SATCOM for Net-Centric Warfare

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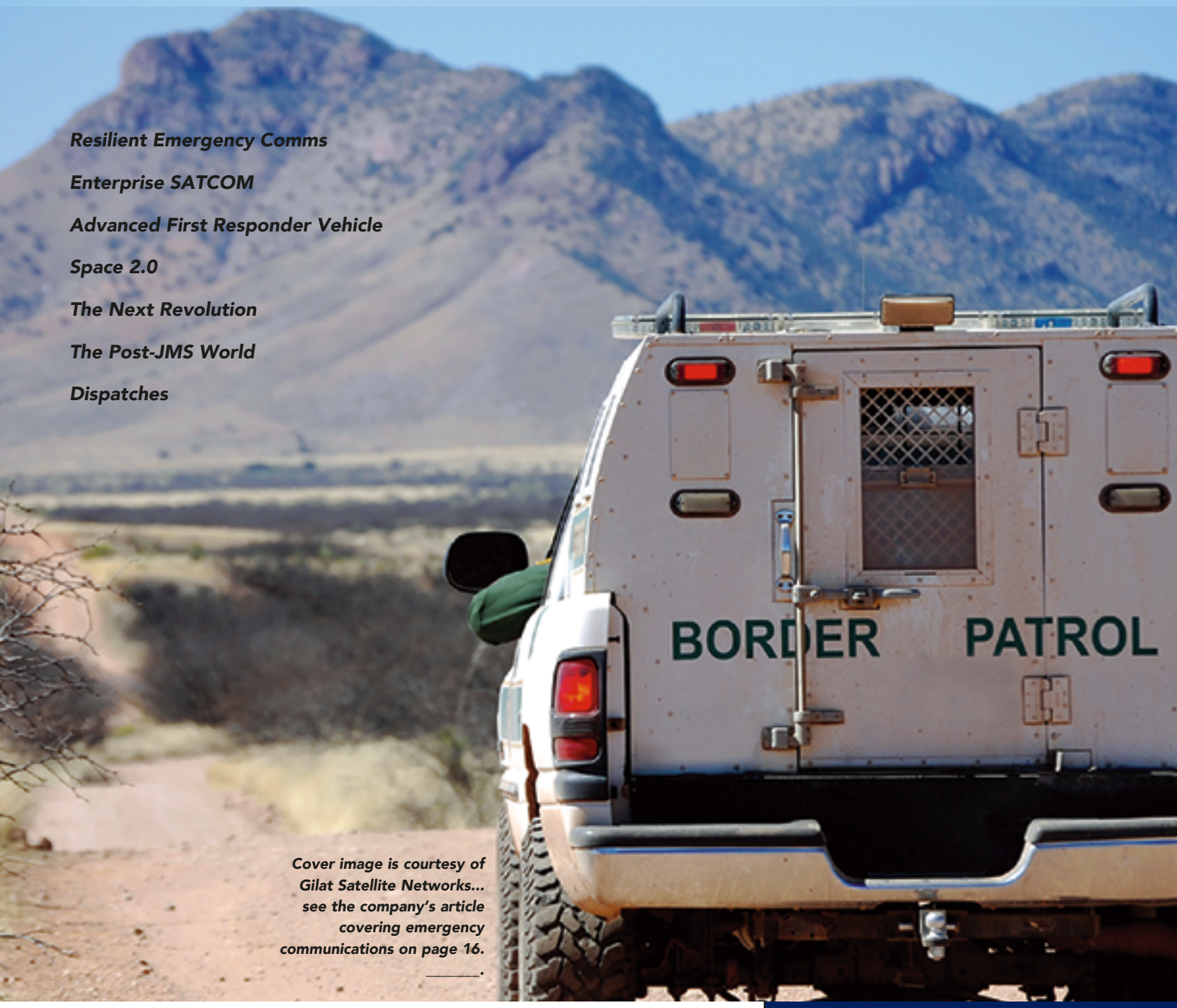
EMERGENCY COMMUNICATIONS



Cover image is courtesy of Gilat Satellite Networks... see the company's article covering emergency communications on page 16.

FOR RESILIENT EMERGENCY RESPONSE COMMS…

Satellite is the new "Go To" Solution

By Doreet Oren, Product Marketing and Corporate Communications, ***Gilat Satellite Networks***
www.gilat.com/

Government and defense organizations responsible for homeland security, public safety and emergency response cannot compromise when it comes to connecting assets in the field to their command centers. Whether dealing with a natural disaster or a terrorist attack, reliable communications and access to live information are essential prerequisites for effective emergency response.

The inconvenient truth, however, is that establishing secure broadband connectivity can be a major challenge in homeland security and other emergency scenarios. Natural and other disasters may take place in remote areas beyond the reach of terrestrial networks, or in other cases may cause the existing communications infrastructure to collapse.

When lives are on the line and every second counts, first responders and security forces require advanced technologies that can be rapidly deployed anywhere to support voice, video and data applications. Effective real-time communications and continuous situational awareness are crucial for making high-pressure decisions in the most challenging circumstances.

Climate Change Ramping Up Frequency and Severity of Natural Disasters

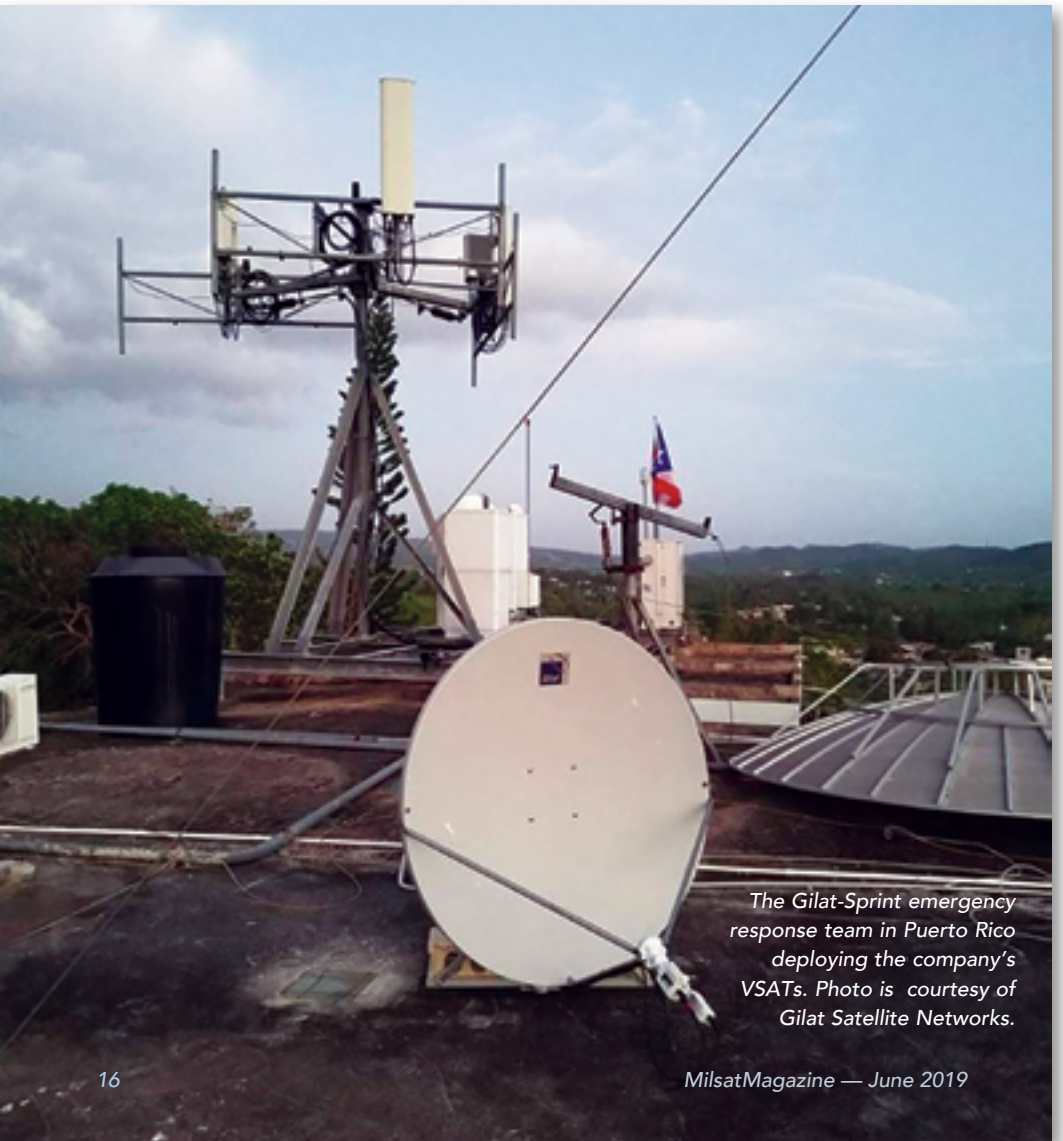
Climate change is not going away and its impact on natural disasters is causing governments and mobile network operators (MNOs) to rethink their emergency preparedness and emergency response strategies.

Secure broadband connectivity can be a major challenge in homeland security and other emergency scenarios.

Weather patterns are becoming more volatile and are expected to become even more extreme in the future. In 2018, there were 58,000 wildfires in the U.S. alone, while the Atlantic hurricane season produced 15 tropical storms, including eight hurricanes. The impact of such storms on communication networks can be catastrophic. In 95.2 percent of the cell sites in Puerto Rico — or 1,703 out of 1,789 — were knocked out of service (according to the FCC). At the same time, severed fiber connections and flooding brought down the terrestrial backhaul networks.

To meet the public's ever-growing reliance on mobile communications, there is a growing interest in broadband communication that is not dependent on the risk-prone terrestrial infrastructure. This is why we are seeing more government organizations, MNOs and emergency organizations adopting alternative solutions, such as satellite communications, for emergency response and disaster recovery.

As more satellites are being launched we are witnessing an abundance of capacity which



The Gilat-Sprint emergency response team in Puerto Rico deploying the company's VSATs. Photo is courtesy of Gilat Satellite Networks.

in turn is lowering prices, making satellite communication ever more affordable and thus a feasible solution for emergency response.

Satellite Communications to the Rescue

Independent from terrestrial and wireless infrastructure, satellite communications provide a secure and reliable solution that can be deployed quickly for disaster response or national emergencies. Its value proposition is derived from the following key attributes:

Bypass terrestrial

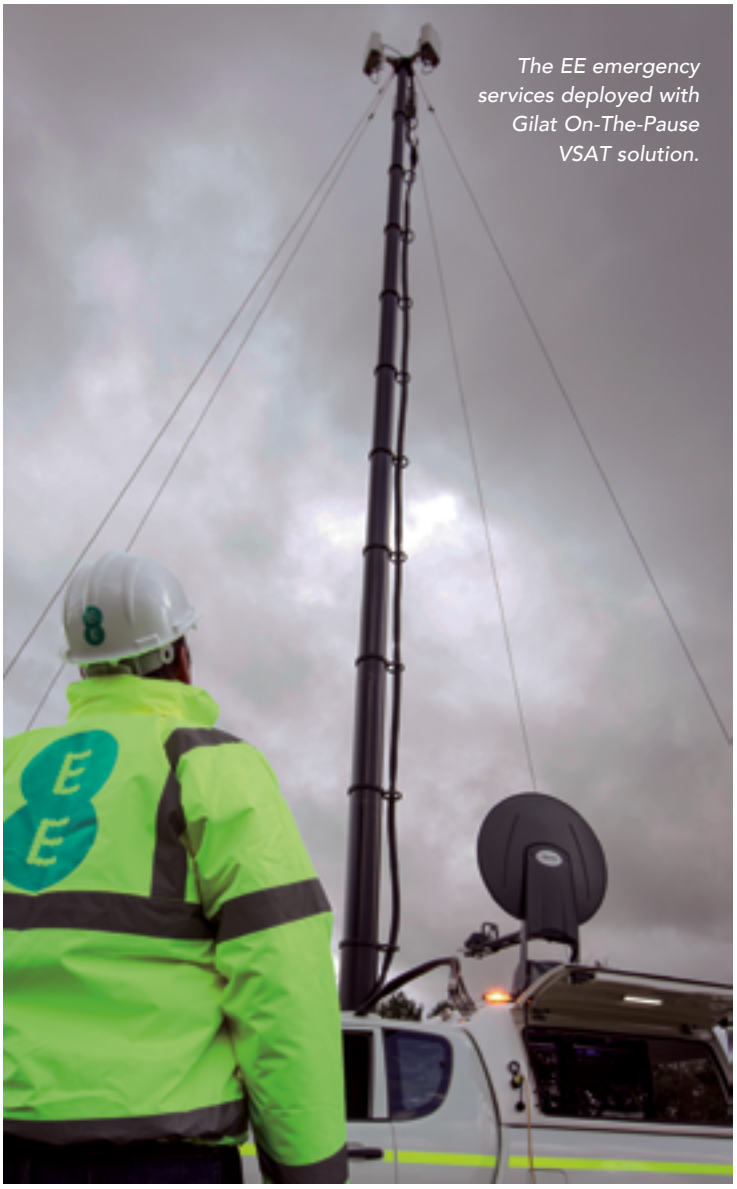
Satellite communications are commonly the only viable connectivity option in areas where terrestrial infrastructure does not exist. Cellular backhaul over satellite solutions enable MNOs to extend network coverage to remote areas beyond the reach of terrestrial infrastructure, enabling emergency services to operate seamlessly in virtually any location.

In other cases, satellite backhaul can serve as a backup solution should the terrestrial network go offline due to a disaster. In emergency situations in metro areas, the terrestrial infrastructure is often destroyed by a sudden disaster.

This means that precisely when communication is most important for saving lives it is, all too often, not available due to network breakdown.

Reliability

Satellite is a robust alternative to terrestrial fixed or wireless technologies. Satellites have almost complete immunity from catastrophic events such as hurricanes, floods, and earthquakes. In these emergency scenarios, satellite enables immediate vital communications for relief efforts, which otherwise could take days or weeks (and sometimes longer) to set up.



The EE emergency services deployed with Gilat On-The-Pause VSAT solution.

Moreover, as SATCOM does not rely on the same last mile pipes as the terrestrial network, connectivity can often be maintained during a disaster, or be restored rapidly afterwards so public safety personnel can continue working after the primary terrestrial network fails. Using a VSAT connected to the hub via a satellite link, emergency crews can have full access to voice and data communications.

Resiliency

Satellite is the only wireless communications infrastructure that is not susceptible to damage from disasters, because the main repeaters sending and receiving signals (on the satellite) are located outside the Earth's atmosphere.

Due to its reach and reliability, satellite-enabled solutions can quickly connect security forces and first responders in any location. Such solutions are proven to be a highly efficient and reliable method for supporting public safety and disaster relief.

Easy and fast to deploy

Satellite communications enable easy network deployment and integration with the core network in both fixed sites and ad-hoc locations. For example, on-the-move and on-the-pause communication can be quickly set-up and deployed on vehicles to provide public safety and security forces in any location with secure and reliable voice and data communications.

SATCOM systems are portable and quickly deployable, while allowing plug-and-play connectivity. In addition, satellite-enabled solutions are compatible with the whole range of communication tools used by first responders, whether based on narrow band (*e.g.*, Tetra) or broadband (*e.g.*, cellular LTE network) infrastructure.

Direct broadband connectivity for voice and data

As satellite bandwidth capacity costs continue to come down, satellite has become an affordable alternative for direct broadband connectivity. On-the-pause and on-the-move communications can support high-speed data, voice and internet access for first responders and security personnel. This includes broadcasting alerts and messages to selected population in times of emergency over a public network.

Supporting Multiple Emergency Response Use Cases

Satellite-enabled solutions support a wide variety of emergency preparedness and response use cases. Not only is satellite an ideal solution in rural and remote areas where deploying a terrestrial network is cost-prohibitive or unfeasible, it is also an effective backup solution for critical BTS' in urban and other areas.

Permanent Coverage Extension

Satellite backhaul can be used as a primary connection to reach remote locations not covered by terrestrial network. In this way, remote locations enjoy high-speed services and continuous coverage independent of the terrestrial network.

In the event of an emergency, satellite-enabled coverage extension ensures connectivity at remote sites.

Permanent Network Backup

Critical BTS sites in the network use a satellite connection to backup the terrestrial backhaul to ensure business continuity. The satellite connection serves as a redundant secondary network deployed in stand-by mode and is activated in the case of a primary network failure. For example, if the terrestrial network goes offline due to flooding or earthquake, satellite connectivity allows mission-critical applications to get back online in seconds.

Public Safety and Security

Satellite-On-The-Move (SOTM) solutions provide first responders with reliable voice and data communications from vehicles, as well as handling backhaul for 2G/3G/4G networks. Secure, broadband connectivity improves situational awareness and response time for police and frontier guards, as well as supporting off-road emergency command and control tasks. Using on-the-move antennas, emergency personnel can communicate on their way to the scene with other vehicles and with HQ to receive live updates and coordinate rescue efforts.

Temporary Backhaul Recovery

Often, the effectiveness of emergency response efforts depends on the ability to quickly mobilize and deploy the right solution. When the terrestrial backhaul, link fails due to any type of disaster, a portable Flyaway kit provides responders with a quick-to-deploy satellite solution. This lightweight suitcase includes the full VSAT terminal and tripod for easy and fast mounting of the antenna for temporarily restoring communication.

Temporary Site Recovery

When the permanent BTS fails, fast on-the-pause communication recovery can be provided using a vehicle-mounted solution. These solutions typically comprise a Cellular on Wheels (COW)/ Cellular on Light Truck (CoLT) BTS and a VSAT terminal for handling the satellite backhaul.

Temporary Increased Capacity

A vehicle-based terminal with satellite backhauling can be rolled-in temporarily to provide additional coverage and increased capacity over the terrestrial link for both planned and unplanned scenarios. Examples include emergency support for a field hospital, large gathering of refugees or displaced persons, as well as major sporting events or outdoor concerts.

Temporary Airborne Site

Tethered balloons and drones can be deployed to temporarily fill coverage gaps at short notice and re-establish the communication network. The balloon or drone carries a 3G/4G small cell on board, while the VSAT on the ground connects to the main network via a satellite backhaul link. Such a solution is useful in providing connectivity in areas hit by natural disasters and to increase coverage as needed.

Real-World Emergency Response and Backup Deployments

Let's take a look at some examples of how government organizations responsible for emergency response teams are adopting satellite-based solutions to enable fast and effective emergency response communications in both urban and rural areas.

Network Resilience and Backup in the UK

EE, part of the BT Group and an operator of one of Europe's largest 4G networks, is working with Gilat Satellite Networks to build out the world's largest 4G Emergency Services Network (ESN). EE was commissioned by the UK's Home Office to deliver emergency service coverage for the whole of the UK over its soon-to-be nationwide 4G network. EE's objective is to extend LTE network coverage to over 95 percent of the UK landmass by 2020. The ESN will run over EE's commercial network and automatically grant priority use to Emergency Services.

EE is using Gilat's field-proven cellular backhaul solution to extend ESN coverage to remote areas without terrestrial infrastructure, enabling emergency services to operate seamlessly in any location throughout the UK.

Gilat is in the process of deploying about 1,000 LTE satellite backhaul sites, including weather-proof VSATs. These sites will enable service in areas without terrestrial infrastructure or in other cases serving as a backup solution. Satellite capacity for the dedicated ESN is provided by Avanti's Ka-band HYLAS satellite fleet, which covers 100 percent of the UK and will connect all EE LTE sites across the country.

The ESN enables network resilience in the event of a cell site failure, as well as providing immediate high-speed voice and data connectivity to emergency response teams in the field. Gilat's VSAT delivers true LTE speeds to 4G handsets and fully supports encrypted data. The ESN deployment comprises both fixed and portable on-the-pause cell sites, which use a vehicle-mounted solution containing both the cell node and the Gilat VSAT that handles the backhaul.

National Emergency Response in Portugal

Due to Portugal's very dry summers, devastating wildfires are a common seasonal occurrence, endangering lives and causing severe damage to communication providers' critical infrastructure.

The Portuguese government, together with its communications partner Altice/Portugal Telecom, established the National Emergency and Safety Network (known as SIRESP) to provide rapid service recovery in the event of a wildfire or other

EE emergency service in use.

major disaster. The partners realized that the legacy TETRA-based emergency communications network in Portugal could not perform reliably with the terrestrial infrastructure in disaster scenarios.

To overcome the limitations of terrestrial networks, they decided to deploy satellite backhaul as a backup service for the Tetra network. If the terrestrial backhaul fails, satellite is used to connect the core network to outlying BTS' until the terrestrial backhaul network can be restored.

Over 600 Gilat VSATs were deployed across Portugal to enable fixed and on-the-pause satellite backhauling to serve the national emergency Tetra network. The Gilat VSAT is deployed on a vehicle, while the temporary cell can be deployed on the vehicle or a fixed site. Using Gilat's solution, the critical communications infrastructure that covers most of the country is now backed up via satellite.

Restoring Communications in Hurricane-Stricken Puerto Rico

Sprint is federally funded to assist in communication in times of emergency. Working with Gilat, Sprint has upgraded its nationwide Emergency Response Team (ERT) fleet to LTE to be prepared to rapidly provide communication throughout the U.S. in case of disasters such as floods, hurricanes or fires. Satellite backhaul gives Sprint ERT the flexibility to bring communications into hard hit areas using SatCOLTs (Satellite Cell on Light Trucks) and Fly Away Kits to provide cellular, LTE and IP data services during times of emergency and disaster.

Sprint played a vital role in restoring mobile communications to Puerto Rico following Hurricane Maria in 2017. More than 50 Gilat VSATs were installed by Sprint's ERT on the main island of Puerto Rico, as well as Vieques, Culebra and the U.S. Virgin Islands. Gilat's satellite backhaul solution allowed Sprint to restore key cell sites within hours in areas where there were no communications. In addition to restoring cell sites and broadband connectivity, satellite backhaul was also used to assist emergency management officials.

Next Generation Disaster Response Platform in Japan

LASCOM

Local Authorities Satellite Communication — is responsible for operating a Disaster Response system for Japan's 47 prefectures. LASCOM required a resilient, high throughput and affordable VSAT network that could ensure communication services to local governments, individuals, and first responders in the event of a disaster. These services include voice, video feeds from disaster sites, video multicasts to local sites, emergency alerts, mobility and data services.

To meet its five-year goals for national coverage, LASCOM chose to deploy Gilat's direct broadband connectivity over satellite solution. This deployment comprises Gilat's redundant multi-service hubs deployed in two different locations and thousands of VSATs will be deployed across Japan.

Conclusion

As the magnitude of natural disasters, terrorist attacks and other security incidents continues to increase, satellite-based solutions are being adopted by government agencies, homeland security and communications service providers to support emergency services and network resiliency. Offering unique and proven value for emergency responders, satellite communications are quickly becoming an indispensable component for disaster recovery, emergency preparedness and response planning.

Governments and network operators realize that satellite not only helps to strengthen the resiliency of existing communication networks, it also contributes directly to saving lives.

When disaster strikes, satellite often remains the only viable connectivity solution in areas where existing terrestrial infrastructure is no longer available.

Furthermore, the dropping prices of satellite capacity are making satellite communication the feasible solution to solve today's emergency communication needs.

Gilat is at the forefront of delivering emergency service communication solutions for numerous deployments worldwide.

www.gilat.com/

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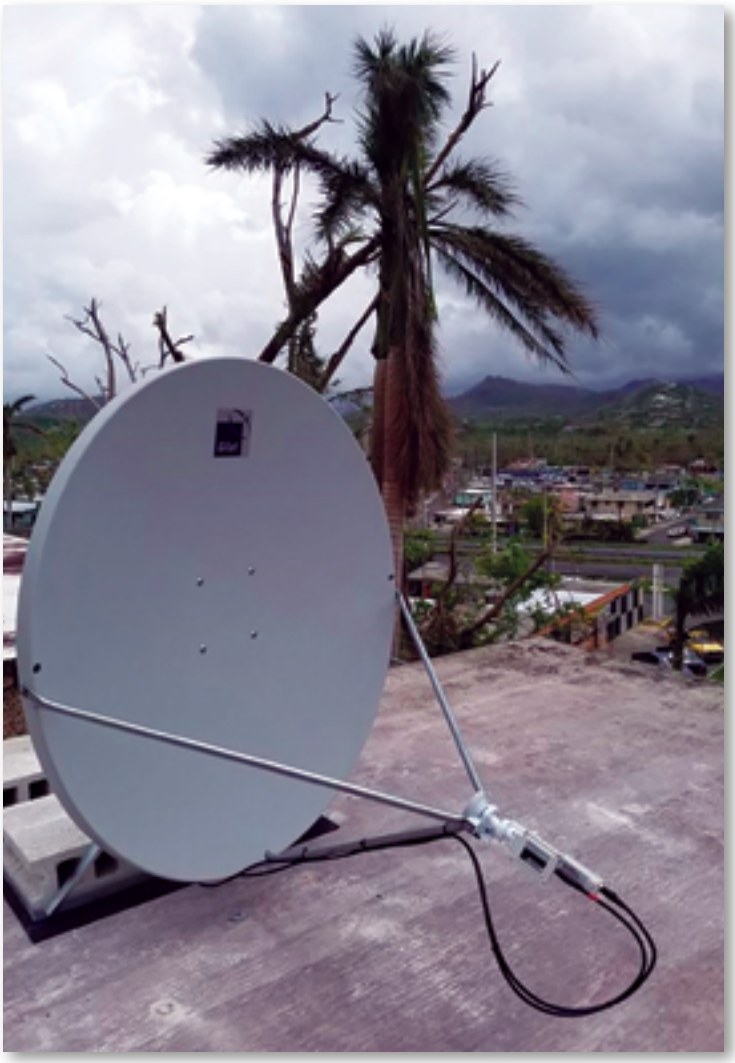
Oren has more than 20 years of industry experience, and has held management positions in R&D, product management and product marketing, for international high-tech companies. In this capacity she contributed to next generation product definition and was responsible for delivering the company's vision to the media and analyst community.

Oren has published thought leadership articles in renowned international journals, and has spoken at numerous industry conferences worldwide. She received a BSc in Computer Science from George Washington University.



Sprint emergency response team in Puerto Rico deploying Gilat VSATs