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WHITE PAPER

FUTURE TRENDS FOR PUBLIC-SAFETY COMMUNICATIONS

Blue-light services need to fall in line with the wider information society

Today's 'information society' is becoming more mobile. Information is shared on the move and applications are expected to be 'always on'. Public safety has to embrace these trends. There is increased access to applications when away from the station, and there are new ways of working such as mobile command and control. While traditional voice is still critically important, data and multimedia applications can be used to enhance the effectiveness of emergency service users.

What's the threat from using out-of-support systems?

Better use of information includes improving the situational awareness both at incidents and during 'business-as-usual' activities. This requires broadband capacity in both uplink and downlink directions. There are many data-rich applications in use with more forecast to be used in the public-safety arena. Some of these, such as automatic vehicle location (AVL), are carried on existing narrow-band critical networks, and some that are less critical in nature may use commercial networks. This trend is set to continue.

Mobile broadband spectrum

Spectrum is a prerequisite for public-safety communications. In Europe, public-safety spectrum needs have been calculated based on emerging requirements gathered by LEWP-RCEG, the Radio Communication Expert Group of the Law Enforcement Working Party. Typical applications identified include location data, multimedia (including video), office applications, downloads and uploads of operational information, and online database enquiries. Based on these requirements, it has been calculated that there is a minimum requirement for 2×10MHz of spectrum for mobile broadband for Public Protection and Disaster Relief (PPDR). While the specifics of future allocations remain uncertain, it is generally accepted by the PPDR sector that sub-1GHz spectrum will need to be made available for wide-area mobile broadband public-safety networks.

LTE and public safety

Long Term Evolution or LTE, is the next step in mobile communications. Technically LTE is not a true 4G technology, but LTE–Advanced (which is Release 10 of the 3GPP standards), is. LTE uses a new technology for cellular wireless – Orthogonal Frequency Division Multiple Access (OFDMA) – which is already used in digital-terrestrial television and radio broadcasting. It introduces a new flat system architecture, which is less complex than earlier architectures, and is planned to provide a lower cost per byte for an operator. It has a very low latency of sub-10ms – making it suitable for real-time applications – and can operate over a large range of frequencies. Unlike 2G and 3G, LTE is a data-only network, and any voice services must be carried as voice over IP (VoIP). LTE is aimed at large mobile network operators; however, it can be deployed

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by large government organisations. In the USA, a band of 2×10MHz at 700MHz arising from the digital dividend has been allocated to public safety and the First Responder Network 'FirstNet' – a single nationwide, interoperable public safety broadband network – is using LTE. Many of the challenges traditionally associated with using a commercial network for public safety – such as back-up power, resilient links and duplication of critical elements – are architecture related, not technology limited, and so can be realised using standard LTE components.

Public-safety users rely on rapid voice response times, direct mode operation, and talkgroup operation. 3GPP is working to adapt LTE for public-safety communications, and these modifications are expected to be available in the standard in approximately 18–24 months, but it is likely to be at least six years before they are available in working systems.

Public versus private networks

Public-safety networks have to operate to minimum levels of coverage, availability and network control, and these are not usually met by public networks. Private networks can be engineered with higher levels of coverage and resilience, which results in a higher site count, more equipment – and a higher cost. Decision makers have to balance the added cost of a private network against the challenges that public networks pose in meeting minimum standards for blue-light users.

The requirements can be relaxed, however, if the LTE or 3G network can sit alongside an existing public-safety network. LTE can provide broadband data, while the more resilient network can offer narrowband voice. Initially this will almost certainly be what happens, with LTE being used for less time-sensitive data alongside narrowband for voice and mission-critical data, such as location services and dispatching.

A good example of this is in Belgium where ASTRID, the public-safety operator, is setting up an MVNO, working through a roaming partner into all four mobile networks. This multiple access into the radio networks will improve coverage and equipment availability, on the basis that if one network does not provide coverage, another probably will, and if one network has a site failure, the other networks will continue to operate. The MVNO is only for data, and the existing TETRA network will still carry voice services.

There is a likelihood that WRC-15 will allocate dedicated spectrum for PPDR (public safety). If this is the case, it may well be in the 700MHz band, and may be adjacent to commercial bands. This creates many options for emergency service users to work with MNOs. Public-safety users could commission LTE networks, or an MNO could build a dedicated network for PPDR services, based on its own sites. hOr, there could be a dedicated core network with roaming to the commercial MNO when outside core public-safety coverage.

Conclusion

Public-safety users need mobile broadband, and the best technology for this (already being deployed in some countries) is LTE, as 3G will not support the preferential access arrangements and quality of service needed. LTE may need to operate alongside narrowband voice services initially, but mission-critical data networks will follow, if they can provide an acceptable level of coverage, availability and control. The long-term goal is for LTE networks to fully support mission-critical voice and data mobile, but it is likely that narrowband networks will remain in place for many years to come.

Contact us

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