Advancing UK public safety with connectivity and innovation

The future of the UK's critical communications networks lies in the adoption of new technologies offering increasing bandwidth, coverage, and interoperability…

The landscape of critical communications in the UK is evolving rapidly, driven by technological advancements and growing operational demands.

Simon Clifton, Head of Pre-sales at Simoco, highlights that while the UK's Airwave TETRA network provides secure and reliable voice communication across the country, other critical data and broadband users rely on public or private LTE services: "the challenges around this are to do with consistent network coverage and available bandwidth across relatively small distances, which often means calls or data streams are dropped whilst on the move."

This variability in coverage and bandwidth can hinder frontline responders during urgent situations. Experts agree that relying solely on traditional professional mobile radio (PMR) or commercial mobile services is outdated.

David Turner, General Manager at Tait Europe, emphasises that many nations are leveraging existing PMR networks and their core functionalities to bridge the gap to broadband: "presenting first responders with a binary choice of PMR or commercial mobile service is not right and quite naïve. Many countries and agencies are leveraging existing PMR networks and core functionality to bridge first responders to an existing broadband network by focusing on the core of the networks, as well as the associated system integration."

This approach allows for quick access to mission-critical voice alongside data applications, enhancing operational efficiency.

Transitioning from legacy to broadband

Although TETRA has served as the backbone of critical communications since the 1990s, its limitations are becoming increasingly apparent. Challenges such as low data bandwidth, spectrum constraints, limited device options, and compatibility issues with modern broadband technologies are prompting a shift.

"The change to broadband is driven by an increasing demand for higher data rates and enhanced multimedia communication," explains David Gibbs from Zebra Technologies.

Frontline teams now need to digitalise evidence, share real-time data, and communicate via voice, text, and video — all in high-pressure environments. Migration to broadband not only offers higher capacity and lower latency but also opens the door to advanced applications like AI, augmented reality, and real-time video, which can transform emergency response.

"With the right mobile computers, we could also hope to see useful AI and augmented reality applications for public safety professionals in the field," notes Gibbs. However, he warns that continued reliance on legacy TETRA networks may lead to increased costs, especially as older devices become harder to maintain and parts become scarce.

It's widely considered that the rollout of 5G brings promising features that could revolutionise mobile critical communications.

One key advancement is network slicing, as Gregor Tomic of Rohde & Schwarz explains: "5G network slicing will serve as a foundational element for future MCX-based services, providing a more robust and reliable framework for prioritising high-priority users."

By creating dedicated slices for emergency services, organizations can ensure high availability and low latency even in congested environments.

Demand for multimedia support — voice, data, and video — is also increasing. The deployment of hybrid devices that combine LTE and 5G ensures seamless mobility and backward compatibility, facilitating a smoother transition.

"The rollout speed of networks is influenced by cost, standards, and spectrum availability, with a trend toward adopting 3GPP LTE services for voice, data, and video support," says Gibbs. He also highlights that private 5G networks can significantly support critical operations by enabling multiple simultaneous video streams and replacing costly legacy systems.

Prioritising data and managing bandwidth - effectively

Bandwidth management remains vital during emergencies, where every second counts.

Tomic underscores that ensuring high Quality of Service (QoS) is crucial: "the ability to transmit real-time video and other critical information in a reliable and timely manner is crucial for ensuring the safety and effectiveness of emergency response operations."

Strategies such as network slicing and application-layer prioritisation can segregate critical data from non-essential traffic, ensuring vital communications are maintained during peak loads.

Clifton adds, "bandwidth management is critical; there are two ways this can be achieved—either by making the entire network Mission Critical ready (MCx) or by slicing the available bandwidth to segregate a section for the critical communications only."

Proper planning and testing of these configurations are essential to prevent failures in high-stakes situations, since effective emergency response often depends on seamless communication across different agencies.

Turner stresses the importance of open platform interfaces: "an open platform interface can connect all the data services together, and then curate it based on what user organisations want and need."

This approach minimizes the need for device replacements and encourages system integration.

Gibbs notes that interoperability is essential for moving forward: "frontline teams need devices that can communicate with other LTE/broadband devices as well as TETRA devices. Different agencies will progress at different paces, and there are regional variations in 5G rollout."

Ensuring flexible, multi-standard devices and systems helps maintain coordination during critical operations.

Embracing emerging technologies

The UK's critical communications landscape is on the cusp of transformative change, driven by 5G, broadband, and innovative network architectures. Experts agree that ensuring reliable coverage, prioritising bandwidth, fostering interoperability, and safeguarding security are vital for effective emergency response on the move.

Tomic highlights the potential of Non-Terrestrial Networks (NTN) and sidelink technologies: "NTN, which utilizes satellites and other platforms, can provide coverage where terrestrial networks are compromised — especially during catastrophic events."

Combining NTN with 5G sidelink enables direct device-to-device communication, essential in environments where infrastructure is damaged or overloaded.

Clifton envisions a future where multiple IP networks operate in parallel — private or public 4G/5G, Wi-Fi, satellite, and mesh networks — creating resilient, global coverage for voice and data.

"It is now possible to build a critical voice and data solution that will work in any place on Earth by using these networks together," asserts Clifton. Preparing for this technological convergence requires organizations to adapt their networks, upgrade infrastructure, and foster interoperability standards.

Entering a new era, powered by 5G, broadband, and satellite, the UK's critical communications systems are integrating diverse networks and ensuring robust coverage, better equipping responders with seamless operations — no matter the challenge. Adaptation and interoperability are key to building a resilient, future-proof communication landscape. ∎