Capgemini

5G LAB

Empowering Mission Critical Communications in Public Safety

THE SHIFT TO BROADBAND MCX FOR PUBLIC SAFETY IS ACCELERATING AMID THE RISE OF EXTREME EVENTS

The availability of highly reliable and secure communications systems is integral to the mission of Public Safety and Security teams (police, fire brigades, ambulances, etc.) engaged in critical situations. It is a true lifeline for the first responders on the ground and the public they serve.

These Public Safety Mission Critical communications systems are at a turning point: around the globe, they are progressively migrating from legacy professional mobile radio (PMR) technologies to LTE/5G solutions with MCX (Mission Critical voice, data, video) to both support **legacy** and **new advanced multimedia services** and enhance **situational awareness** during crisis situations.

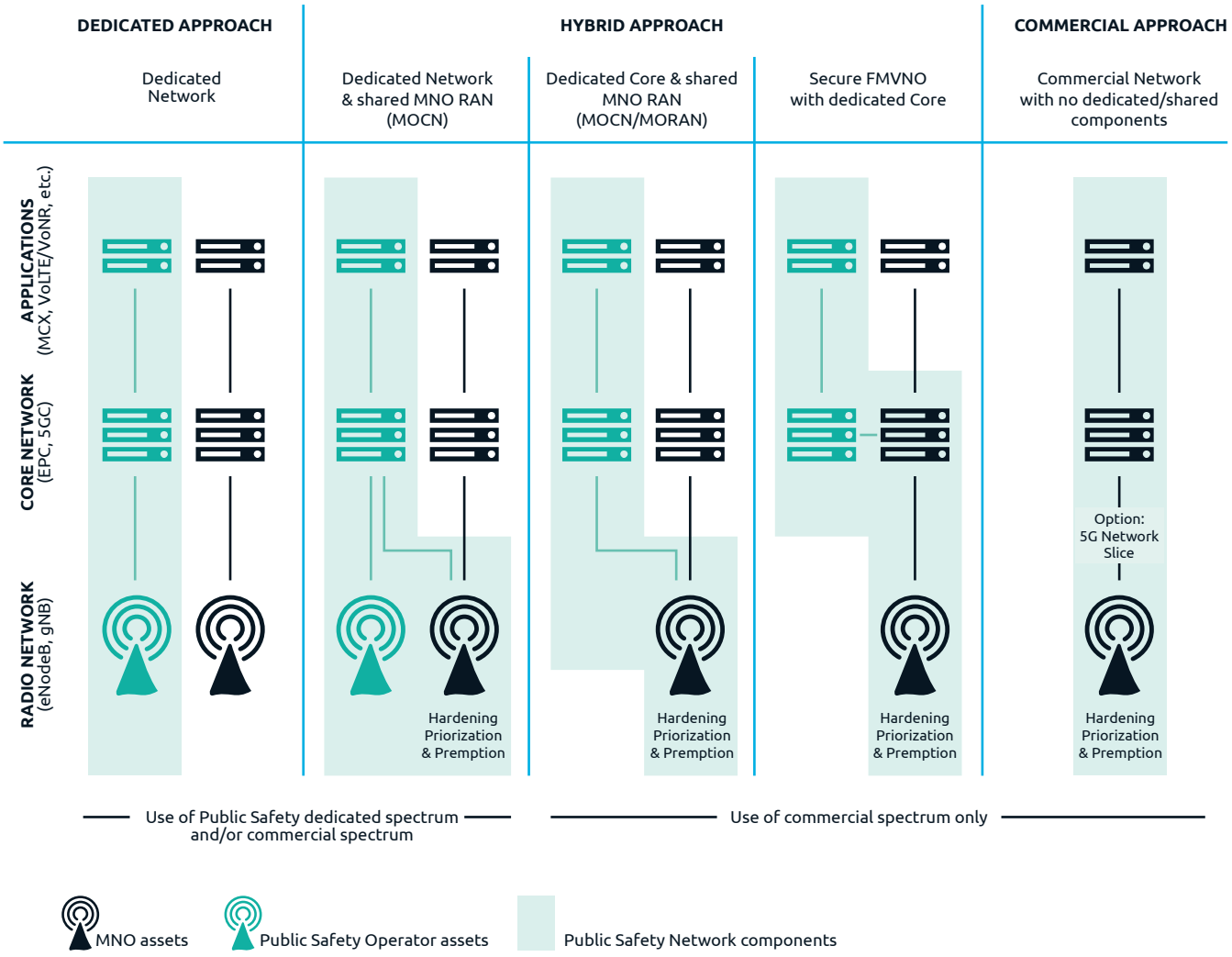
This evolution is driven by multiple factors:

- The increasing number and magnitude of crises (climate-related events such as fires and floods, social demonstrations, riots, terrorist attacks) which stresses the resources and capabilities of Public Safety organizations
- The correlated growing imperative for first responders and command centers to have more advanced communications systems leveraging data, video, and real-time geolocation in addition to voice to increase situational awareness and operational efficiency
- The limitations of existing PMR solutions (TETRA, P25, etc.) in terms of service evolution and supplier concentration
- The growing readiness and maturity of the 3GPP and MCX ecosystem for Mission Critical communications in terms of suppliers (network, device, application), standards, and solutions

AMONG THE AVAILABLE DEPLOYMENT MODELS, THE MOCN MODEL SEEMS TO BE PREFERRED BY PUBLIC SAFETY AUTHORITIES

To implement Mission Critical communications over LTE/5G radio networks, Public Safety Authorities (PSAU) can choose from multiple networks and operating models. The right choice is very much dependent on local strategy, investment capacity, time-to-market imperative and specific requirements, among which are the availability and amount of PPDR spectrum and legacy national PMR assets and teams.

NETWORK MODELS FOR DELIVERING MOBILE BROADBAND CRITICAL COMMUNICATIONS

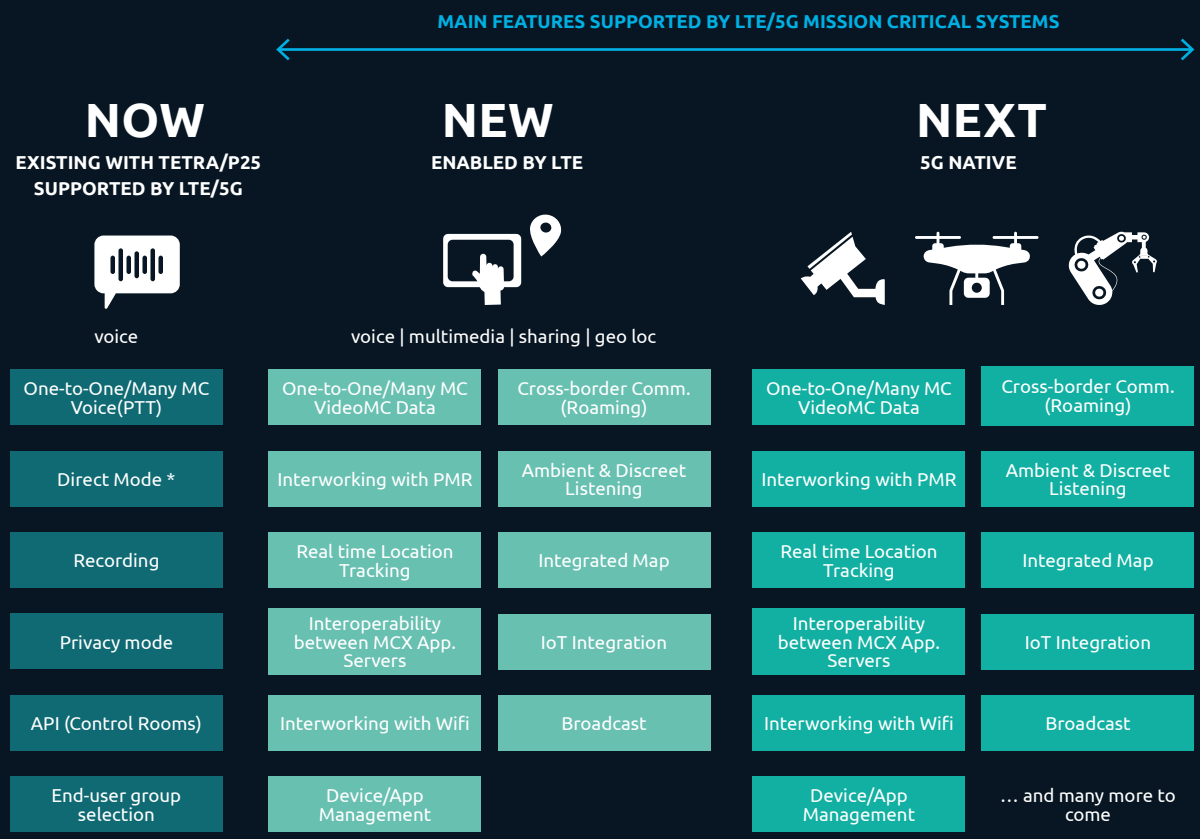


Most countries are selecting a **hybrid model** based on a dedicated and secured Core Network with MCX controlled by the PSAU but possibly managed by an external actor (network equipment provider or Mobile Network Operator), and leveraging the radio coverage provided by one or several public Mobile Network Operator(s). The Multi-Operators Core Network (**MOCN**) model is the most frequently used. In addition, we observe a sub-variant of the MOCN architecture, which combines the MNO's public radio network with a dedicated radio network using the PPDR spectrum. The **Full MVNO model** provides a similar architecture to the MOCN model, albeit without the direct access to MNOs' radio networks.

Aside from the hybrid models, other options exist. On the one hand, the **commercial model**, and on the other hand, the **private model**. The **commercial model** would allow the PSAU to rely fully on the existing infrastructure of an MNO (in a 5G architecture, this could be based on a dedicated network slice). However, this implies full dependence on the MNO and therefore carries potential security risks. The slicing model is not mature yet, but it is an interesting architecture to investigate in the future with 5G SA. The **private model** relies on a dedicated radio network infrastructure, independent of any public mobile network: the PSAU becomes a fully-fledged telecom mobile operator with end-to-end control over wireless communications. This option requires substantial investment in the deployment of the core systems, in the nationwide radio network, as well as in network and services operation. The availability of sufficient PPDR spectrum is a key prerequisite.

FUTURE EVOLUTIONS ARE IN SIGHT TO FURTHER ACCELERATE THE ADOPTION OF BROADBAND LTE/5G MCX FOR PSAU

MCX SERVICES CONTINUUM, FOR PUBLIC SAFETY



The move towards mobile broadband Mission Critical (MC) communications will pave the way for an expanding set of services, which will enhance situational awareness:

First, LTE MCX networks are driving the use of multimedia applications (via MC data and MC video sessions) such as the sharing of documents/photos, reports, video from Public Safety users on the ground broadcasted to the control room and vice-versa, videos from street cameras/drones sent to the users, enhanced location tracking, ambiance and/or discreet listening.

Next, as mobile broadband networks increasingly use 5G, more MC IoT use cases are expected, with massive 4K video streams provided by a fleet of cameras or drones, remote/effective control of IoT devices such as drones, mobile robots or sensors, use of augmented reality services, potentially enhanced by future network slicing capabilities. 5G will also enable the deployment of MCX applications and AI use cases at the Edge (i.e., in dedicated areas such as prisons, or as part of tactical command centers in the event of a crisis).

In addition, a growing number of initiatives around the integration of 5G NTN (non-terrestrial networks) connectivity and direct-to-device LEO satellite communications are foreseen, which end users will progressively benefit from in the future.

WHAT ARE 5G PUBLIC SAFETY-FOCUS LAB?

1

Accelerate the deployment of 5G through transformative use cases.

Clients only have to focus on the application layer to develop their use cases, leveraging the pre-assembled technical platform of our Labs as well as our multidisciplinary team and experts with direct interaction with Capgemini's global network of innovation capabilities (Applied Innovation Exchange –AIE).

2

Build new strategic partnerships to foster innovation.

The Labs rely on a constantly evolving ecosystem of partners (both telecom and technology-driven) that help build end-to-end solutions for Public Safety.

3

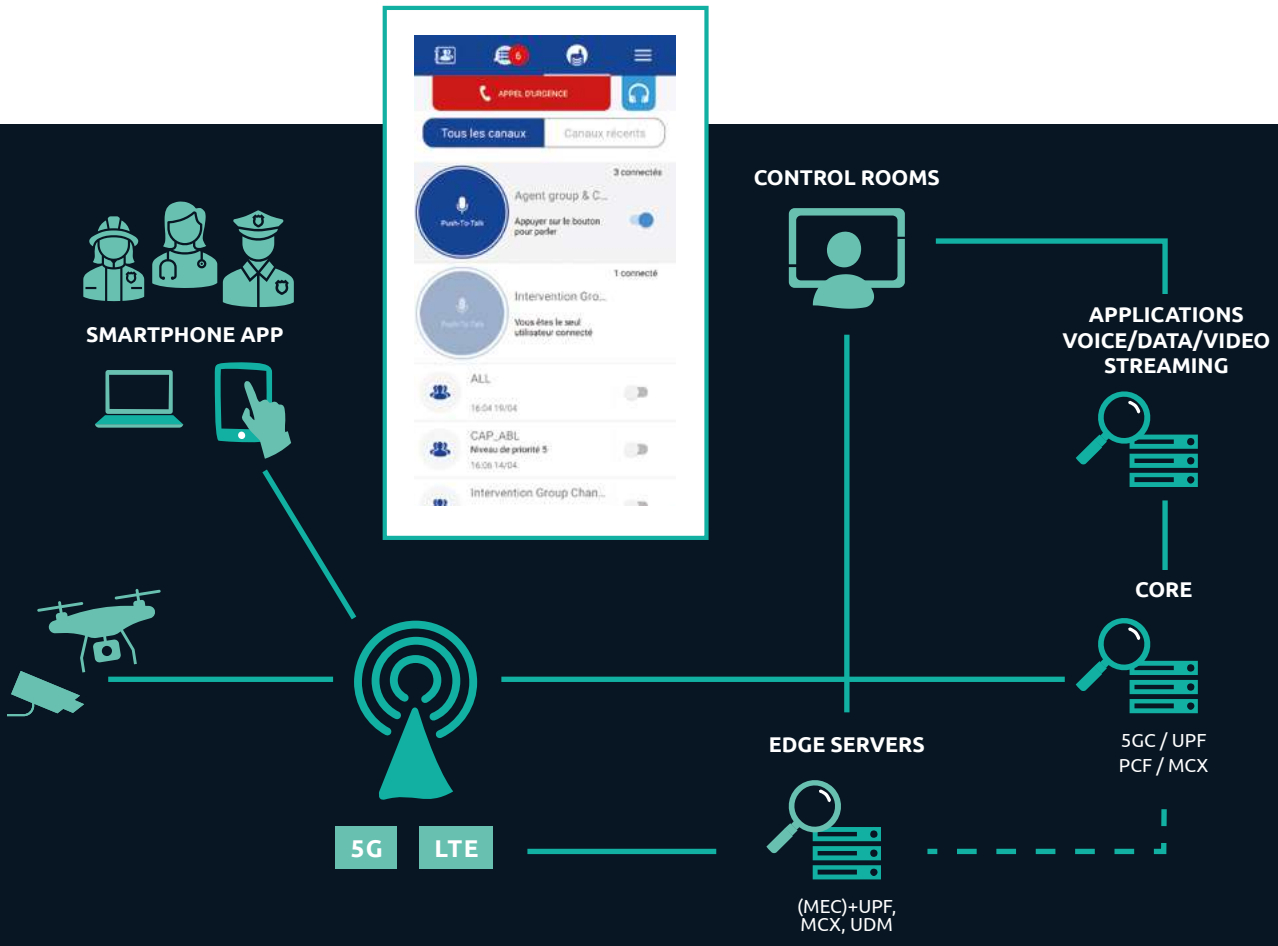
Standardize the usage of 5G technologies to encourage sustainable innovation for industries.

Continuous development of enriched assets, use cases, and credentials with best-of-breed solutions that exceeds market expectations.

4

LAB dedicated to Public Safety Use Cases.

Capgemini's 5G Labs is the name of our innovation program for 5G. 5G Public Safety-focus Lab of Paris is the Center of Excellence dedicated to new technology solutions developed for Public Safety.



VIDEOSURVEILLANCE USE CASE

PUBLIC SAFETY-RELEVANT USE CASES AND HIGHLIGHTING THE BENEFITS OF 5G FOR OUR CUSTOMERS

USE CASE MISSION CRITICAL SERVICES (MCX)

Mission Critical Services

- Replace the PMR network with LTE/5G MCX network.
- Secured, preempted Push-To-Talk (MCPTT) communication.
- Enhanced communications with video & data (MCVideo & MCData) for alerts messaging, file distribution, geolocation and data streaming functionalities.
- Secured, preempted Push-To-Data/-Video (MC Data / Video) communication.
- The Lone Worker Protection function consists of alerting the control room or another agent when an agent is confronted with an accident.

5G & Edge main benefits

- Leverage video and data communications capabilities thanks high bandwidth and low latency and Edge.
- Integration of IoT devices (cameras, drones, biometrics…).




USE CASE LICENSE PLATES RECOGNITION

Real-time geolocation of stolen vehicles or vehicles with fake plates

- AI analysis of a video stream from a 5G camera at Edge.
- Real-time tracking on the control room map.
- Sharing vehicle position with agents via MC Data.

5G & Edge main benefits

- Low-latency and high-resolution video stream transmission.
- Ability to manage many 5G-connected devices over a limited geographical area thanks to massive machine-type communications (mMTC).

USE CASE

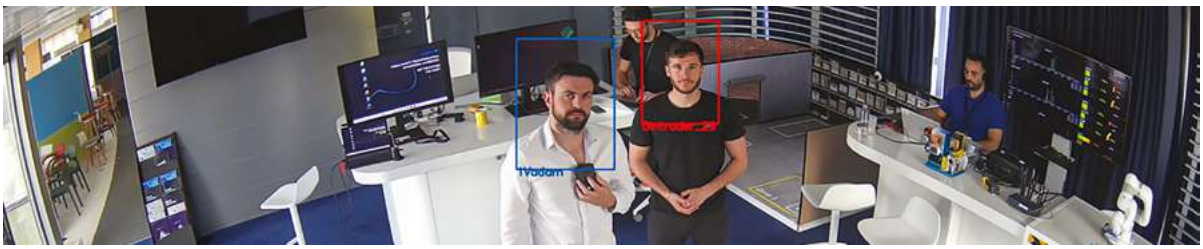
SMART SAFETY SURVEILLANCE & DANGER ZONE

Intelligent industrial premises monitoring

- Improved safety and security of industrial & Public Safety (prisons, banks…) site.
- Real-time surveillance of factory worker.
- Tracks and reports security breaches, fatalities, and other safety incidents.

5G & Edge main benefits

- Low-latency and high-resolution video stream transmission.
- AI/ML deployment at the Edge : powerful & easy person, zones and objects recognition.
- Data Privacy with local treatment.



USE CASE

VOICE TRANSLATION

Introduce speech-to-speech and speech-to-text into Mission Critical Communications

- Real-time written transcription and oral translation of communications.
- Improved coordination between agents of different nationalities.
- Automated intervention reports.

5G & Edge main benefits

- Low latency for real-time transcription and translation.
- Deployment of translation intelligence at EDGE, enabling translation to run on different MCX platforms.
- Data Privacy with local treatment.

CONTACT

Pierre FORTIER
Vice President | Capgemini Invent
5G Global Lead
pierre.fortier@capgemini.com

Cédric Bourrely
Director | Capgemini Invent
5G Labs Program Lead / Paris Lab Director
cedric.bourrely@capgemini.com

Patrice Crutel
Director | Capgemini Invent
Technology & Platform Strategy Director
patrice.crutel@capgemini.com

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