The Growing Connectivity Between LMR & the G's

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LMR & 5G Markets

- There is no one market for critical communications
- While public safety dominates many discussions and panel sessions there are so many different sectors
- Even within Public Safety you could argue device needs differ between 3 lead agencies
- LMR also covers a range of user groups Stadiums, Utilities, Construction, Ports, Manufacturing, Entertainment, Parks

LMR & 5G Markets

- 4 & 5G markets also now diversifying into public versus private
- Public networks for coverage & multiband capacity
- Private networks for Mining, Manufacturing, Ports, Airports, Distribution Centres
- New technology improving the economic viability of private 5 Networks, 5G SA & Small Cell

Market Indicators & Drivers

- Software and Hardware manufacturers continuous investment
- ETSI, 3GPPP, TCCA standards & associations
- Market collaboration between vendors
- Device Eco-Systems
- Government policies and security postures

5G Market Barcelona 2025

Over 100k attendees

4000+ Exhibitor’s

Huge investment by vendors of all sizes

AI, AI, AI and more AI

A lot of walking

MCX 2025 plug test ETSI & TCCA

- **WHAT ARE THE OBJECTIVES AND SCOPE OF THE 9TH MCX PLUG TESTS EVENT?**
- The concept of Mission Critical Services such as “Mission Critical Push To Talk" (MCPTT), “Mission Critical Data" (MCData) and “Mission Critical Video" (MCVideo) started with 3GPP Release-13 and is ongoing in current Releases. The goal of this MCX Plugtests event is to validate the interoperability of a variety of implementations using different using different multi-client / vendor complex scenarios based on 3GPP Mission Critical Services. The format of the event will be live testing conducted face-to-face over 4G and 5G Networks.
- This Plug test event will focus on off-network communication and the 3GPP Release 18.
- Specific focus will be put to cross communications including the Interworking Function (IWF) to other technologies like TETRA and P25, Off network communication and the inter MCX scenarios (enabling the connection of different systems, agencies or countries). The tests are based on 3GPP, ETSI and IETF standards and are designed for:
- MCS Application Servers (MCPTT, MCDATA, MCVIDEO)
- MCS Clients (MCPTT, MCDATA, MCVIDEO)
- eMBMS Components
- IMS / SIP Cores
- Consoles and Control Rooms connected to MCX servers
- MCS Test Equipment
- RAN equipment (4G and 5G)
- Packet cores (4G and 5G)
- UEs (User Equipment), Cab Radios, embedded equipment, Rugged Handheld Phones and 5G NR Sidelink Devices
- IWF towards TETRA and P25 systems.

Mission Critical Voice and Data Services

Raemis can be integrated with external MCC application servers using standard Rx or N5 interfaces. At a recent ETSI plug-test event Raemis was the primary core used for the interop testing with a large number of mission critical communications vendors including some identified below.

Mission Critical Service Capabilities

A list of capabilities supported by Raemis and associated Mission Critical Communications applications are shown below:

Common Features	Mission Critical Push-to-Talk	Mission Critical Video	Mission Critical Data	Mission Critical Dispatcher
User Login	Full/Half Duplex Private Call	Private Video Streaming	Point-to-Point Secured Data Service (SDS)	Ambience Listening
User Group Subscription	Emergency Private Call Group Chat	Video Group Call	Point-to-Multipoint SDS	Quick Combining
Data Management	Imminent Peril Group Call	Video Chat Group Call	Point-to-Point MMS	Group Combining
Affiliation/Presence	Emergency Group Call	Emergency Video Group Call	Point-to-Multipoint MMS	Broadcast Call
Late Entry	Group Call Upgrade/Degrade	Video Push	Status Message	Temporary/Permanent Disable
Evolved Multimedia Broadcast Multicast Services (eMBMS)	Floor Control	Video Pull		Dynamic Group Number Assignment (DGNA)
GIS Location	TETRA Interworking Function			Voice/Video Call Recording
Backup and Redundancy				

Motorola Brazil Solution

- https://www.motorolasolutions.com/newsroom/press-releases/unified-communications-for-brazil-public-safety-organisations.html

- **BRUSSELS, Belgium – June 17, 2025** – Motorola Solutions (NYSE: MSI) today announced it has been selected by the Band Administration Entity (EAF), an organisation created by the Brazilian Telecommunications Agency (Anatel), to implement a new federal mission-critical communications solution that will enable Brazil's defense and public safety organisations to seamlessly collaborate during joint missions. Motorola Solutions will integrate multiple existing land mobile radio (LMR) systems and add new mission-critical Push-to-X (MCX) broadband services to enhance interagency interoperability and access to data applications to better protect Brazil's communities.

- To address these challenges, Motorola Solutions will implement WAVE PTX, a 3GPP standards-compliant communications platform that will run on the government's private 4G network, and Critical Connect, a service that will enable interoperability between the 4G network and P25, TETRA and DMR land mobile radio systems.

Motorola MCX

- https://www.motorolasolutions.com/en_xu/products/broadband-push-to-talk/wave-ptx/driving-interoperability-in-mission-critical-services.html

- **MCX-to-MCX interoperation**
- We successfully demonstrated MC-PTT Group Calls between our system and third-party MCX systems.
- We showed that our Group-Regroup function works via patching across multiple MCX systems. This capability lets public safety operators dynamically patch talkgroups between different MCX systems in real time.

- **MCX-to-IWF interoperation**
- The MCX-IWF (InterWorking Function) is the 3GPP standard for connecting MCX networks and land-mobile radio (LMR) systems.
- Motorola successfully demonstrated systems that interface with MCX-IWF gateways, by conducting an end-to-end group call between an MCX client and third-party TETRA radio systems, connected via IWF gateways from multiple vendors.
- **MC-Video and MC-PTT multicast (eMBMS)**
- During emergencies or planned large-scale events, public cellular networks can become congested and slow. Multicast MCX capabilities help ensure that public safety users have priority access to these systems. Because bandwidth is limited, multicast technology maximises bandwidth efficiency, ensuring timely delivery of data with minimal bandwidth consumption.
- For this plugtest, we integrated our MCX systems and clients running on our LEX L11 handhelds, with a Nokia packet core and a broadcast/multicast server from ENENSYS. We then successfully showed that this configuration was fully capable of supporting MC-Video and MC-PTT communications with mission-critical MCX Quality of Service (QoS). In a real emergency, this technology can help ensure that the most critical information arrives on time, even when bandwidth is limited.
- **MCX Application Server interoperability**
- Our latest MCX Server software release has been tested as an MCX Application Server (MCX-AS) and proven interoperable with a wide range of third-party MCX mobile app clients and dispatch systems. The interop test included a comprehensive list of MCX-AS capabilities:
    - MC-PTT, MC-Data and MC-Video features
    - MCX common services: Configuration, Group Management, Identity Management, Key Management, Location Management
    - 4G LTE and 5G network support

3GPP Standards

Present (**Rel-19** & **Rel-20**)

- ✓ Rel-19: New & Enhanced MCX Features
- ✓ MCShAC: Standardized sharing of administrative configuration between interconnected MC systems
- ✓ MCS over NTN: Enables MC services via satellite access, integrating satellite providers into business models
- ✓ Recording & Replay: Introduction of recording server functionality for MC communications (MCPTT, MCVideo); some features continue to Rel-20
- ✓ Location Protocol: Unified location management across all MC services for better alignment & efficiency
- ✓ FRMCS Phase 5: Enhanced MC gateway UE & ad-hoc group communication features
- ✓ IOPS: Isolated Operation for Public Safety improvements—now network agnostic between LTE & 5G
- ✓ Other: 5G video enhancement, L4S support, emergency remote floor request, ProSe UE-to-UE relay

Rel-20 5G-Advanced: **New** & **Enhanced MCX Features**

- ✓ Discreet Listening: Provides the ability for discreet monitoring of users or groups, with certain privacy safeguards
- ✓ Recording Enhancements: Major updates to MC recording, expanding from Rel-19 items
- ✓ FRMCS Phase 6: Advanced group features, improved gateway interconnection, enhancements to GSM-R interworking
- ✓ 5G ProSe Multihop Relay: Advanced relay for both device-to-device & device-to-network scenarios
- ✓ Other Improvements: Temp/perm. UE disable, pause/resume for ambient listening, ongoing corrections & enhancements

Courtsey of Jukka Vialen, Airbus

AIRBUS & VODAFONE Join Forces

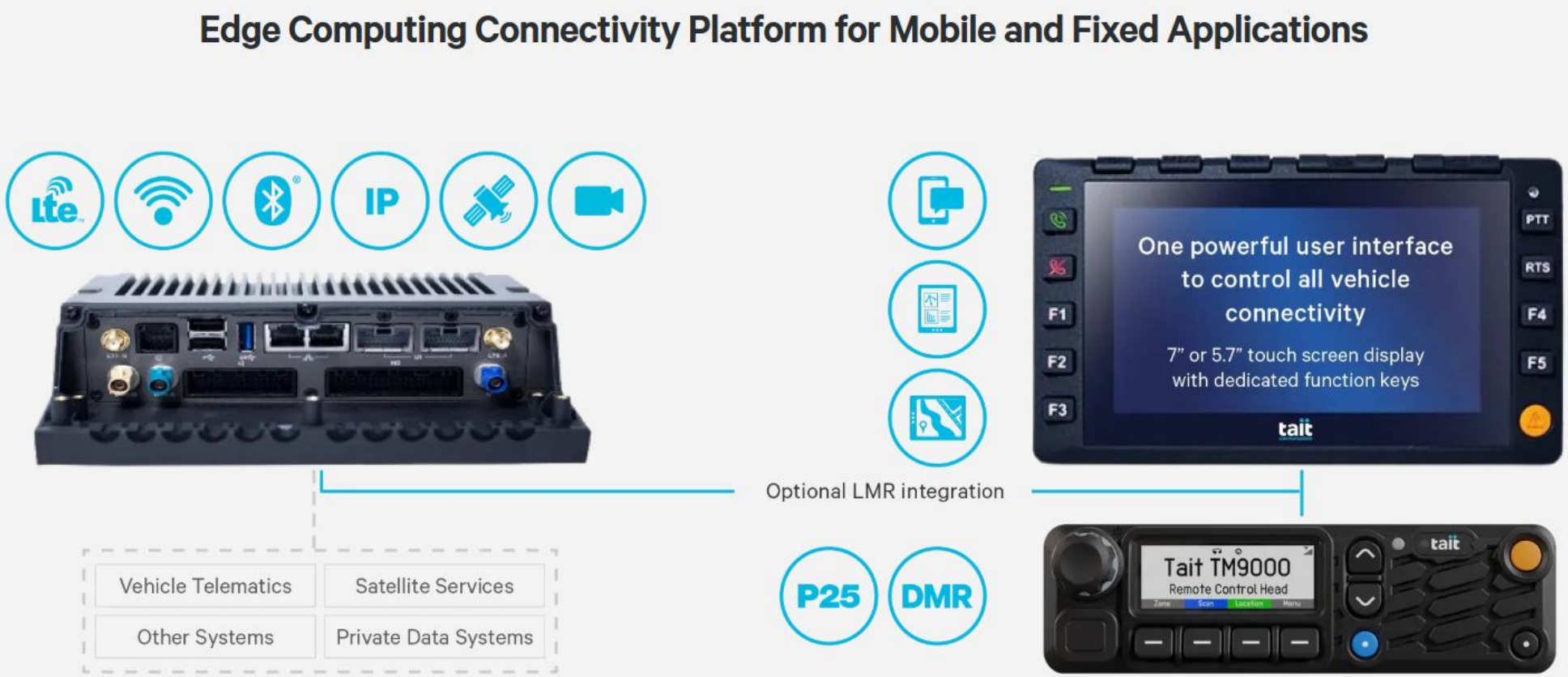
https://www.vodafone.com/news/technology/vodafone-and-airbus-join-forces-to-support-businesses-and-governments-with-new-secure-critical-communications-across-europe

Vodafone Business and Airbus Public Safety and Security, a business unit of Airbus Defence and Space, have joined forces to provide new secure business critical and collaborative communication services for people who work in mission critical areas across Europe.

Olivier Koczan, Head of Public Safety and Security at Airbus Defence and Space, added: "This partnership brings together the best of both worlds: Airbus's secure critical communications platform, Agnet, and Vodafone's expansive network capabilities.

The solution will also be made available via Vodafone's Mission Critical (MCX) communications service being rolled out across Europe, starting with Germany. MCX automatically prioritises all forms of mobile multimedia traffic generated by an App like the one provided by Airbus, including voice, data and video, used by both blue light organisations and critical industries. Additionally, mobile broadband coverage can be extended to hard-to-reach rural areas and out at sea using new low-earth orbit direct-to-mobile satellites being pioneered by Vodafone.

Mobile devices + Broadband



5G Hardened Devices are appearing

RUGGEAR

ASKEY

ZEBRA

Comprehensive voice functionality

Interoperability with narrowband devices

Seamlessly communicate with devices that utilise today's digital radio technologies, including TETRA, DMR, P25 and TETRAPOL via integration with MCX solutions, as well as other LTE/5G devices.

Conclusions

- LMR is here to stay for some time, international trends show the market is still growing
- 4/5G offers many new options for existing and new markets
- The G's still have not solved direct mode physic's
- Many manufacturers are offering hybrid devices and solutions to solve problems
- Standards & ecosystems process takes time, progress is happening
- The industry as a whole benefits if we all understand, work towards and insist on standards