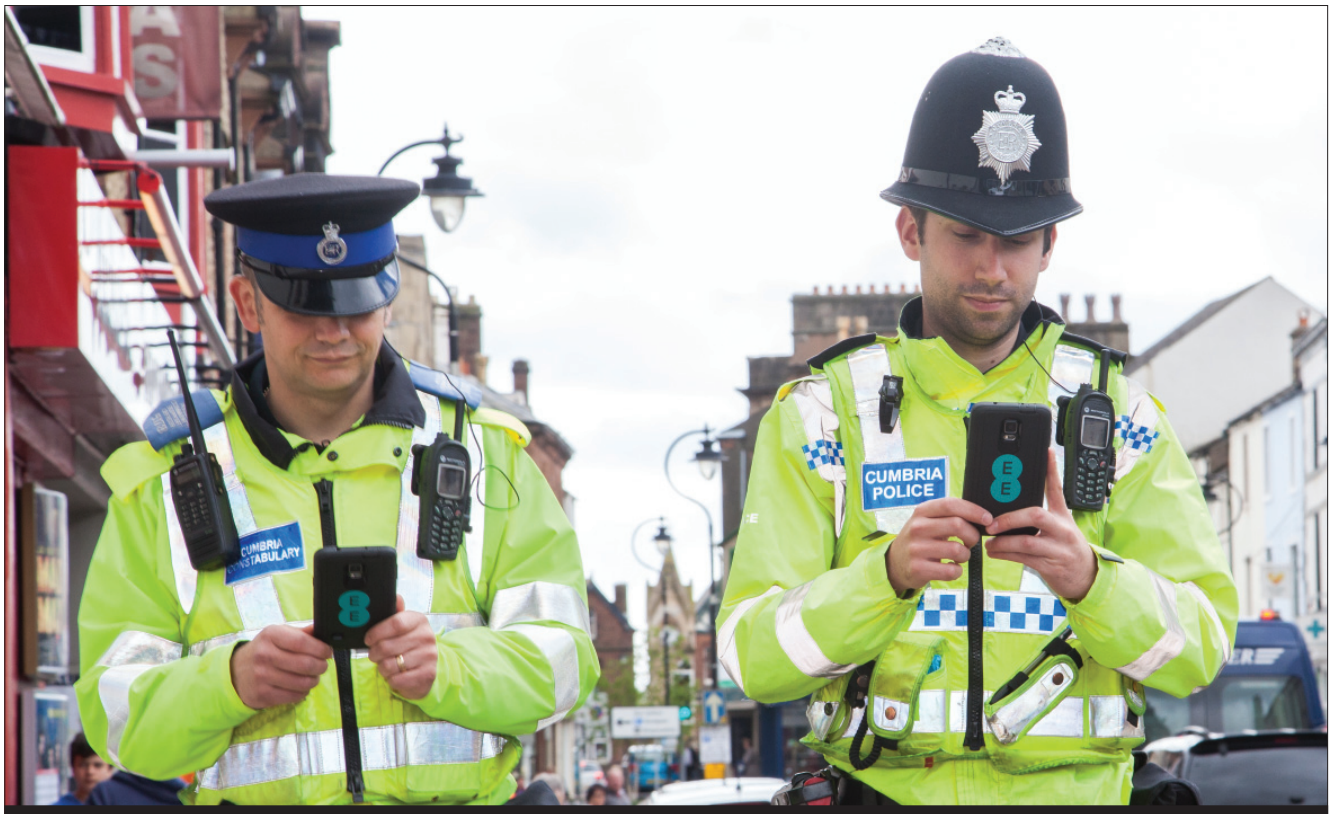


Cumbria Constabulary frontline officers equipped with 4G Samsung galaxy note 4's from EE. Photo courtesy of EE

Building the world's largest 4G emergency services network over satellite

The UK's Home Office has commissioned EE to deliver emergency service coverage for the whole of the UK over its nationwide 4G network. EE is expanding its landmark LTE deployment to rural areas, as well as backing up key urban locations for emergency preparedness, using Gilat's cellular backhaul (CBH) over satellite solution. Doreet Oren, Director of Product Marketing and Corporate Communications at Gilat Satellite Networks, explains how EE is leveraging satellite backhaul to bring advanced voice and data communications to the UK's Emergency Services crews.

In a world where natural disasters are becoming more extreme and terrorist attacks occur with alarming frequency, the need for effective emergency services has never been more prominent. With respect to ensuring public safety of its citizens – regardless of their location – the UK government has taken decisive action.

The £1 billion Emergency Services Mobile Communications Programme, launched in 2015, is well on its way to making the UK the first country to provide nationwide emergency services over a satellite resilient commercial 4G network. The goal of the new Emergency Services Network (ESN) is to enable emergency responders to share broadband data, voice and video information in the toughest operational circumstances, so they can act quickly and more efficiently – and ultimately save lives.

The ESN is expected to transform public safety in the UK. With integrated 4G voice and broadband data services, hundreds of thousands of police, fire and emergency medical services users will benefit from mission-critical data that is both reliable and secure. Improved situational awareness will

allow users to make more efficient decisions and communicate under the most challenging conditions.

Enabling secure and reliable public safety services throughout the UK

The UK's Home Office required a secure and resilient communication network to support Emergency Services, as well as providing backup for terrestrial networks. Particularly in rural and sparsely populated areas, ensuring reliable communications can be difficult.

To meet its goal of nationwide emergency service coverage, the Home Office chose to work with EE, which operates the UK's largest 4G mobile network comprising over 19,000 4G sites and covering 90 percent of the UK landmass. The ESN will run over EE's commercial network and automatically grant priority use to Emergency Services. The network will provide geographical coverage along major and minor roads and selected buildings.

EE's 4G network will significantly improve the efficiency of the Emergency Services by giving them access to the type of mobile broadband data and applications that until now have only been available to the private sector. Using the new network, UK's Emergency Services will have access to advanced applications, such as:

- Ambulance crew sending vital patient data to the hospital prior to the patient's arrival;
- A Police officer wearing a body camera to record an arrest and live-stream to nearby officers for support; and.
- Fire & rescue crew assessing a burning building based on digital blueprints on tablets and live helicopter camera video streaming

Upgrading from radio to mobile 4G/LTE technology

It was clear to the Home Office programme managers that its existing radio-based network technology was limited in its ability to offer emergency responders these types of advanced voice and data services. Rather than being locked into its legacy radio-based network technology, it was decided to gradually phase out and replace the near-obsolete terrestrial trunked-radio (Tetra) system with enhanced 4G network capabilities.

The new ESN will allow 300,000 critical emergency workers and 50,000 vehicles access to broadband voice and data services for the first time. In addition, the ESN will enable emergency response teams to connect to the LTE network from their own smart handheld devices for maximum convenience and flexibility.

Meeting the UK's network resilience and extended coverage requirements with satellite

In emergency situations, the terrestrial infrastructure is often destroyed by a sudden disaster. This means that precisely when communication is critical for saving lives, it is all-too-often not available due to network breakdown.

Satellite communications are commonly the only viable connectivity option in areas where the terrestrial infrastructure is destroyed, insufficient or overloaded. To enhance ESN resiliency and availability, EE understood that a satellite backhaul solution is required to back up its terrestrial backhaul infrastructure.

Feeling the effects of climate change

Climate change appears to be creating more volatility in our weather patterns, which are expected to become even more extreme in the future. In the wake of devastating wildfires in the US and Australia, as well as major hurricanes and typhoons in the Caribbean and Asia, new expectations are emerging related to mobile networks' readiness to deal with major events and support public safety needs.

To meet the public's ever-growing reliance on mobile communications, EE and other mobile operators are investing in broadband communication solutions that are not dependent on the terrestrial infrastructure. The UK ESN project is a salient example of why national and local governments, mobile operators and emergency organizations are adopting satellite communication for emergency response and disaster recovery.

Another advantage of satellite backhaul is that it enables rapid and easy network deployment in both fixed sites and ad-hoc locations as dictated by the ongoing crisis. For example, on-the-pause communication can be quickly set-up and deployed on vehicles to provide first responders in any location with secure and reliable voice, video and data communications.

Gilat's LTE satellite backhaul solution for anytime, anywhere voice and data communications

Over the past two years, EE has been expanding coverage and improving the resilience of its 4G network to meet the Emergency Services' nationwide coverage requirements. Working with Gilat and other partners, EE is extending and enhancing its existing commercial 4G network via a series of site upgrades.

Mansoor Hanif, Director of Radio Access Networks at EE stated: "Gilat's world-class cellular-backhaul-over-satellite

New app cuts London's Ambulance dispatch by up to two minutes. Photo courtesy of EE

solution will play a key part in enhancing our 4G network resilience and helping us to extend the network even further into rural areas as we carry on our journey to cover 95 percent of the UK landmass."

Gilat's field-proven LTE satellite backhaul solution facilitates ESN coverage in remote areas without terrestrial infrastructure, enabling emergency services to operate seamlessly in any location throughout the UK.

Satellite capacity for the dedicated ESN is provided by Avanti's Ka-band HYLAS 1 and HYLAS 2 satellites, which cover 100 percent of the UK and will connect all EE LTE sites across the country. David Williams, Former Chief Executive Officer of Avanti stated: "Avanti's Ka-band satellite fleet is able to provide the highest levels of network quality and flexibility for EE across every part of the UK. Gilat's innovative architecture and platform complement our satellite backhaul services, and provide value to EE and, ultimately, its customers."

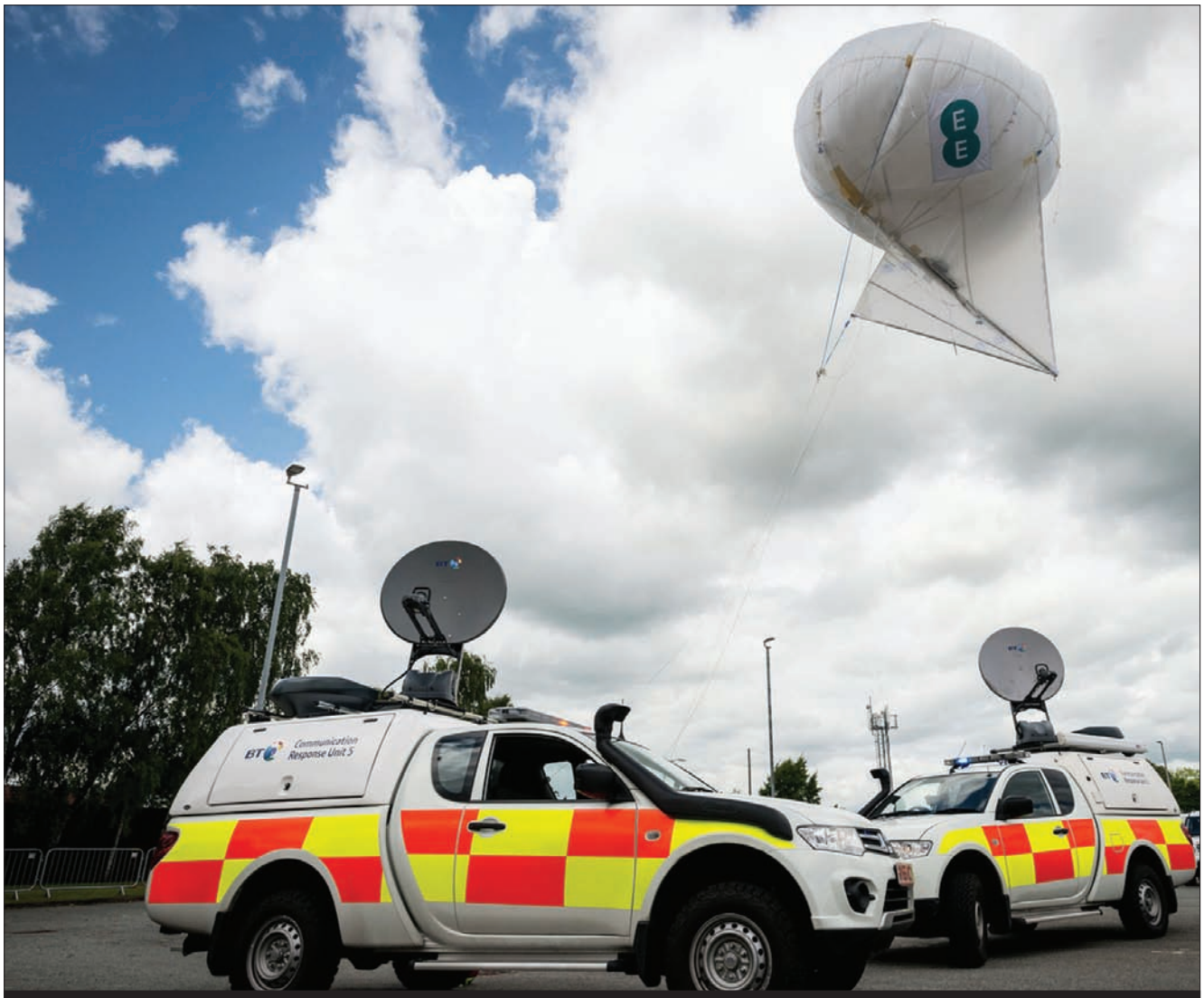
The enhanced resilience of Gilat's satellite-based cellular backhaul solution meets the UK Emergency Services' critical communications requirements, supporting both fixed and portable communication solutions. Gilat has already deployed about 1,000 LTE satellite backhaul sites, enabling service in areas without terrestrial infrastructure or in other cases serving as a backup solution.

True LTE speeds with secure data encryption

Gilat's satellite backhaul solution is based on the SkyEdge II-c hub platform with Mobile Edge Computing (MEC)-enabled Capricorn VSATs at the cellular sites. Gilat's solution enables true LTE speeds for cellular handheld devices while maintaining IPSec data security.

Field-proven modem technology provides the highest data and encryption rates on the market, without packet loss under fade conditions. Using Gilat's patented application acceleration technology, EE achieves download speeds of about 140Mbps to the handset, including AES-256 bit link layer encryption. Dynamic switchover to SCPC return enables the VSAT to achieve very high uplink data rate performance, as required for applications such as mission-critical live video contribution.

In addition, Gilat's X-Architecture allows baseband



EE patent-pending emergency communications response vehicle using pre-standard 5G backhaul radio

resources to be shifted to the area in need via a software-defined network (SDN) solution, facilitating the prioritization of emergency services.

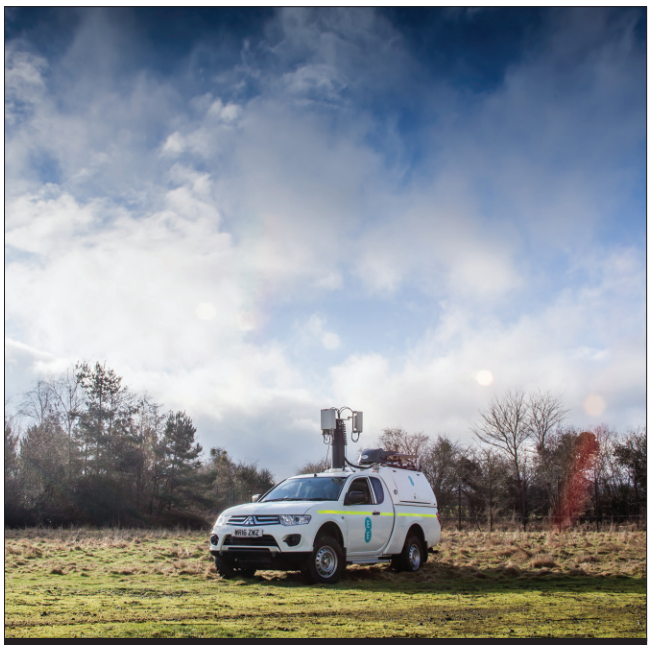
Supporting multiple emergency response use cases

Gilat's solution enables EE to support a wide variety of emergency 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 Base Station (BTS) sites in urban and other areas. For instance, should the terrestrial network go offline due to flooding or earthquake, the satellite-based backup network can kick in and serve as a backup until the terrestrial network is restored.

Gilat also supports temporary solutions for backhaul recovery, site recovery and increased capacity due to failures and major events. For example, Gilat offers a portable, quick-to-deploy Flyaway solution to restore communications in emergency situations where the BTS continues to operate but the terrestrial backhaul link fails.

In the event of a BTS site failure, fast on-the-pause communication recovery can be provided by a vehicle-mounted solution including a Cellular on Wheels (COW) BTS and the Gilat VSAT for handling the satellite backhaul.

In summary, leveraging Gilat's industry-leading cellular backhaul over satellite solution, EE is in the process of building out the world's largest 4G emergency service network. This state-of-the-art ESN will provide secure, reliable and high-performance broadband services to first responders and security personnel throughout the UK. By improving emergency communications, this resilient network is a major step towards boosting public safety and saving lives.



EE RRV. Photo courtesy of EE