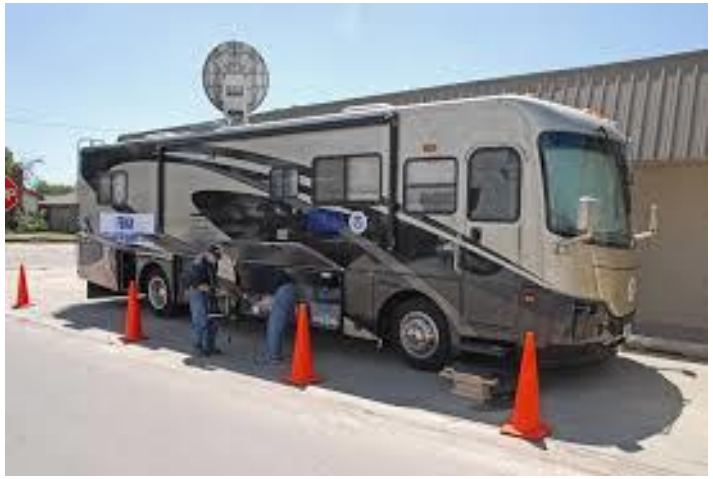
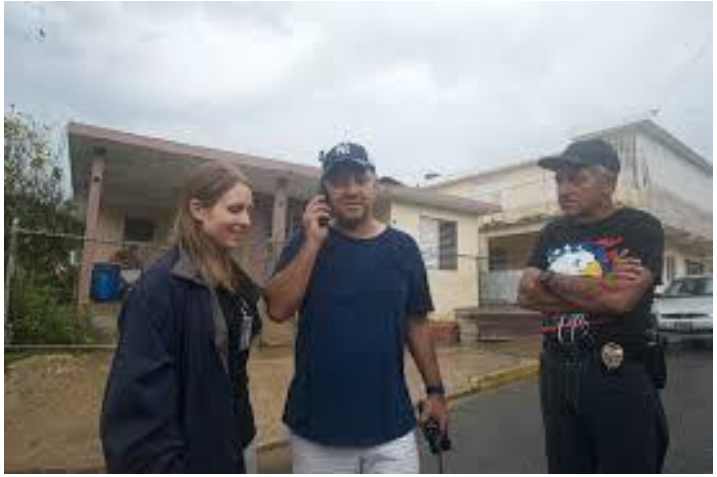
Satellite Communications in Disaster Relief





Images courtesy of FEMA

Why Satellites?

- Global coverage, independent of terrestrial infrastructure
  - Satellites provide broadband speeds of up to 100 Mbps today
- Rapidly deployable, portable, and instant set-up
- Ubiquitous Geostationary Orbit satellite coverage and low-latency non-Geostationary coverage position the satellite industry to facilitate emergency response efforts and restore broadband connectivity
- Set up with minimal training, at times with the push of a button
- Simultaneous voice and broadband
- Provide backhaul for terrestrial infrastructure, and connectivity to low-density regions where terrestrial alternatives are costly

Ensuring Satellite Availability: Regulatory Obstacles

- Rapid licensing needed during disaster
- Customs issues are a barrier for a substantial portion of telecommunications efforts
  - Coordination between local governments and customs is necessary
  - Preclearance of telecommunications equipment or acceptance of foreign certification are several ways to bypass this issue
  - Bans on encrypted technology can prohibit the entry of equipment, as satellite equipment often has encryption embedded for secure use
- Identify points of contact prior to disaster events to facilitate communication between satellite operators and local governments
- Part III of the ITU Smart Sustainable Development Model Initiative Report describes barriers to telecommunications deployment and recommendations in further detail: https://www.itu.int/en/ITU-D/Initiatives/SSDM/Pages/default.aspx

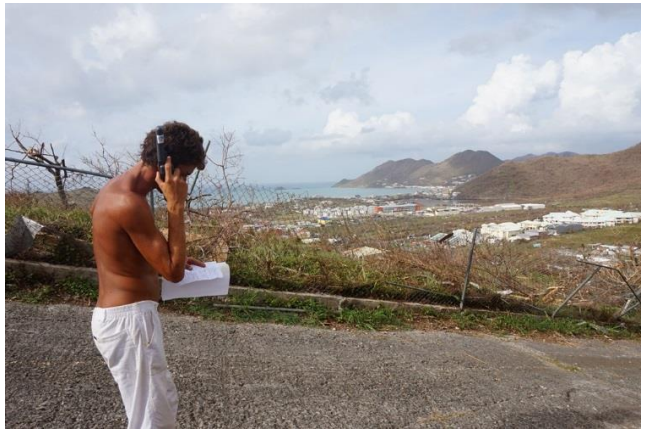
Ensuring Satellite Availability: Provider Access

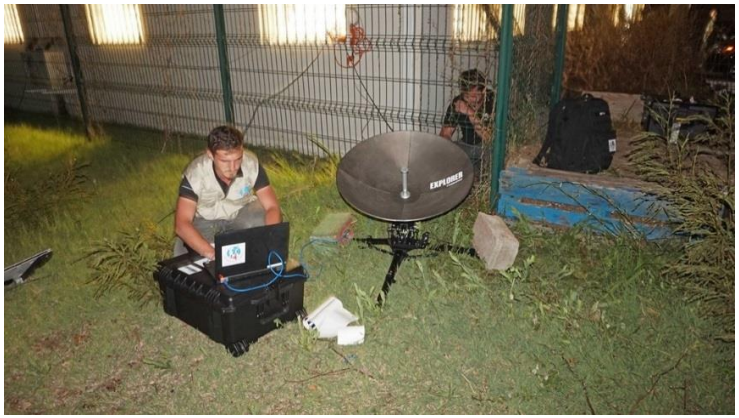
- Redundant systems are necessary
  - Schools, utilities, emergency responder locations, and hospitals should be outfitted with satellite communications prior to disaster
  - Satellites can provide alternate path for emergency calls
- Pre-position equipment in strategic locations, take inventory
- End-user readiness is key
  - Training and preparation, with simulated emergency events and hands-on demonstrations is necessary
- Terminal maintenance needs to be conducted regularly
  - Ensure firmware and software are updated, and batteries, power, and solar backups are ready
- Consider deploying emergency funding in advance, and develop disaster risk financing strategy: https://blogs.worldbank.org/latinamerica/one-year-after-storms-five-ideas-building-back-stronger-caribbean
- First responder's guide for satellite communications available: https://www.satellitetoday.com/wp-content/uploads/2018/07/32569_VS-2018-First-Responders-Guide_FINAL-REV.pdf

Case Study: Hurricane Irma, Saint Martin, 2017

- Télécoms Sans Frontières (TSF) deployed to Guadeloupe 24 hrs after Irma – authorization to enter Saint-Martin and Saint-Barthelemy 3 days later
  - Satcoms support emergency response efforts with voice and data at the island Coordination Centre and fire brigade HQ
  - Connectivity restored to Princess Juliana airport
  - Coordinate medical evacuations
  - Conveyance of material and human assistance
  - Provision of emergency accommodation
- Satellite phones utilized by TSF's mobile calling teams provide free telephone calls to enable families to let loved ones know they are safe and to seek assistance

Hurricane Irma satellite communications relief efforts in Saint Martin. Photo credit: Inmarsat

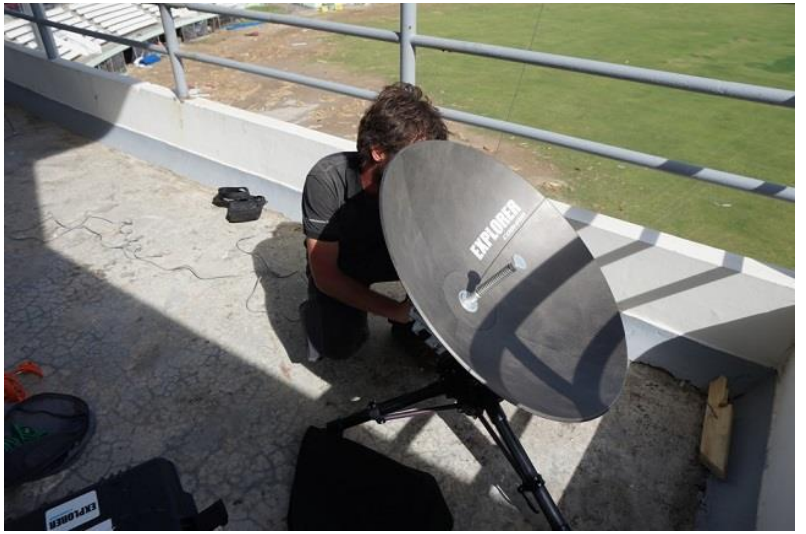


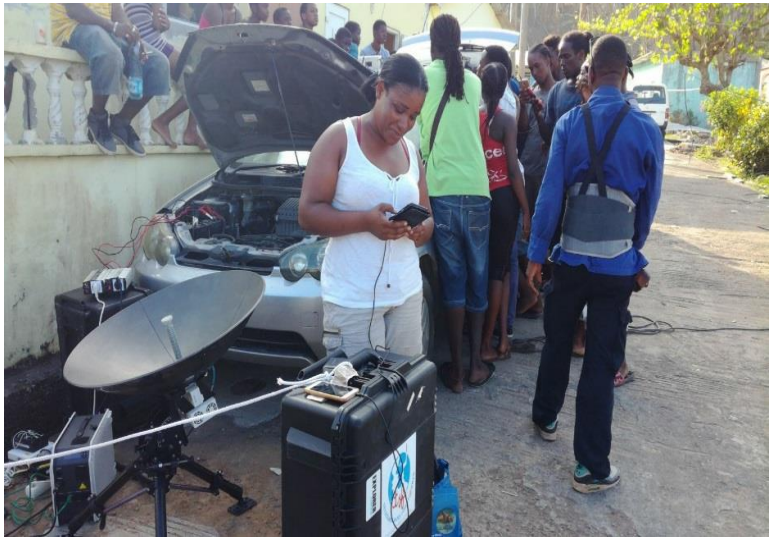


Case Study: Hurricane Maria, Dominica, 2017

- Installed satellite Internet connection at Roseau stadium to support relief teams
  - 72 GB of data transferred in the first week
  - distribution coordination
  - provision of relief supplies
  - mobilization of logistics to reach remote areas of the country
- Wi-Fi zones
  - Portsmouth town center - >1500 devices in first week
  - VSAT enabled Wi-Fi bridges in towns enable citizens to access social networks and communications apps
  - Ambulant Wi-Fi – bringing access to social media, messaging apps and news sites village to village
  - Wi-fi provided to humanitarian aid organizations using C-band capacity

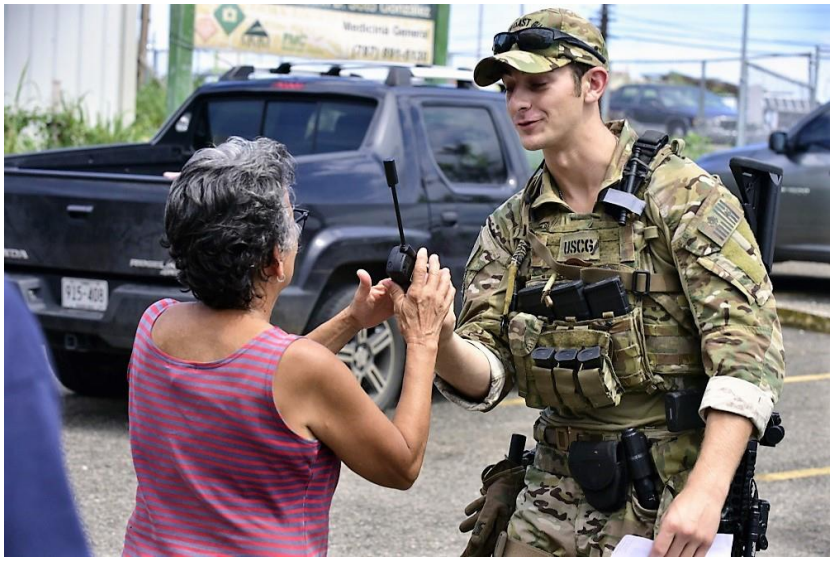
Hurricane Maria satellite communications relief efforts in Dominica. Photo credit: Inmarsat





Case Study: Hurricane Maria, Puerto Rico, 2017

- 95% of cell towers down immediately after storm; nearly 75% one month later
- GSO (C-band) and NGSO (MEO, Ka-band) satellites were used to help restore 4G/LTE connectivity to hundreds of thousands of end users
- Satellite providers increased capacity to region
- Thousands of satellite phones deployed
- Tracking services allowed monitoring of human and material assets
- Supported FEMA Air Bridge, deploying VSATs to airports to allow for emergency services to access the island
- Provided service to a variety of retail customers, including stores, banks, drug stores, and allowed business continuity of services like insurance claims, credit card processing, and government food stamp cards
- Satellite phone at Guajataca Dam allowed National Weather Service to warn FEMA of severe structural damage, and allowed for evacuation of 70,000 people downstream from dam

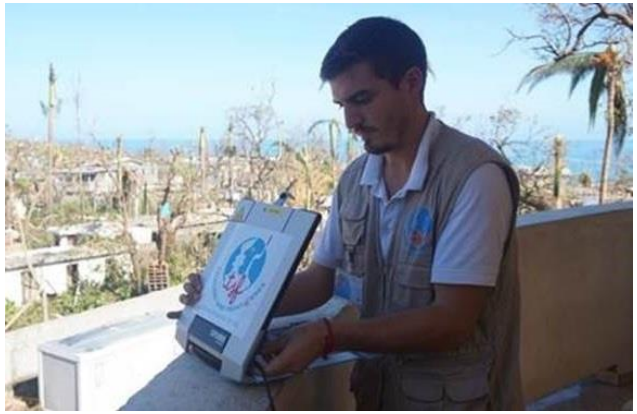


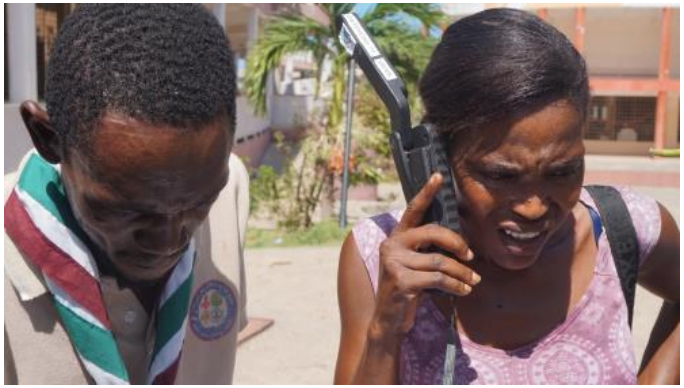
On Oct 6th, a Coast Guard Tactical Law Enforcement Team South crewmember, gives a satellite phone to a local in PR so she can call her son in Alaska who she hasn't been in contact with since Hurricane Maria. Photo Credit: U.S. Coast Guard photo by Petty Officer 3rd Class Eric D. Woodall

Case Study: Hurricane Matthew, Haiti, 2016

- Cat. 4 hurricane. More than 1000 dead and 1.5 million others in need of relief
- Local mobile network disabled, restoration in many areas took more than a week
- Satellite communications were essential to response and recovery efforts
  - Pre-positioned emergency communications kits made available to the humanitarian community in the first hours following the disaster
  - Satellite connections installed at Departmental Emergency Operations Centers (COUD) carried nearly 28 GB of data to support recovery in 11 days after the hurricane
  - In 9 days before mobile networks were restored, satellite phones helped 2,461 people across 19 communities restore family links
  - Wi-fi connectivity provided to emergency responders, including the World Food Program using GSO C-band satellite capacity
- VSAT equipment deployed to COUD to replace local Internet connection stayed in place for months after the event

Hurricane Matthew satellite communications relief efforts in Haiti. Photo credit: Inmarsat





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