affected outages and/or resilience during any particular hurricane?

In Puerto Rico, most of the communications outages from Hurricane Maria were due to direct damage to critical communications infrastructure such as cell tower damage (frame, antennas, or equipment blockhouses), severing of critical land line and fiber optic cables, damage or destruction of public safety and amateur radio repeaters, and the total lack of grid power.

2. What were the cascading effects of communications outages? Did communications service outages have impacts on supervisory control and data acquisition systems (SCADAs) of other critical infrastructure?

Since virtually all communications systems were down simultaneously along with loss of grid power, this had an adverse effect on virtually all other infrastructure.

3. To what extent was the communications infrastructure resilient to the hurricanes? What methods were employed prior to hurricane landfall to address infrastructure resiliency?

The communications infrastructure was non-resilient. Several communications modalities relied on other modalities to be functioning. For example, even when cell towers survived without significant damage, the lack of functioning back-haul lines made their survival irrelevant since they could not transfer traffic.

4. Are there industry best practices that address communications operations in high risk areas (e.g., flood, high-wind areas)? If so, were these practices implemented and did they prevent and/or mitigate outages? To what extent do these best practices involve cross-industry and/or government participation and was such participation effective?

It did not appear as though there were any mitigations in place a-priori that planned for the possibility that all communications modalities would be affected simultaneously. High risk areas did not appear to have mitigations in place. Remote tower locations made repair extremely difficult.

B. Questions Regarding the FCC’s Response

1. Are there actions that the FCC could take to improve the support and coordination it provides to industry and government (federal and SLTT) partners? For example, was the FCC support to Emergency Support Function #2 effective?

To the extent that the FCC responded quickly to specific requests from ESF2, that part of the FCC’s support was more than adequate. However, ESF2’s requests were limited and thus needed support which the FCC could have provided was not. It also appeared that the local communications infrastructure providers were not intimately engaged with ESF2 or the FCC.

2. Are there any actions that the FCC should consider to improve the communications industry response to hurricanes? If so, what would those be?

Having redundant methods of communications which do not rely on other inter-dependent modalities would have prevented the cascade failure of all communications simultaneously.

3. The FCC provided information to the industry and the public before and during the course of hurricane season. For example, the FCC released public notices providing information, including but not limited to, emergency contact information for the FCC’s 24/7 center and process guidance on seeking waivers/STAs. The FCC also created event-specific webpages

to share information such as communications status reports, public notices, and orders. Was this information helpful? Is there additional information or assistance that the FCC should provide at the beginning or during an event?

The FCC daily reporting of cell site percentages up/down, and the status of some other elements were helpful. The FCC should consider adding the status of land-lines (not just switching stations), status of public safety repeaters, and other relevant forms of communication statuses. This would be helpful to both the public and disaster response personnel.

4. How effective were the FCC’s responses with respect to RFIs, RFAs, and requests for STAs and waiver requests? Do the processes for handling these requests need improvement and, if so, how can they best be improved?

Waving the symbol rate limits on Amateur radio bands was very helpful in increasing the amount of digital data which could be transferred amongst disaster response personnel and NGOs.

5. To what extent did the data provided by DIRS aid response efforts? Is there additional information, including licensee information, which would improve response and coordination efforts?

Having specific POCs for specific types of stations or other communications installations is helpful. However, the inability to contact these POCs in an area where virtually all communications are inoperable makes having the data irrelevant. Further, if the data base is web-based and there is no internet connectivity, responders cannot access the data.

6. The FCC monitors radiofrequency spectrum via deployed and/or fixed sensors to determine operational status of licensees. Were the reports related to such efforts effective in improving response of federal and SLTT partners? Should the FCC take actions to provide awareness and education on these capabilities?

If the FCC had deployed or fixed sensors, it would have been helpful to use them to identify specific RF radiators causing harmful interference to responding personnel communications.

7. The FCC provides assistance to industry, first responders, and others in coordinating ad hoc emergency uses of spectrum in the affected areas. To what extent was the coordination process effective?

The effectiveness of the coordination was limited by the inability to transfer that information to users who needed the information. This is why a-priori planning should include multiple methods of disseminating important information.

8. Were there interoperability issues among local spectrum users and those that arrived to assist in response? If yes, to what extent and how were they resolved? To what extent was unlicensed spectrum used and were there interoperability issues?

There were some interoperability issues mainly due to the lack of available communications mechanisms. In some cases, public safety agencies were forced to use amateur radio for critical communications since it was one of the few modalities available.

9. Should the FCC publicly post information about interoperable channels assignments to facilitate spectrum coordination?

Yes, see recommendations below.

C. Questions Regarding Communications Service User Experience

1. To what extent did government agencies issue emergency alerts to the public, particularly over the Emergency Alert System (EAS) and the Wireless Emergency Alerts (WEA)? What other alerting methods were used? Were those communications effective? For example, were the alerts easy to understand, read, and geographically accurate? Were they accessible to people with disabilities and sent in languages other than English? Were there consumers that the alerts did not or could not reach? If public safety officials chose not to use EAS or WEA, why not?

The usefulness of EAS and WEA were limited by the lack of functioning broadcast stations. Response personnel were unable to broadly reach the public to inform them of things like relief supplies distribution points or possible dangers such as risk of dam collapse.

2. Were consumers able to effectively reach 911 services via voice and/or text (where text-to 911 was available) during and after the hurricanes? If not, why not? Are there actions that the FCC should take to improve 911 resiliency and reliability during events such as the hurricanes?

No, the general public was unable to use 911 services due to the inoperable status of both the 911 center and the lack of functional communication paths. The 911 center was unable to receive calls from the public for some time and even once they gained the ability to do so, they lacked the ability to dispatch needed responders due to the lack of ability to communicate with same.

3. Were emergency communications services available to people with disabilities and others with specific communications needs? What actions can be taken to improve emergency communications for these communities?

The FCC should consider encouraging people with disabilities and others to obtain an amateur radio license. In addition, individuals with those needs should be encouraged to have multiple methods of communications.

4. Were consumer complaints related to communications outages responded to by service providers in an appropriate and expedited manner? Is there any action that the FCC should take to improve this process?

Due to the extent of the damage, outages could not reasonably be expected to be repaired quickly. In addition, many of these services had frequent outages even once they were brought back online.

5. To what extent were the operations of Public Safety Answering Points (PSAPs) affected by the hurricanes? Were PSAPs able to receive 911 calls during the storms, and if so, did redundancy and diversity in the circuits to the PSAPs contribute significantly to 911 reliability? Were PSAPs able to handle the call volume before, during and after landfall? Did PSAPs receive prioritized restoration for their service outages?

It appeared that the PSAPs and the 911 Center itself were damaged and inoperable for an extended period of time.

6. To what extent were first responders able to use their own wireless communications networks and devices? If not, what alternatives were used, if any? What was their experience with land mobile radio and microwave radio services in each hurricane?

Many of the wireless users made use of public safety repeaters which were inoperable. The lack of other forms of communications, including HF, UHF, and VHF simplex hampered first responders for an extended period of time.

7. The FCC oversees the National Security/Emergency Preparedness (NSEP) priority service programs, which provide for service restoration and provisioning and mobile wireless and wireline priority. To what extent were the priority service programs effective? Did NSEP users receive improved performance (higher percentage of call completion) when using the Government Emergency Telecommunication Service (GETS) and Wireless Priority Services (WPS) compared to non-prioritized voice calls? If not, why not? Were GETS calling cards distributed across emergency responder organizations? Were emergency responder cell phones equipped with WPS? Are there any actions that the FCC could take to improve the effective use of the priority services programs?

Priority services are irrelevant when the communications mediums carrying voice and data are inoperable, as was the case after Maria hit Puerto Rico.

8. To what extent were response efforts facilitated by amateur radio operators? Going forward, should efforts be made to increase the use of amateur radio services in connection with the planning, testing and provision of emergency response and recovery communications?

Many public safety agencies were helped by amateur radio volunteers. In some cases, the ability for amateur radio operators to communicate was the only method these first responders had. Hospitals were similarly grateful. However, the number of amateur radio operators available was woefully inadequate to overcome the total lack of functioning communications infrastructure. Use of amateur radio (and SHARES, MARS, and other) operators should be considered mandatory for emergency response. Understanding the strengths and weaknesses of the various communications modalities (and their interdependence on one another) should be mandatory training for all emergency response and recovery personnel.

D. Questions Regarding Communications Service Provider Experience

1. To what extent were service providers able to pre-position equipment, supplies, and/or resources close to the affected areas in advance of each hurricane? How did this impact the continued availability of communications services or facilitate recovery?

The availability of a small amount of on-hand equipment was quickly dwarfed by the magnitude of the communications infrastructure damage. Cell providers (e.g. T-Mobile) were able to arrange airlifted equipment to expedite some of the initial recovery. In the future, these providers should consider sending this equipment and supplies to disaster areas prior to the hurricane such that immediate repairs can begin rather than waiting for airports or sea ports to re-open.

2. Did small and rural providers, including those serving Puerto Rico and the U.S Virgin Islands, face any unique challenges in preparing for, responding to and recovering from the hurricanes?

In the case of Puerto Rico, there were numerous areas which were initially inaccessible due to damage to roadways, bridges, and debris.

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Specific Recommendations:

1. The FCC should consider expanding the number of interoperability frequencies, their functions, and the bands they are in. Propagation in the 5Mhz interoperability band region was problematic on several occasions during my time in Puerto Rico. The FCC should consider multiple frequencies within both lower and higher HF bands. For example, the FCC could consider allocating ~10 frequencies within several bands as follows:
   1. 2-3 High data rate digital frequencies (or frequency ranges)
   2. 2-3 Low data rate digital frequencies (for PSK31, MT63, and others)
   3. A designated universal HF calling frequency for each band
   4. 3-4 voice-only frequencies

The FCC should also consider allowing FHSS systems on portions of the amateur and interoperability frequency bands to increase effective throughput.

1. The FCC should eliminate symbol rate limits on all amateur bands. Current technologies would allow for a large increase in the effective throughput of digital modes while reducing bandwidth requirements if these symbol rate limits were eliminated.
2. The FCC, in cooperation with FEMA and NCC/SHARES, and MARS, should conduct regular exercises with the general amateur radio community operating in concert with local, state, and Federal radio operators, emergency management agencies, hospitals, police, firefighters and other first responders, and NGOs such as the American Red Cross, Salvation Army, broadcasters and others so that in the event of a widespread disaster, these groups would already be familiar with interoperability and would already have experience working together. It was observed that in Puerto Rico, these groups had not coordinated their response a-priori and their interoperability was sporadic at best.
3. The FCC, in cooperation with the Department of Defense and the States, should develop a training program for both National Guard, the various state guards, and active duty military units that would be called upon in a disaster, to ensure there is a nationwide trained cadre of soldiers, equipment, and knowledge to use HF effectively. This was not the case in Puerto Rico and is likely not to be the case nationwide. Similarly, the FCC should, in cooperation with NCC/SHARES, FEMA, and Federal, State, and local agencies develop a trained cadre of operators and equipment which can be called upon to deploy to a disaster area. This would be analogous to FEMA’s Surge Capacity Force.
4. The FCC should consider initiating a nationwide program to encourage and promote development of amateur radio operators who are able to operate without grid power and without “modern” forms of communications in the event of a widespread disaster. It is important to emphasize the message that the ability to operate off-grid for some period of time of days to weeks, may make the difference between life and death for the areas surrounding amateur operators. There were several areas within the interior of Puerto Rico that were completely isolated because of road damage. There was no way to communicate outside these areas even in the event of an emergency.
5. The FCC, in cooperation with FEMA, NCC/SHARES, and other Agencies both Federal, state, and local, should require that all licensees should have some ability to operate without grid power and without re-supply (such as fuel) for at least 72 hours, and preferably 21 days. Fuel supplies and deliveries of same were hamstrung in Puerto Rico by the lack of grid power, the clogged/destroyed roadways, and damaged port infrastructure. As such, many, many agencies, including hospitals, were unable to maintain radio communications for any significant period of time.
6. The FCC should consider instituting a requirement for broadcast stations that are a part of the EAS and WEA to have portable or backup broadcast abilities which can operate without grid power or re-supply of fuel for at least 72 hours. The FCC might also consider developing with FEMA a suite of mobile/portable broadcast units which are pre-configured to operate on specific radio frequencies and OTA television channels such that the general public cane tune in to those specific frequencies on their existing AM, FM, and television sets to obtain information from disaster response officials. These temporary stations could be pre-positioned along with other disaster supplies and deployed as needed to provide the maximum coverage of the public.
7. The FCC should consider requiring all cell providers to have redundant means to transfer voice, text, and data traffic from their cell towers. Further, the FCC should consider requiring land line and fiber optic cable providers to be similarly redundant, especially those that service PSAPs and 911 centers.
8. The FCC should consider designating one or two public safety “disaster frequencies” in different bands which public safety agencies can use via HF that would allow such agencies to communicate with disaster response officials. Such frequencies would only be authorized for use during disasters and would not supplant or replace existing ICS-205 communications planning but rather would be a “single point of contact” (SPOC) method for all agencies should other communications modalities not be available. Many of the public safety radios in Puerto Rico were pre-programmed with the existing repeaters and public safety short-range frequencies. When those were unavailable, few operators had the knowledge required to re-program their radios. If a known SPOC frequency had been pre-programmed, it is likely that many public safety organizations would have been at least partially able to coordinate responses and the 911 Center could have used this to dispatch needed services when other forms of communications to responders were disabled.

In summary, there was much to be learned from the experience of Hurricane Maria in Puerto Rico. It pointed out the fragility and inter-dependence of 21st Century communications infrastructures. It also pointed out the need for communications at all levels far beyond that which was anticipated. Further, it can be argued that many of the volunteer amateur radio operators, both ones already in Puerto Rico, and those which were deployed, did a great service to the community and to disaster response in general and should not be considered “amateur” but rather “non-commercial” since they appeared to me to be consummate professionals.

If history is a good guide, the magnitude of this disaster will be repeated. Hopefully we will be better prepared to respond to the call for help from our fellow Americans.