3GPP activities for BB-PPDR

Yannick Lair
Chairman of 3GPP SA6
LG Electronics
A partnership

Organizational Partners (SDOs)

- Regional standards organizations:
  - ARIB (Japan),
  - ATIS (USA),
  - CCSA (China),
  - ETSI (Europe),
  - ITU (France),
  - TSDSI (India),
  - TTA (Korea),
  - TTC (Japan),

Market Representative Partners

- 14 Market partners representing the broader industry:
  - 4G Americas,
  - COAI (India),
  - CTIA,
  - GCF,
  - GSA,
  - GSMA,
  - IPv6 Forum,
  - MDG (formerly CDG),
  - NGMN Alliance,
  - Small Cell Forum,
  - TCA,
  - TD Industry Alliance,
  - TD-Forum,
  - UMTS Forum.

Individual members – around 500 companies from 39 countries
The 3GPP Eco-system

Developing Recommendations
ITU-R/T

Input specs
Referring to 3GPP specs (contributed by individual members)

Referring to 3GPP specs

Developing Wireless LAN/MAN specs

Cross-reference of specs
Partners of 3GPP Referring to 3GPP specs for the local specs

Cross-reference
Requirements

Developing internet protocol specs

Developing Mobile application specs

Market Partners

Referring to specs

Terminal certification based on 3GPP specs

Terminal Certification

EU
Japan
Korea
China
North America
India

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3GPP SA WG6 Mission-critical applications

Decision made at a joint OMA/ETSI-TCCE/3GPP meeting, in August 2014, to form a new group for mission critical applications standardisation, residing in 3GPP.

Terms of reference for the group approved in December 2014. Initial focus on MCPTT (Mission Critical Push-To-Talk).

The group had its first meeting in January 2015 and met eight times in 2015 to complete MCPTT application architecture. 1500+ contributions reviewed, between 50 and 150 signed up attendees.
Working groups and process

Stage 1: Requirements
- SA1 - Services
  - Requirements normally come from operators (MNOs)
  - High public safety presence from Europe and USA for Mission Critical applications

Stage 2: Architecture
- SA3 - Mission Critical application architecture
- SA2 - Security architecture
- SA6 - Overall system architecture (EPS, IMS)

Stage 3: Protocols
- CT1 (Core protocols)
- CT3 (Use of inter-IMS NNI)
- CT4 (Database aspects)
- CT6 (USIM configuration)
- SA3 (Security protocols)
- SA4 (Codec and multicast aspects)

+ RAN groups for radio specifications, e.g. RAN1 for physical layer, RAN2 for radio protocols and MBMS architecture, RAN4 for RF and RRM requirements. Soon RAN5 for mobile terminal conformance testing?
Overview of PPDR features in 3GPP

**Applications**
- Mission Critical Push To Talk (MCPTT) over LTE
- Mission Critical Data (MCData) over LTE
- Mission Critical Video (MCVideo) over LTE

**LTE system improvements**
- Group Communication System Enablers (GCSE_LTE): efficient and dynamic group communications
- Isolated E-UTRAN Operation for Public Safety (IOPS)

**Proximity-based Services (ProSe)**
- discovery of users in proximity
- Optimized direct communication
- With or without NW infrastructure
- Relays (UE-to-Network, UE-to-UE) for public safety

**5G**
- Higher reliability
- Higher availability
- Lower latency
- Higher accuracy positioning

- **Rel-12** (frozen)
- **Rel-13** (frozen)
- **Rel-14** (ongoing)
- **Rel-15 and beyond**
MCPTT developments in Rel-13

- MCPTT Stage 2 and Stage 3 completed within 15 months, from January 2015 till March 2016.
- High-level of functionality: 800+ service requirements, 70% covered and 10% partly covered in Rel-13:
  - User authentication and service authorization
  - Configuration
  - Affiliation and de-affiliation
  - Group calls in on-network and off-network (within one system or multiple systems, pre-arranged or chat model, broadcast group calls, emergency group calls, imminent peril group calls, emergency alerts)
  - Private calls in on-network and off-network (automatic or manual commencement modes, emergency private calls)
  - Dynamic group management (user and group regrouping)
  - Floor control in on-network (within one system or accross systems) and in off-network
  - Multicast/Unicast bearer control, MBMS (Multimedia Broadcast/Multicast Service) bearers
  - Location information reporting
  - Use of UE-to-network relays

Stage 1 - 3GPP TS 22.179, approved in March 2016
Stage 2 - Application - 3GPP TS 23.179, approved in December 2015, transposed into ETSI TS 123.179, Security - 3GPP TS 33.179, approved in March 2016
Deployment scenarios

Different deployment options depending on the split of responsibilities between Public Safety agency and MNO:

- All services administered by same operator
- MCPTT service provider administered
- PLMN operator administered
MCPTT functional model

Application-level functional model to be used as foundation for further Rel-14 MCPTT enhancements.

Model to be used as foundation for Rel-14 MCData and MCVide services, with reuse of common functional entities and reference points, for group management, identity management, configuration management and security. MCVide and MCData client and server are being defined, and will use services provided by these common entities.

This functional split between common entities and service specific entities is accompanied by a reorganization of documentation in Rel-14.
Stage 2 Technical Specifications in SA6

- MCPTT TS
  - Rel-13
  - 3GPP TS 23.179 V13.1.0 (2016.07)
  - 3rd Generation Partnership Project
  - Technical Specification Group Services and System Aspects
  - Functional architecture and information flows to support voice critical communication services
  - Stage 2 (Release 13)

- MCPTT draft TS
  - 3GPP TS 23.379 V13.0.0 (2016.04)
  - 3rd Generation Partnership Project
  - Technical Specification Group Services and System Aspects
  - Functional architecture and information flows to support voice critical communication services
  - Stage 2 (Release 13)

- MC Video draft TS
  - 3GPP TS 23.381 V13.0.0 (2016.04)
  - 3rd Generation Partnership Project
  - Technical Specification Group Services and System Aspects
  - Functional architecture and information flows to support voice critical communication services
  - Stage 2 (Release 13)

- MC Data draft TS
  - 3GPP TS 23.282 V13.0.0 (2016.04)
  - 3rd Generation Partnership Project
  - Technical Specification Group Services and System Aspects
  - Functional architecture and information flows to support voice critical communication services
  - Stage 2 (Release 13)
Mission critical data services over LTE

- As well as voice services, mission critical users have been increasing their use of data services, including low throughput services on legacy networks and data services on commercial networks.
- One-to-one or group (affiliation, possibly shared for different services) based services, on and off-network.
- Capabilities which can be used standalone or combined with other services:
  - Messaging / SDS (Short Data Service), to user or application, interworking with TETRA Short Data Service
  - File distribution, including for non-real time video or offline transfer of a video
  - Data streaming
  - IP connectivity (device acting as client or as server than can be accessed by other devices)
- Some specific services:
  - Conversation management, building on messaging, file distribution and streaming, for group and one-to-one
  - Real-time operational enhanced status within a group
  - Controlled access to data service through mission critical user organisation and to external services
  - Common communication framework for robots and drones control, or Pan-Tilt-Zoom cameras
- Reuse of existing protocols whenever possible.

Stage 1 approved in June 2016 (3GPP TS 22.282)
Stage 2 work in progress (draft 3GPP TS 23.282)
Mission critical video services over LTE

- One-to-one or group (affiliation, possibly shared for different services) based services, on and off-network.
- Performance (e.g. low latency, devices and cameras moving at high speed).
- There should be one universal interoperability video codec. Additional codecs can be made mandatory by local, national and regional authorities.
- Real time (urgent or not urgent) video streaming and non real time (offline, similar to MCData service).
- Video push and pull (from UE or video storage server) services.
- No floor control, but admission control to network resources. Automatic reception or invitation to join.
- Connection to cameras inside or external to MCVideo system.
- Remote control of video parameters (resolution, codecs) and camera views, camera discovery, location.
- Robot and drone video control communication.
- Video conferencing, synchronised voice and video.
- Reuse of existing protocols whenever possible, e.g. TVNP.

Stage 1 approved in June 2016 (3GPP TS 22.281)
Stage 2 work in progress (draft 3GPP TS 23.281)
Ongoing and future work items in SA6

Rel-14 work items in SA6
- MCPTT enhancements
- Common functional architecture
- MC Video
- MC Data

Rel-15
- Stage 2 freeze in Dec 2017
- Stage 3 freeze in June 2018

March 2017
- Rel-14 Stage 3 freeze

Ongoing studies in SA6 — cross services
- MBMS usage for mission critical services
- Migration and interconnection between LTE mission critical systems
- Interworking with non LTE systems

Possible future developments, e.g. FRMCS (Future Railway Mobile Communication System), 5G…
LTE and non-LTE mission critical systems interworking

- Interoperable group/emergency/private calls
- End to end encryption
- Codec reconciliation
- Dynamic cross systems group management

Initial focus on voice, to be extended to other services (e.g. TETRA Short Data Service).

Cooperation between different organizations is needed!
For more Information:

Presenter: yannick.lair@lge.com

contact@3gpp.org  www.3gpp.org

Search for WIDs at http://www.3gpp.org/specifications/work-plan and http://www.3gpp.org/ftp/Information/WORK_PLAN/ (See excel sheet)