

DISASTER RECOVERY FROM SPACE

SES ▲
**GOVERNMENT
SOLUTIONS**



DISASTERS PLAGUING OUR COMMUNITIES TODAY

Natural disasters can occur with little to no warning making them hard to plan for. Who would have predicted that a gender reveal party would spark a wildfire that destroyed 22,744 acres of land, cause about eight million dollars in damage and the death of a firefighter [1]? The 2020 El Dorado Fire, commonly known as the Gender Reveal Fire, was caused by a malfunctioning smoke-generating pyrotechnical device on September 5th[2]. The smoke produced by the El Dorado fire stretched past the fire zone causing apocalyptic orange skies and residents to get sick from the air pollution.

Having a proactive disaster response plan is key to an effective recovery and rebuilding process. The aftermath of a natural disaster can plague a community well after the news cameras leave and the rest of the world has moved to the next big story. 2017 saw a hyperactive Atlantic hurricane season that caused billions of dollars in damages and left many without power and shelter.

Hurricane Maria, a category five hurricane, devastated Puerto Rico, Dominica, and St. Croix in September 2017, causing \$90 billion (2017 USD) in damages. Making it the third most costly tropical cyclone in U.S. history [3]. The catastrophic damages caused by Hurricane Maria left Puerto Rico with a lack of resources and caused the worst electrical blackout in U.S. history. The blackout was so detrimental, thousands of people were still without power in 2018 [4]. In response to the crisis, SES partnered with Alphabet, parent company of Google, on Project Loon to bring fiber-like satellite connectivity to Puerto Rico.



Project Loon provided internet connectivity from floating balloons to areas in need. SES provided a rapid deployable O3b FastConnect terminal and satellite capacity. Since most of the cell towers were damaged or destroyed in the hurricane, mobile terminals were paramount to the island's response and restoration efforts. Project Loon, with the aid of O3b satellites, was able to quickly restore basic communication and internet activities to the residents of Puerto Rico who were left without cellular or network connectivity [5].

This rapid response aided in the recovery of Puerto Rico brought a sense of normalcy to the community. Reliable network connectivity is vital not only to the emergency response teams but also to mental well-being of the impacted community. Having the ability to stay abreast of relief efforts drastically increases the number of individuals rescued. Also, the ability to contact loved ones via text or online communications keeps phone lines open for rescue workers. In this era of connectivity, people feel isolated and uneasy when they can't use their devices. This causes panic and is difficult to effectively rebuild an impacted community.

Network connectivity is an important aspect to any disaster preparedness plan, especially when traditional terrestrial networks and communication infrastructures are in danger of being damaged or destroyed. SES partners with many organizations focused on disaster response and recovery.

GLOBAL BANDWIDTH MANAGEMENT

The ability to manage a single bandwidth pool across a coverage area that spans multiple spot beams, including partitioning bandwidth into sub-networks based on geographic scope, quality of service, etc.

[1] <https://twitter.com/SanBernardinoNF/status/1304628831009910784?s=20>

[2] <https://inciweb.nwcg.gov/incident/7148/>

[3] <https://www.nhc.noaa.gov/news/UpdatedCostliest.pdf>

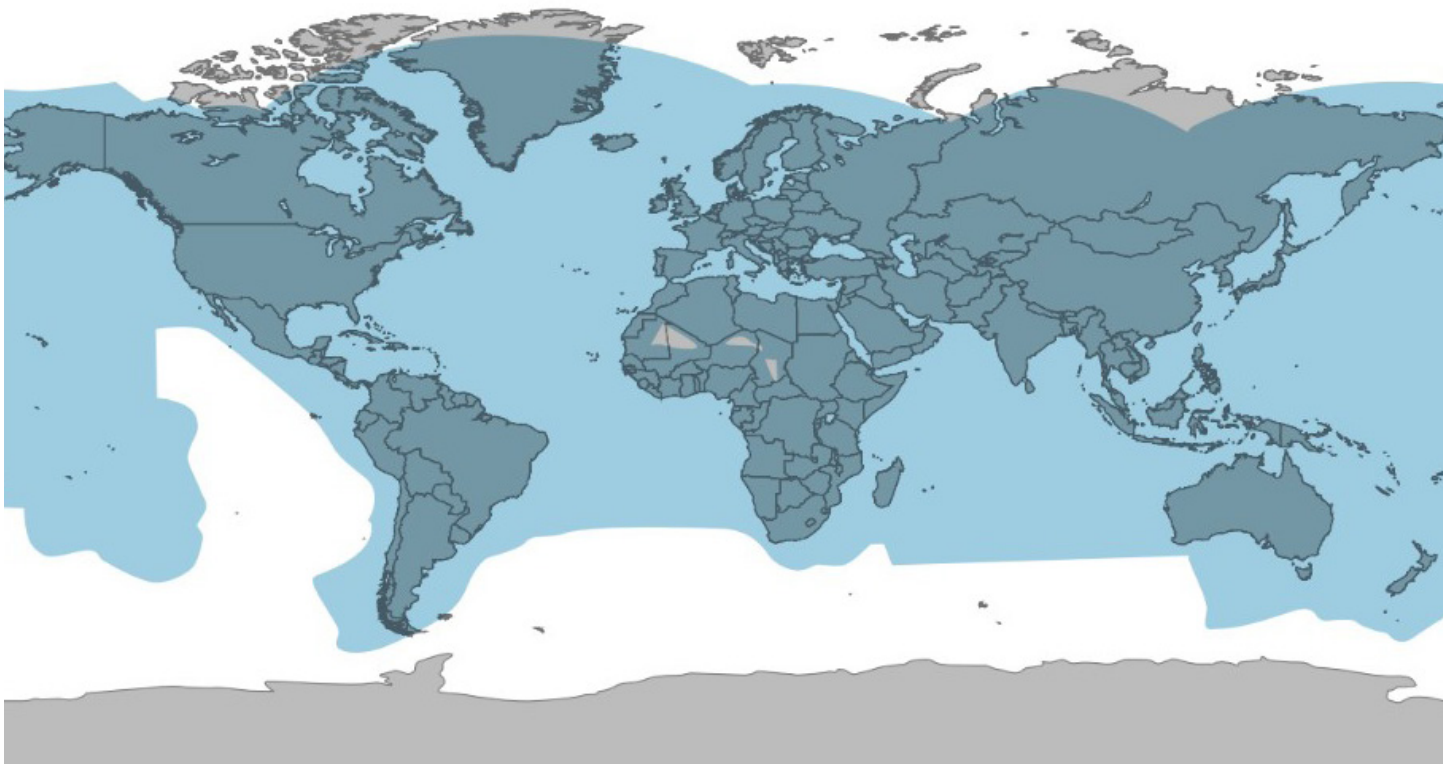
[4] <https://www.npr.org/2018/08/15/638739819/nearly-a-year-after-maria-puerto-rico-officials-claim-power-totally-restored>

[5] <https://www.satellitetoday.com/telecom/2017/10/26/alphabets-project-loon-uses-ses-capacity-reconnect-puerto-rico/>

INNOVATIVE TECHNOLOGIES HELPING TO REBUILD COMMUNITIES IMPACTED BY NATURAL DISASTERS

The SKALA Global Platform was introduced to the market in 2017 to provide reliable high-throughput connectivity for rapid response and deployment scenarios at a lower cost, making it the perfect solution for disaster response and recovery. This end-to-end solution is a unique combination of ground system technology, advanced satellite capabilities, and service lifestyle expertise that enables the creation and delivery of tailored services across a diverse range of use cases. SKALA's distributed architecture provides unprecedented scalability, enabling customers to increase bandwidth as needed and eliminates major bottleneck issues as capacity requirements increase. SES satellites provide global coverage using a combination of wide-beam and high-throughput satellites (HTS) in geostationary orbit (GEO), which are connected to our expansive terrestrial MPLS network via global teleport gateways tailored specifically to scale and secure SKALA [6]. This innovative platform allows users to capitalize on the full value of the SES fleet, including HTS which optimizes the platform architecture for a wide variety of use cases.

Skala global coverage enables unprecented scalability



With its ability to support different throughput requirements at a moment's notice, SKALA offers a unique opportunity to truly customize the service requirements and adapt to the requirements as the situation evolves. The flexibility is built using Commercial Off The Shelf (COTS) technology that is widely available on the market today. In many cases, using existing equipment can be supported with little or no modification. By using COTS technology, users gain the protection of a mature developed technology. Responders won't be walking into a disaster with a service that has not been tested and approved for demanding use cases. In many instances, a terminal can be set up at a hub location or command center and be integrated into a network to provide backhaul connectivity until the traditional infrastructure is restored. This alleviates the need to develop or deploy an entirely separate network.

[6] https://intranet.ses/10086580.pdf?name=010_Solution-Brief---Skala-Global-Platform-_Americas

SKALA provides a pay-as-go metered service allowing users to access capacity only when needed and eliminates a fixed monthly cost that is traditionally required for dedicated capacity. Often emergency responders scramble to find connectivity where their personnel are deployed. The SES Government Solutions infrastructure allows responders to focus on the emergency knowing they will have the ability to leverage a shared network platform that's in operation covering many locations they've needed in the past and likely will need in the future,

Shared Packages

MIR		Contention Ratio and CIR (FWD+RTN)		
FWD	RTN	4	8	16
1,024	256	320	160	80
2,048	512	640	320	160
4,048	1,024	1,280	640	320
10,240	2,048	3,072	1,536	768
15,360	2,048	4,352	2,176	1,088
20,480	2,048	5,632	2,816	1,408
25,600	2,048	6,912	3,456	1,728

IP data rate per site

Pre-defined CIR/MIR packages with uncapped volume and pay-as-you-grow model

Volume limited packages

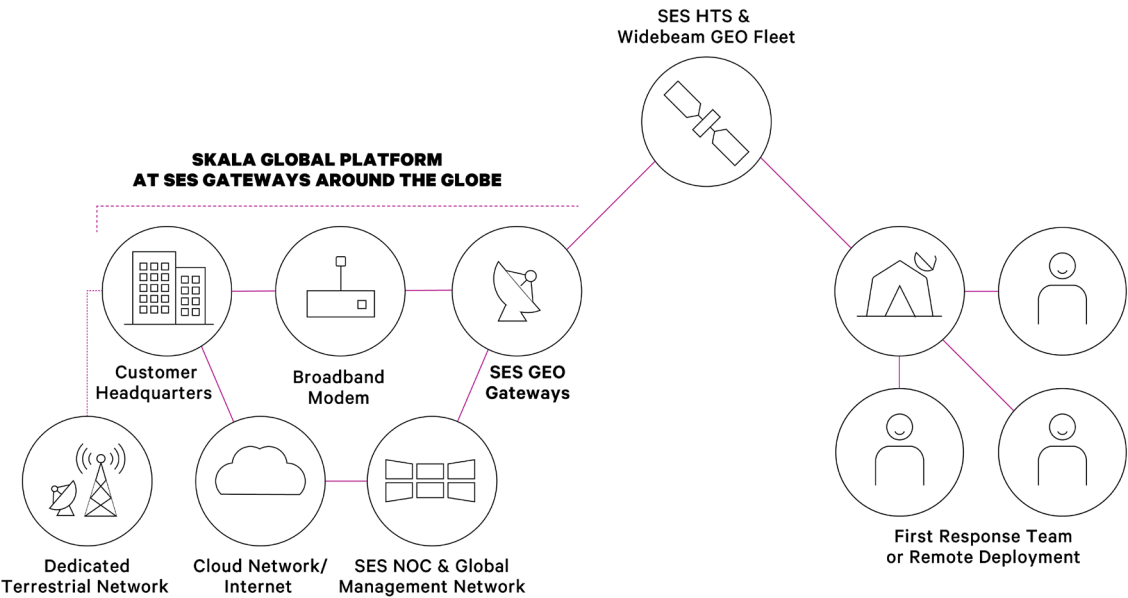
Service plans (GB)	Downlink speed (Kbps)	Uplink speed (Kbps)
5	2,048	512
10	5,120	1,024
15	5,120	2,048
20	7,168	1,024

Monthly allowance per site

Volume limited packages with monthly allowances per site. Fair use policy (capped volume) applies

HIGH-THROUGHPUT SATELLITES (HTS)

High-throughput satellites (HTS) makes it possible for SKALA to provide a flexible cost point while maintaining the high-quality broadband services the customer receives. HTS delivers drastically increased throughputs, better link optimization and performance. The HTS combines frequency reuse with blanket juxtaposition of high-power spot beams over a geographic area allowing the user to transmit and receive more data than a standard ku-band widebeam. The increased performance of the link allows for smaller antennas to be used, which is key for disaster response and recovery. The concentrated spot beams of HTS systems can transmit up to 20 times greater data throughput compared to wide beam satellites.



SKALA FOR DISASTER RESPONSE AND RECOVERY

A NEXT-GENERATION NETWORK MANAGEMENT SYSTEM

Enables the management of complex, large-scale networks to ensure reliable, efficient and profitable network operations.

Having internet access, via terrestrial or satellite, is invaluable to disaster response and recovery efforts. With network enabled capabilities and devices becoming an integral part of recovery plans, having high-throughput connectivity is critical to mission success. SKALA's vetted technology and support provides a unique solution for when things go wrong in a no-fail situation.

Imagine arriving at a disaster site where the roads have flooded, or a wildfire has destroyed critical infrastructures. There is limited or no access to terrestrial networks and you have to send your rescue workers far enough away from base where the radio signal is so weak, they cannot connect with the command station. Or you must contend with dangerous weather patterns or shifts in the location of the wildfire. Having network connectivity could make all the difference in the number of lives saved or lost.

When hurricanes, such as Irma, Maria and Harvey, decimate a municipality and a major disaster is declared, the federal government, led by the Federal Emergency Management Agency (FEMA), responds at the request of the state or local jurisdiction impacted by this disaster. FEMA works with contractors and local governments to set-up a Joint Field Office (JFO) and creates a response plan based off the available infrastructure. Often recovery begins while emergency response activities are still in progress. The Federal Coordinating Officer (FCO) must not only get a clear operating picture, but also have the capability to communicate the needs of the community to those providing the services. This might involve isolating areas where people are still trapped in their homes while also determining the quantity of life saving medicine, such as insulin, required to keep people alive.

Access to data and being able to communicate with those on the ground are critical to restoring, redeveloping, and revitalizing communities impacted by a natural disaster. During the height of hurricane season, communities can experience multiple storms or natural disasters in a short timeframe. With access to weather data, key personnel can improve disaster risk monitoring to make better informed decisions which are paramount in improving the efficiency of disaster response and preparedness.

In this scenario, SKALA can provide rapid deployment of satellite connectivity to the disaster site and the JFO will fill-in the gaps of the terrestrial backhaul or provide all the connectivity needed if terrestrial networks are no longer operational. As recovery progresses the response team can decide to increase or decrease the amount of bandwidth they are paying for. If another storm hits the impacted community taking out the rest of the terrestrial networks, SKALA's flexible and cost-effective service requirements allows for increased bandwidth capabilities without the exorbitant cost.

AUTOMATIC BEAM SWITCHING

Remotes can automatically cross multiple spot beams and gateways within a short period of time while maintaining a constant IP session, with no manual intervention. Multiple orbital slots allow for look angle redundancy at satellite level.

RESILIENT. FLEXIBLE. CONNECTED

With the increased number of hurricanes and wildfires, effective disaster response and recovery is paramount to public safety. With progressively treacherous wildfire seasons, local jurisdictions need recovery plans in place for when terrestrial networks are unavailable or overpowered by the requirements of network-enabled equipment. SKALA enables decision makers to provide reliable bandwidth to their response teams wherever the situation requires. When a slight shift in the wind is all it takes to engulf an area with fire, real-time data and communication can be the difference between lives saved and lives lost.

With SKALA's flexible pricing and reliability it is the ideal resource for any disaster recovery plan.

HEADQUARTERS

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