Developing specifications for LTE

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Introduction

- Standards used for commercial cellular and critical communications have evolved separately
- Recent significant interest in adapting LTE for critical communications and public safety applications
- 3GPP is working in collaboration with the critical communications industry to deliver suitable LTE standards

Commercial cellular systems

Advantages:

- Substantial R&D investment and innovation
- Economies of scale
- High speed multimedia support
- High network capacity

Drawbacks:

- Not optimised for critical communications
- Coverage obligations typically less stringent than those for Critical Communication

Critical communications systems

TETRA

P25

TETRAPOL

etc. …

Advantages:

- Robust
- Excellent group operation
- Priority control
- Direct mode

Drawbacks:

- Costly, due to limited volumes
- Slower evolution than commercial cellular
- Lack of broadband capability

Critical Communications and LTE

National Public Safety Telecommunications Council

- Working on requirements for LTE-based national US public safety network
- FirstNet participating actively in 3GPP working groups

Tetra + Critical Communications Association

- Committed to LTE for broadband critical communications
- Providing 3GPP with use cases and service requirements
- Now a 3GPP “Market Representation Partner” allowing wider 3GPP participation from TCCA community

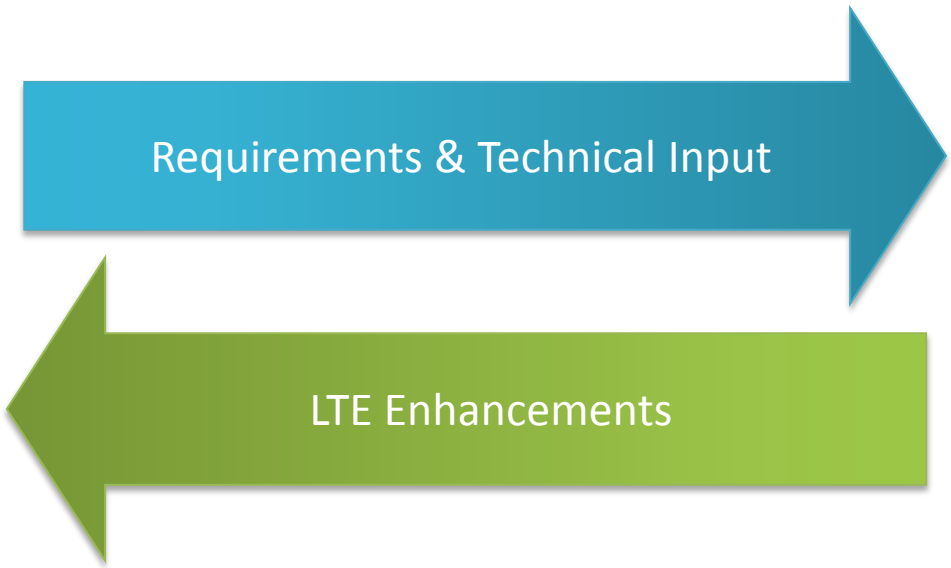
Co-operation with 3GPP

- Preserve strengths of LTE while adding features needed to support critical communications
- Maximise technical commonality between commercial and critical communications aspects

ETSI TC TCCE

TCCA TETRA + Critical Communications Association

NPSTC



Cellular Industry

3GPP A GLOBAL INITIATIVE

Striking a balance – what aspects to standardise?

Less customisation

More customisation

More COTS technology reuse

Lower costs

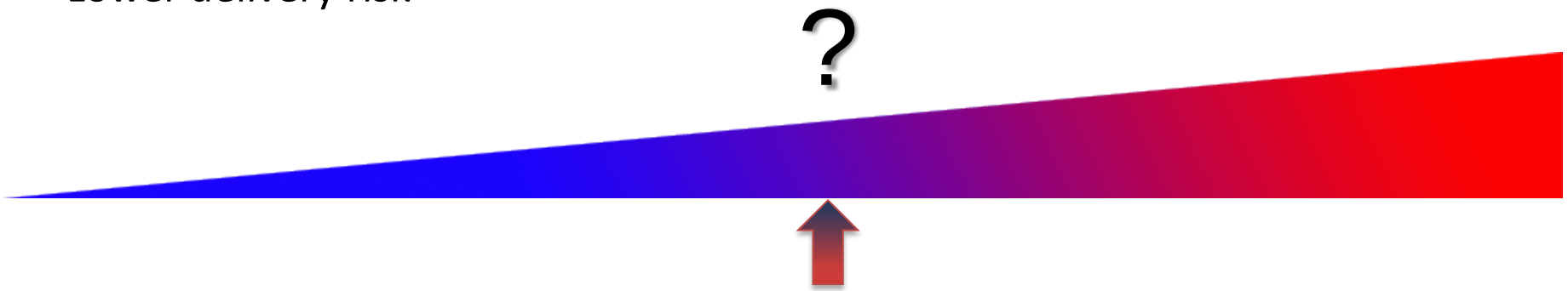
Faster standardisation

Lower delivery risk

More operating modes supported

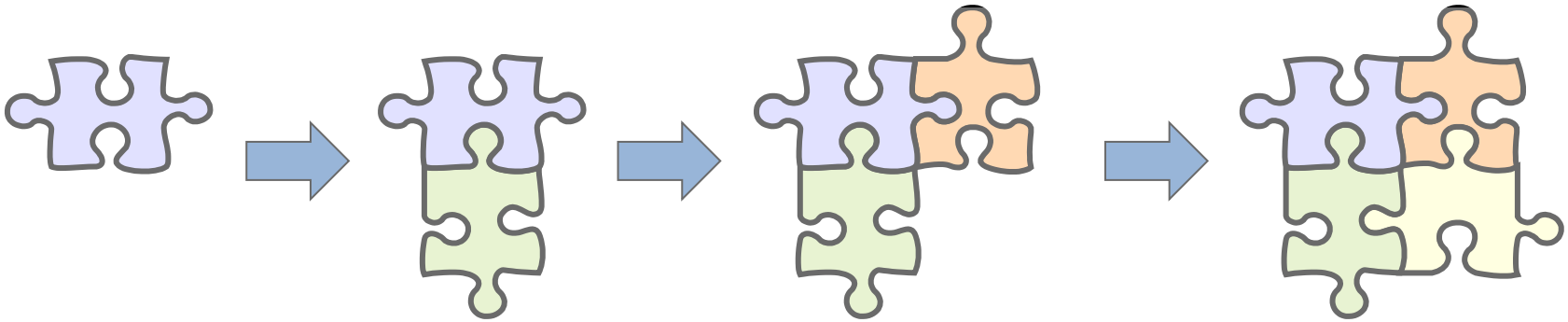
Performance (KPI) improvements

Better support for “difficult” radio situations



3GPP phased development

- 3GPP standards release takes 18-24 months
- Large work items typically span several releases
  - Break complex problems into simpler elements
  - Deliver minimum viable solution in initial release with enhancements in later releases
- Critical communications work will span more than one release



Initial phase: Release 12 work items

Work Item	Work Item Document Reference
Proximity-based Services (ProSe)	SP-130715
CT aspects of Proximity-based Services	CP-140194
LTE Device to Device Proximity Services (LTE_D2D_Prox)	RP-140518 RP-122009 *(study)*
Group Communication System Enablers for LTE (GCSE_LTE)	SP-140113
Study on Group Communication for LTE (FS_LTE_GC)	RP-131382

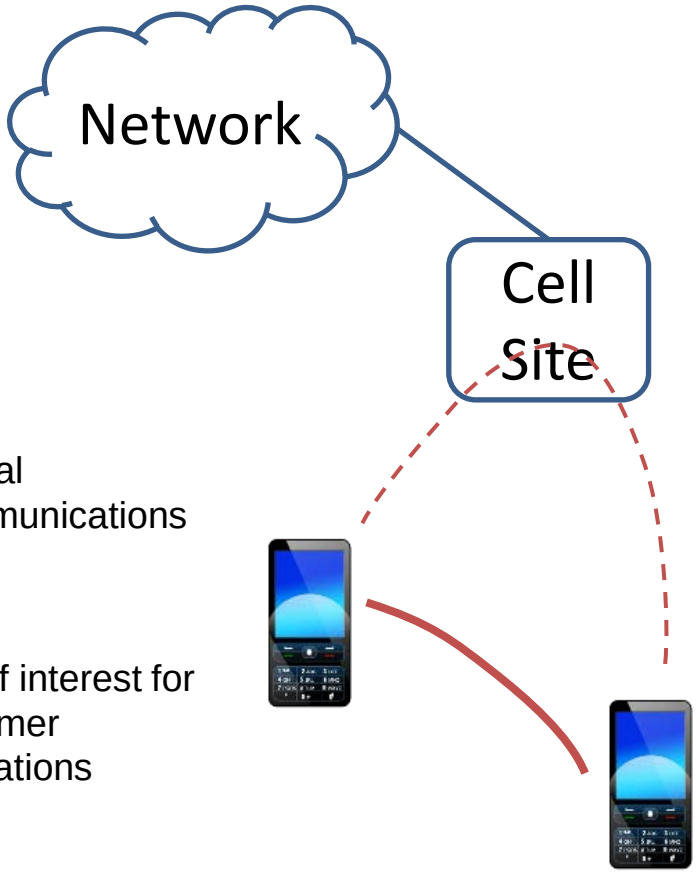
http://www.3gpp.org/ftp/Information/WORK_PLAN/

Proximity-based Services (ProSe)

- Enable devices to detect other devices in proximity and allows devices in proximity to communicate directly
  - Enable communication without network coverage
  - Reduce network load
  - Increase capacity in given bandwidth

Critical Communications only

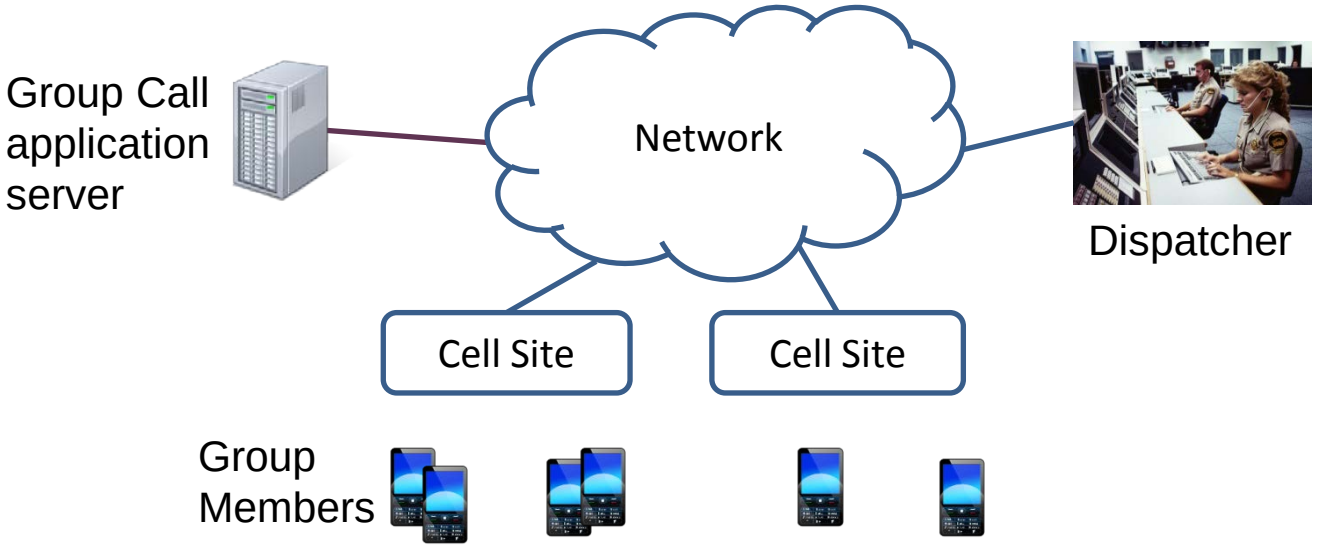
Also of interest for consumer applications



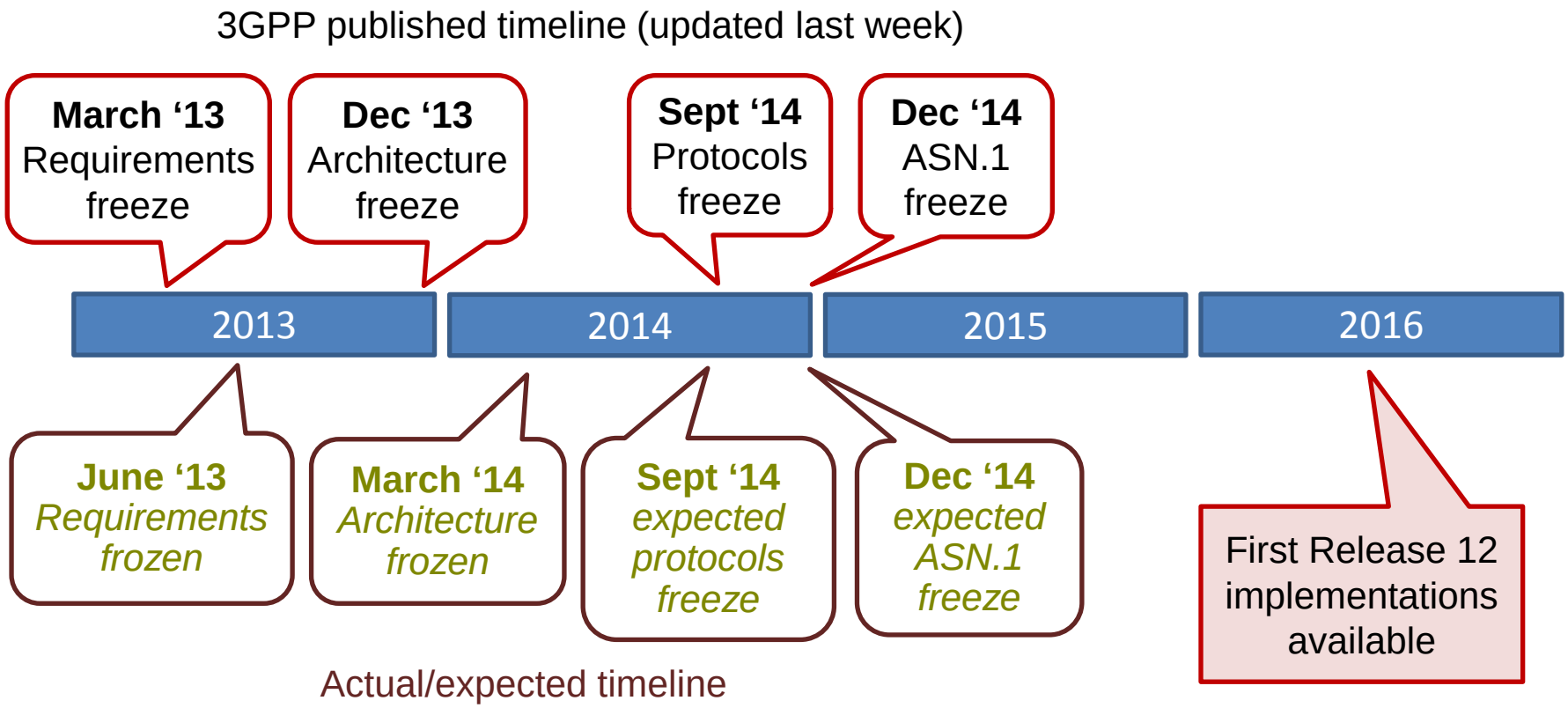
Group communication enablers

Enable efficient group communication

- Dynamic groups with mobile users and dispatchers
- Support for large groups (perhaps up to 5000)
- Service continuity for transitions between unicast and multicast bearers



Release 12 timeline



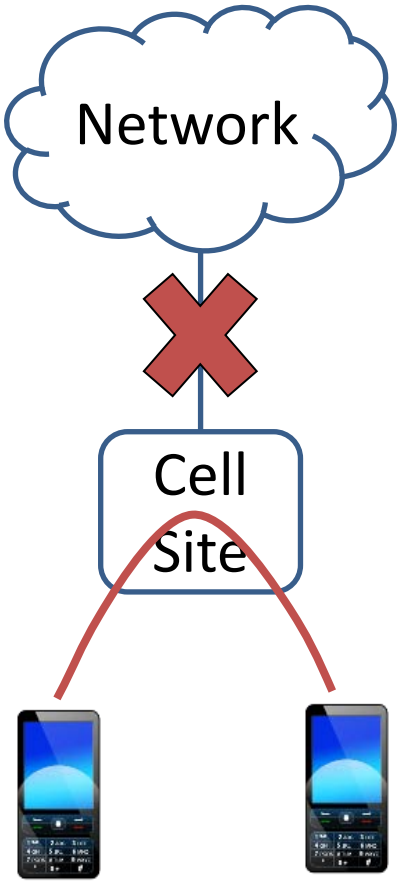
Next phase: Release 13 work items

Work Item	Work Item Document Reference
Study on Isolated E-UTRAN Operation for Public Safety (FS_IOPS)	SP-130596
Isolated E-UTRAN Operation for Public Safety (IOPS)	SP-140167
Mission Critical Push-to-Talk over LTE (MCPTT)	SP-130728

Next phase content not yet fully defined

Isolated E-UTRAN operation

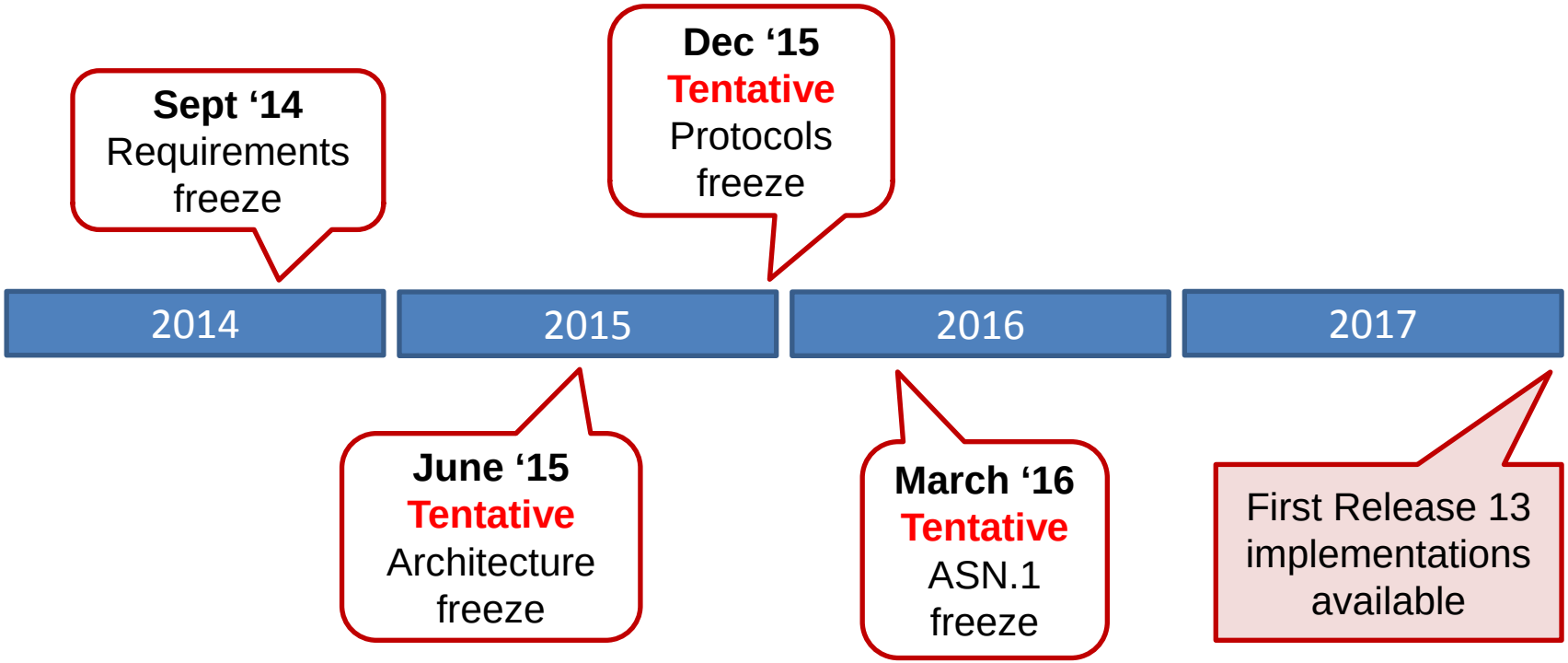
- Enable locally routed communication
  - for “nomadic” eNodeBs operating without backhaul connectivity
  - for “regular” eNodeBs experiencing temporary loss of backhaul connectivity



Mission Critical Push-to-Talk

- Requirements include:
  - Floor control aspects
  - Group and individual PTT calls
  - Associated services including talker ID, location and emergency alerting
  - Interworking with other voice systems including PSTN and LMR/PMR

Release 13 timeline



LTE Voice - Migration and legacy interworking

- VoLTE standards are available
  - For “individual” full duplex voice calls
  - Includes all commercial regulatory features
  - Mission critical LTE Voice (PTT) requirements being developed in 3GPP
- Commercial cellular industry has strong requirements on smooth technology migration and interworking
  - The tighter the legacy interworking the more costly/complex the system
- Interworking requirements between Critical Communications Broadband and TETRA need careful consideration
  - Common groups
  - Voice migration (co-existence of VoIP and TETRA voice)
  - Handset capabilities

Delivering LTE standards

Participate in person

Be visible

Provide technical leadership

Bring contributions

- Liaison statements are a poor substitute for knowledgeable people in the meeting
  - We need your physical presence and active participation
- Take care to preserve meaningful reuse of COTS LTE technology
- 3GPP must balance priorities of all members
  - Contributions drive the work

Work beyond 3GPP

- Standards is one element in enabling a market
  - Release 12 will introduce initial LTE enhancements
  - Release 13 will add further enhancements
  - 3GPP specifications are transposed into regional standards by ETSI, ATIS, CCSA, …
- Potential users also need to consider:
  - Spectrum
  - Regulation
  - Application designs
  - Legacy co-existence and migration strategies
  - Handset and infrastructure ecosystem

3GPP and frequency band support

- 3GPP defines “core functionality”, e.g. support of ProSe
- Later, 3GPP defines frequency band support

What does this mean?

- 3GPP core functionality is independent from frequency band used
- As long as frequency band support is there, all 3GPP core functionality is available

Summary

- 3GPP work on critical communications in progress
  - Meet market needs in an interoperable manner
- 3GPP and the critical communications community
  - Your continued technical participation is needed
- How to balance benefits of re-use vs. customisation?
  - New commercial business opportunities
- Careful consideration for interworking and migration
  - TETRA -> LTE (voice) migration / co-existence
- LTE-based critical communications networks
  - Optimise use of common off-the-shelf technology

Thank You !

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More Information about 3GPP:

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