

WHEN HURRICANES STRIKE

Satellites Play a Critical Role in Saving Lives Before and After a Hurricane



Since 2005, 19 Atlantic hurricanes have hit the United States, causing more than 2000 casualties and damage estimated in the hundreds of billions of dollars

(Left) Since Hurricane Katrina, 28 U.S. States plus two U.S. Territories have been severely impacted by Atlantic hurricanes and tropical cyclones.

Satellites to the Rescue — For more than 55 years, satellites have been helping to save lives by supporting improved hurricane forecasting, preparation, search, rescue and recovery as well as everyday services, critical to citizens when disaster strikes.

ADVANCED WEATHER FORECASTING VIA SATELLITE

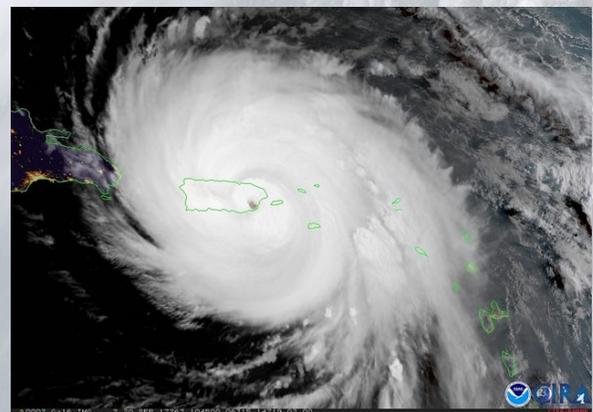
As weather predictions are vital to saving lives, the new Lockheed Martin manufactured GOES-R satellites with advanced imaging allows meteorologists and emergency responders to more quickly and accurately predict when and where hurricanes will strike. Spire Global utilizes small satellite GPS-RO weather data critical to industries and people across North America and the world. All this data is crucial as it helps local officials plan life-saving evacuations in areas predicted to be heavily impacted by severe weather.



Weather and imaging satellites provide life-saving data to forecasters and emergency officials. (Above) Artist Conception of GOES-R Weather Satellite Photo credit: Lockheed Martin



From Aug 27th to Sept 3rd, Hurricane Harvey devastated the Gulf Coast of Texas and Louisiana causing massive flooding and storm damage.



On Sept 20th, when Hurricane Maria made landfall in PR, land-based radar was disabled. The GOES-16 weather satellite provided forecasters with valuable real-time images like the one above. Photo credit: NOAA and GOES-R.gov

COMPARISON IMAGERY

Comparison Imagery - Before and After Imaging from satellite companies assists responders in locating areas of flooding and shelters/resources, performing search and rescues, evaluating damage to critical infrastructure, searching for navigable roads, and prioritizing aspects of the response and recovery.

CURRENT IMAGERY INITIATIVES

DigitalGlobe has released public imagery over affected areas during Harvey, Irma, and Maria. They have teamed with Team Rubicon and the United Nations. Humanitarian OpenStreetMap Tasks (HOT) are being provided imagery from DigitalGlobe's high-resolution satellite constellation.

Planet and its constellation of earth imaging satellites is supporting teams of volunteers, humanitarian organizations, and other coordinating bodies in relief efforts with daily imagery updates and analytical tools through its Disaster Response Program



(Above) Before and after Hurricane Maria in PR. Photo credit: DigitalGlobe
(Below) Before and after Hurricane Irma destruction in USVI. Photo credit: Planet



**GLOBAL POSITIONING SYSTEM (GPS) SATELLITES

Operated by the U.S. Air Force, GPS satellites built by Lockheed Martin and Boeing provide position, navigation, and timing data for GPS terminals and mobile phones before, during and after a disaster. This data enables critical precision location of disaster victims, relief team workers, and emergency responders and their equipment. GPS satellites also support the continuity of communications networks, electrical power grids and financial networks and ATM services by providing precise timing data that is critical for synchronization and operational efficiency.

SATELLITE COMMUNICATIONS (SATCOM)

Satellite Communications (SATCOM) Networks are highly survivable and robust compared to terrestrial communications infrastructure which may be damaged or destroyed in a hurricane. **SATCOM equipment can also be pre-deployed to centralized "safe" locations within a region and in some cases, these systems can be pre-installed to enable operation before, during, and after a disaster. From federal, state and municipal public agencies including FEMA and NGO recovery organizations to everyday consumers, satellites provide robust services and business continuity when other networks are damaged, overloaded or unavailable. Satellite Communications also provides a load sharing or surge capacity solution and enable the creation of instant communications infrastructure.

2017 SATELLITE COMMUNICATIONS RESPONSE AND RECOVERY INITIATIVES IN TEXAS, FLORIDA AND THE CARIBBEAN

****DataPath:** In Texas, in collaboration with several partner organizations, DataPath mobilized to provide key communications support to Team Rubicon, a disaster relief nonprofit organization that consists primarily of military veterans. DataPath deployed two satellite antennas on top of Team Rubicon's Houston command center. DataPath also deployed a terminal and established a wi-fi network at a Team Rubicon volunteer processing center. DataPath partner Network Innovations (NI) donated connectivity services for these efforts. In response to Hurricane Irma, DataPath also partnered with NI. The team provided three quick-deploy satellite terminals to deliver critical communications. The first, along with a Rapid Response Communications Kit for telephone and secure data connectivity restored communication with the fire department, emergency services, and medical services. The second terminal supported a U.S. Marine Corps Airfield Services detachment. The third terminal was set up to support the Florida Department of Law Enforcement, restoring internet, email and phone connectivity.

****Globecomm:** Globecomm responded immediately to the recent hurricanes that hit Florida, Texas, Puerto Rico and the Caribbean, providing satellite terminals, satellite service with terrestrial backhaul and 24/7 service support to the government and commercial sectors. One day after Hurricane Maria devastated San Juan, Globecomm added nearly twice the capacity to a client's satellite network to ensure all communications needs were satisfied. Globecomm also enabled wireless cellular service at local base stations in Puerto Rico to support thousands left without communications and restored critical FAA Communications antennas.

2017 SATELLITE COMMUNICATION RESPONSE AND RECOVERY INITIATIVES IN TEXAS, FLORIDA AND THE CARIBBEAN (continued)

****Hughes Network Services (HNS):** In Texas (TX), Puerto Rico (PR), and the US Virgin Islands (USVI), Hughes partnered with FirstResponse1 to establish emergency connectivity in airports, hospitals, schools, and community hubs. In PR and USVI, Hughes and ResponseForce1 supported the FEMA Air Bridge and deployed VSATs and solar generators to get the region's airports back up and operational. In PR, Hughes is supporting retail customers, including wholesalers, drug stores with business continuity services including the processing of insurance claims, credit card transactions, and government issued food stamp debit cards. FEMA shelters and local retailers equipped with Hughes Gen5 are enabling community members to connect to their families over VoIP and Internet.

Hughes also supported key USG agencies in TX, PR and USVI such as FEMA, the National Weather Service, DoD, and CBP, to ensure critical communications were available. Hughes is working to make donations to key relief organizations in the affected areas to ensure they have the services they need available to help the people who have been hit.

****Inmarsat:** To assist in the recovery effort, Inmarsat and its partners have donated and delivered rapidly deployed voice and high-speed data services including IsatPhone handheld satellite phones, BGAN (Broadband Global Area Network) and Global Xpress to support official emergency and disaster response teams, providing vital communications and other important humanitarian services following hurricanes Harvey, Irma and Maria as well as recent earthquakes in Mexico. In PR, Inmarsat services were used to restore communications to emergency operations centers and major resorts and were used to establish temporary hot spots in local communities, allowing affected individuals to use phone, text, and social media services to stay in touch with loved ones over their own devices. In addition to delivering satellite equipment and services, Inmarsat has made a donation to the American Red Cross to help those who have been affected.

Inmarsat Government: Small, rapidly deployable terminals like BGAN (Broadband Global Area Network) systems are providing internet and communications services to a number of government customers, and have done so during Harvey, Irma, and Maria responses. Inmarsat's networks are operating nominally over USVI and PR with additional Global Express capacity being steered into the region.

Intelsat: On St. John, USVI, Intelsat is supporting the Global Disaster Immediate Response Team (DIRT), a quick response international non-governmental organization (NGO) that provides medical assistance, communications access, and search and rescue support. Global DIRT is using IntelsatOne Flex and antennas and kits provided by Intelsat to support communications at multiple sites, including a medical clinic.

Intelsat is helping return communications to normal levels on PR, working with two major telecommunications companies to provide VSAT services to restore network operations for enterprise customers. The Intelsat Ku-band broadband service is helping banks and pharmacies open again as well as providing communications support for the Puerto Rican government and FEMA. The Intelsat-16 satellite has also been redeployed to provide further assistance in PR following Hurricane Maria.

Intelsat is also working with antenna manufacturer Kymeta and has donated Intelsat Epic^{NG} throughput to support the Liberty Global Wi-Fi tour caravan in PR. The Liberty Global tour will deliver Internet connectivity to 29 remote and damaged areas of the island. Working with Kymeta's steerable roof-mounted, flat panel antennas, the service will provide connectivity up to 20 Mbps forward and 1Mbps return.

****Intelsat General Corporation:** Federal, state and local emergency workers have come to rely completely on satellite communications in the early stages of a response, as was illustrated by the recent experience of Network Innovations (NI), a leading Intelsat General satellite integrator. The company assisted emergency workers following both Hurricane Harvey and Hurricane Irma. Immediately after Hurricane Irma passed through the Florida Keys, the integrator sent one of its vehicles equipped with a drive-away VSAT dish and five technical teams to assist both local agencies and public safety responders. The teams delivered communications to Key West and Marathon police and fire units as well as established a communications station with the National Guard in Key West to allow people waiting in food lines to send emails or make calls to loved ones.

****Iridium:** Iridium worked directly and through our partners with federal, state, and local government emergency management agencies to ensure access to reliable communications. Following the storms, Iridium worked with non-governmental organizations (NGOs) and first responder organizations to help supplement their communications capabilities by providing emergency 'seeder' phones where possible and appropriate. These devices proved to be vital in the initial days after the hurricanes hit in terms of providing communication for first responders responsible for rescuing people and saving as many lives as possible.

During the hurricanes, hundreds of Iridium phones were used to support emergency services through groups such as the International Telecommunications Union (ITU), Homeland Security, the U.S. Department of Defense, the State of Florida Governor's Office, and many NGOs. At one point, there were over 3,100 unique Iridium subscribers in the Caribbean region, enabling more than 221,000 total minutes of voice and data. Iridium Push-to-Talk provided real-time group communication and enhanced the coordination of life-saving efforts and evacuation of numerous areas in post-storm flooding conditions.

2017 SATELLITE COMMUNICATION RESPONSE AND RECOVERY INITIATIVES IN TEXAS, FLORIDA AND THE CARIBBEAN (continued)

****Ligado:** Ligado's satellite network is currently being used by the DHS, FEMA and the FBI in PR and USVI and usage has soared in the region. In the immediate aftermath of Maria, Ligado worked with the United Way's MISSION UNITED to meet the communications needs of those impacted by the Hurricane. Donated satellite phones and service are still being used by public safety officials, volunteers, and community organizations in PR so that they can stay in touch with areas where the communications infrastructure has been destroyed. The Company has fulfilled all requests for additional satellite phones and network capacity to support government and NGO relief. Additionally, Ligado has responded to Hurricanes Harvey and Irma by getting hundreds of new satellite phone units into the hands of public safety officials and other first responders actively involved in disaster relief efforts.

O3b: O3b, an SES subsidiary, is using the Ka band through its Medium Earth Orbit non-geostationary satellite constellation to help bring local wireless networks in PR online while the terrestrial infrastructure is being repaired.

SES-GS: SES-GS is providing Ku capacity to U.S. Government Responders in PR and other islands in the Caribbean.

SES: SES is providing C-band services to relief workers in PR and utilization of Emergency.lu rapid deployment kits in Saint Martin, Sint Maarten and Dominica. These terminals were quickly brought in for use by responders in response to Irma and Maria to provide internet connectivity. Once installed, teams deployed Wi-Fi access points so that humanitarian aid organizations could have connectivity, numbering around 400 registrations. Emergency.lu was also used to restore communications at Princess Juliana airport. Additionally, SES provided C-band capacity at no charge for the benefit concert to benefit victims of hurricane Irma and Maria.

Telesat: In response to an urgent request from a telecommunications service provider (TSP), Telesat established two VSAT networks in PR following hurricane Maria, utilizing Telstar 12V capacity and hub VSAT services at Telesat's Mount Jackson Teleport. Telesat also assembled remote hardware kits that were delivered to the TSP customer in PR, and engaged an on-site field service representative to deploy the two networks and assist the TSP customer.

Viasat: Viasat currently has broadband satellite coverage of the Continental United States plus Hawaii and Alaska, but not USVI or PR (with Viasat-2 coming online later this fall, coverage will be available in those regions). During the recent events, in Texas and Florida, the NGO recovery teams deployed 26 Viasat portable satellite broadband terminals to help volunteers connect online to provide critical medical attentions, place people in shelters, and continue to heal the impacted communities.



SATELLITE PHONES

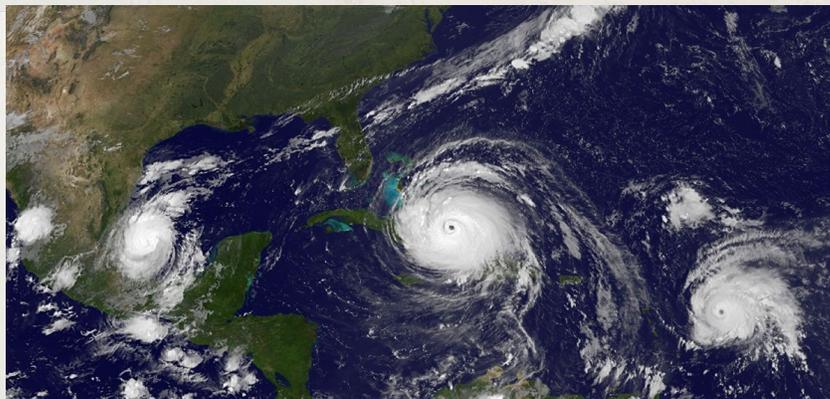
Satellite phones from companies such as Iridium, Inmarsat, Ligado and Globalstar can provide a vital service to first responders, recovery teams and survivors cut off from the world who wish to reach out to family and loved ones.

(Left) On Oct 6th, a Coast Guard Tactical Law Enforcement Team South crewmember, gives a satellite phone to a local in PR so she can call her son in Alaska who she hasn't been in contact with since Hurricane Maria. Photo Credit: U.S. Coast Guard photo by Petty Officer 3rd Class Eric D. Woodall

****The 2017 Hurricane Season Produced 17 Named Storms and Six Major Cyclones (Category 3, 4 or 5)**

The 2018 Hurricane Season Begins June 1st

(Right) On September 8, 2017, the GOES-16 weather satellite took this image of Atlantic Hurricanes (from left to right) Katia, Irma and Jose. Photo Credit: NOAA



****Updated January, 2018**

SATELLITE CONNECTIVITY AND BROADBAND



Hurricane preparations—Satellites provide vital debit and credit card authorizations at gas stations and retail stores.

Retailers process everyday purchases using satellite data services before and after a hurricane strikes. Companies such as EchoStar, Hughes and Telesat provide reliable satellite support and business continuity to gas stations, grocery stores and retailers for point of sale (POS) credit/debit card authorizations and inventory management. Consumers purchase fuel, water, food and other essentials to prepare for hurricanes. Satellite data and broadband providers such as Hughes, Viasat, Inmarsat and Telesat also provide essential lifesaving broadband and VSAT data services to response and recovery agencies, hospitals and others in regions cut off from terrestrial Internet and Wi-Fi.

SATELLITE BROADCAST

Satellites from companies such as Eutelsat, Intelsat, SES and Telesat support television news trucks and emergency responders to provide valuable onsite rescue and recovery information and services.

SiriusXM works with the Integrated Public Alert and Warning System (IPAWS) management office to distribute receivers in impacted regions such as PR and can dedicate additional channels to broadcast vital emergency safety information.

CELLULAR COMPANIES ALSO DEPEND ON SATELLITES

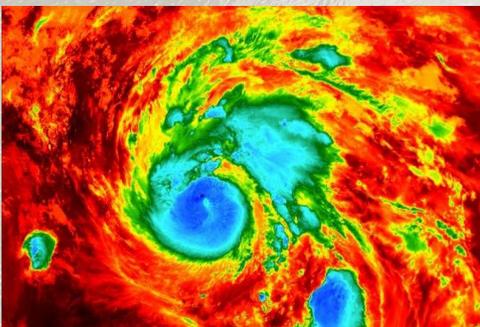
Currently, AT&T is using satellite phones and both Verizon and AT&T are deploying satellite trucks in regions hit hard by recent hurricanes in order to restore service. T-Mobile and Sprint are using VSAT terminals to provide backhaul support for restoration of cellular and text service.



Satellite News Trucks pictured above were deployed following Hurricane Katrina.



(Above) VSAT terminals restoring connectivity in PR (Photo credit: Colin Chaperon for the American Red Cross)



Hurricane Harvey Caused Massive Flooding in TX and LA (Photo credit DigitalGlobe.com and ESA)

Hurricane Sandy Destruction



For More Information, please contact Therese Jones, Senior Director of Policy, Satellite Industry Association via email at tjones@sia.org

Further reference materials: [SIA Satellites to the Rescue Presentation, click HERE](#)

[SIA First Responders Guide for Satellite Communications, click HERE](#)