HUGHES
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Lessons from Disaster Relief

The Importance of Communications Resiliency and Preparedness

An important mission of Hughes Network Systems, LLC (Hughes) is to provide reliable communications services during times of crisis. And its active response during a devastating series of Atlantic hurricanes that stretched from Texas to the US Virgin Islands demonstrates the critical importance of satellite networks in supporting disaster relief efforts. When existing terrestrial networks are seriously damaged or disabled, only the alternate paths of satellite access can ensure responders stay connected in impacted regions, sharing vital information for decision-making as they work to restore damaged infrastructure and help save lives. These experiences prove there is an urgent need for emergency preparedness plans to include highly resilient communications infrastructure employing both terrestrial and satellite access technologies, together with adequate tactical support resources to be on the ready before disasters strike.

Restoring lost connectivity

As a leading provider of satellite broadband technology and services, Hughes provides broadband service coverage over three high-throughput satellites (HTS) in geostationary orbits (GEO) above the earth, well above terrestrial storms and their devastation. In response to Hurricanes Harvey, Jose, Irma, and Maria, Hughes leveraged its service availability and ground systems to support relief efforts, most notably in Texas, Puerto Rico, and the US Virgin Islands.

A Hughes VSAT solution installed on the roof of the Hospital San Cristobal made connectivity possible.

In Texas, Hughes worked with partner ResponseForce1 to support the Federal Emergency Management Agency (FEMA) community shelters with satellite broadband for public use so that members of the community were able to check in with family and friends via Voice over IP (VoIP) and the Internet.

In Puerto Rico, Hughes and partner, ResponseForce1, supported the San Cristobal Hospital in Ponce and deployed very small aperture terminals (VSATs) and solar generators to get the hospital back online during the wide scale outage. This connectivity enabled the hospital to remain operational and allowed leadership teams to order supplies and medications as well as evacuate patients in critical condition.

In these regions, Hughes also supported businesses, such as wholesalers, pharmacies, retailers, and others to ensure operations could continue. Online transactions made possible included processing insurance claims, credit card payments, and government-issued food stamp (debit card) purchases—which was critical as cash was difficult to come by following the storms. Following the hurricanes in Puerto Rico and the US Virgin Islands, there were more than 1,500 individual terminal activations supporting both government and private sector organizations on the islands. This averaged out to be about a dozen installs per day, requiring proven and streamlined logistical coordination to succeed.

Hughesnet provides connectivity to the airfield at the San Juan Airport.

Hughes supported multiple government agencies in the region, such as FEMA, the National Weather Service (NWS), Department of Defense (DoD), and Customs and Border Protection (CBP). Using Hughes VSAT systems, ResponseForce1 worked with federal agencies to reconnect airports in St. Croix, St. Thomas, and San Juan. Upon being reconnected, agencies were able to schedule the initial first responder flight cycles to the islands. Numerous agencies are now evaluating options to keep the terminals at critical sites on the islands as a resiliency measure for their networks.

Infrastructure and preparedness

In November of 2017 alone, government agencies on the island relied on Hughes satellite technology to place more than 30,000 VoIP calls.[1] The results here demonstrate the degree to which terrestrial communications networks struggle to withstand the forces of a natural disaster, such as a hurricane or flood, which often topple, wash out, or sever wireline components. Satellite-based communications infrastructures do not share the same vulnerabilities as miles of terrestrial lines, making satellite extremely well-suited to provide emergency communications in communities where terrestrial infrastructure has been compromised. However, due to a widespread lack of preparedness, there are rarely sufficient network systems in place in advance to support the needs of first responders and communities following a disaster, especially to the degree seen after Hurricane Maria.

Terrestrial infrastructure can struggle to withstand the forces of nature.

While no network can be impervious to every disaster or potential scenario, there is still room for governments and the private sector to be better prepared for what could potentially come. Failure to implement resilient communications infrastructures prior to a disaster extends the response time without communications, as was seen during Superstorm Sandy in 2012.[2] By contrast, during the 2017 hurricanes, prepositioning of emergency communications equipment helped get sites connected long before terrestrial access was restored.[3]

Residents near the 90-year-old Guajataca Dam were warned in time before its breech.

Path diversity in action

Where such path diversity has been deployed, there have been significant improvements on communications network resiliency during emergencies. For example, as Hurricane Maria was withdrawing from Puerto Rico, an imminent crisis was taking place on the island. The 90-year-old Guajataca Dam, located between the towns of San Sabastian, Quebradillas, and Isabela, was compromised with severe structural damage. While the entire island was without power and terrestrial communications, the NWS had an existing VSAT at their local station, which they connected to their power generator, enabling emergency calls to the DoD and FEMA to inform leaders of the impending crisis.

With NWS having a path-diverse means of communications, it was able to receive an immediate evacuation order from the U.S. Federal Government to warn the estimated 70,000 people located downstream from the dam.[4] Additionally, while the evacuation was underway, the DoD had deployed disaster resources to the dam and not only averted a collapse but restored the dam to a stable and operational condition, neutralizing a potential catastrophe before it could happen.[5]

Critical facilities, such as schools, utilities, police and fire stations, hospitals, and emergency management offices, should all be considered for resilient satellite communications to augment primary terrestrial communications. Commercial operations, such as retailers and gas stations, should also consider continuity of services to keep ATM and Point of Sale (PoS) applications online using satellite communications when the ground network goes down. Public

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1 Jack Corrigan, "How Puerto Rico is Rebuilding Its Network Three Months After Maria," Nextgov (December 19, 2017). Available at: http://www.nextgov.com/emerging-tech/2017/12/how-puerto-rico-rebuilding-its-network-three-months-after-maria/144686/.

2 Jim McKay, "Sandy Created a Black Hole of Communication" Emergency Preparedness (January 28, 2013). Available at: http://www.govtech.com/em/disaster/Sandy-Black-Hole-of-Communication.html.

3 Hughes Press Release: Hughes Announces Availability of Rapidly Deployable Emergency Response Systems, (September 20, 2017). Available at: https://www.hughes.com/who-we-are/resources/press-releases/hughes-announces-availability-rapidly-deployable-emergency.

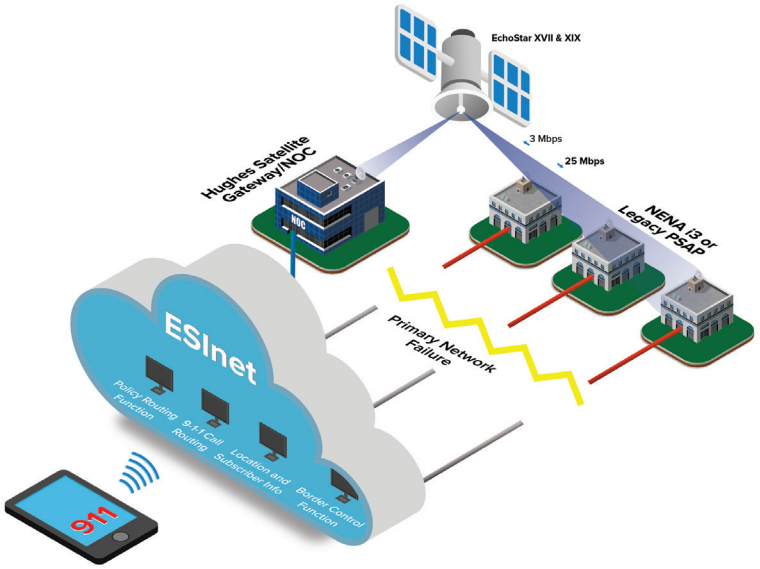
4 Ralph Ellis, "Puerto Rico dam fails; evacuations begin along Guajataca River," CNN (September 23, 2017). Available at: http://www.cnn.com/2017/09/22/us/puerto-rico-guajataca-river-dam-evacuations/index.html.

5 Lisa Hunter, "Department of Defense agencies join forces to repair Guajataca Dam," U.S. Army (October 4, 2017). Available at: https://www.army.mil/article/194908/department_of_defense_agencies_join_forces_to_repair_guajataca_dam.

Safety Answering Point (PSAP) 9-1-1 networks can benefit the most from increased resiliency by employing true networking path diversity using satellite to ensure highest possible network availability.

When 9-1-1 isn't an option

One of the common headlines during the 2017 hurricane season—frequently raised during times of emergency—was the inability of victims to reach local emergency personnel when calling 9-1-1. The inability to reach 9-1-1 PSAPs, forced victims to desperately search for alternate means of calling attention to their situations. The stories from Hurricane Harvey included examples of victims tweeting their locations, in hopes that neighbors might come to their rescue, since they could not reach emergency operators.



Cases like this may have been preventable if 9-1-1 networks were better equipped. Satellite backup is so seamless now that if an operator were on the phone with an emergency caller, they would not experience any call degradation in the switch. By incorporating satellite into the 9-1-1 PSAP network architecture, operators can continue taking calls during an emergency, even when the PSAP loses their primary and secondary network connections.

Some states and regions are already recognizing and adopting these measures voluntarily. A council of county governments added a satellite network to its 9-1-1 system to ensure its citizens have access to emergency services across nine counties in two states. With satellite path diversity, if a PSAP T1 line were to fail, routers at the location automatically switch to the satellite system and reroute the emergency call.

What impedes adoption of path diversity?

Two factors are holding back the widespread use of technological path diversity. The first is a lack of education and awareness of the importance of path diversity. The second issue is a lack of available government funding. However, any government effort to increase communications network resiliency should include provisions and funding to support network path diversity. This would ensure less time spent trying to procure and deploy communications solutions during the chaos of an emergency. For local communities, understanding their area's communications infrastructure—and whether it takes advantage of path diverse networks—is critical to proper planning and preparedness.

The time for preparedness is now

Federal, state, and local governments, along with the emergency response community must look at infrastructure prepositioning to ensure required systems are deployed and there is an effective emergency preparedness plan in place. In many emergencies, and even in the case of the 2017 hurricane season, time is limited for prepositioning communications infrastructure when a storm is already on the way.

In 2017, three major hurricanes struck different regions of the US. Unfortunately, the continued lack of adequate preparedness for emergency response networks exacerbated the damage incurred by the storms themselves. While there is no magic button to control climate patterns, government agencies and communities can bolster their ability to recover faster when extreme weather inevitably strikes. That requires federal, state, and local governments to include path diversity as part of their standards and best practices for critical sites, and to explore the adoption of such requirements in annual budget criteria. With the high-speed service available from the latest high-throughput satellites, there is no reason any critical network within the US should remain unprepared.

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