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Introduction

The present document covers requirements for Mission Critical Push To Talk (MCPTT) service (represented by the term, MCPTT Service). The MCPTT Service can be used for public safety applications and also for general commercial applications (e.g., utility companies and railways). The specifications contained within the present document can also form the basis for a non-mission critical Push To Talk service (called a PTT service).

Note that further development of mission critical services beyond MCPTT (such as Mission Critical Video and Mission Critical Data) created an opportunity to re-use base functionality documented in the Stage 1 requirements for MCPTT. For example, the ability to communicate mission critical information to groups of users is a common need regardless of service type. Wherever originating MCPTT requirements were found to be in common with other mission critical services, those requirements were moved to a new Technical Specification (3GPP TS 22.280). Each requirement that was moved has been voided in this version of 3GPP TS 22.179, and an informative annex has been created at the end of this specification documenting the location of the originating 3GPP TS 22.179 requirement in 3GPP TS 22.280.

1 Scope

The present document provides the service requirements for operation of the MCPTT Service. MCPTT makes use of capabilities included in Group Communications System Enablers and Proximity Services, with additional requirements specific to the MCPTT Service. The MCPTT Service can be used for public safety applications and maritime safety applications and also for general commercial applications (e.g., utility companies, railways and maritime usage). The requirements in this specification do not apply to GSM or UMTS.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] TSB-102-B: "Project 25 TIA-102 Document Suite Overview".
- [3] TIA-603-D: "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards".
- [4] TIA-102.BABA: "Vocoder Description".
- [5] 3GPP TS 22.278: "Service requirements for the Evolved Packet System (EPS)".
- [6] 3GPP TS 22.468: "Group Communication System Enablers for LTE (GCSE_LTE)".
- [7] ITU-T Recommendation P.862: "Perceptual evaluation of speech quality (PESQ): An objective method for end-to-end speech quality assessment of narrow-band telephone networks and speech codecs".
- [8] ITU-T Recommendation P.862.1: "Mapping function for transforming P.862 raw result scores to MOS-LQO".
- [9] ITU-T Recommendation P.863: "Perceptual objective listening quality assessment".
- [10] TIA-102.BABG: "Enhanced Vocoder Methods of Measurement for Performance", March 2010.
- [11] 3GPP TS 26.190: "Speech codec speech processing functions; Adaptive Multi-Rate - Wideband (AMR-WB) speech codec; Transcoding functions".
- [12] 3GPP TS 26.194: "Speech codec speech processing functions; Adaptive Multi-Rate - Wideband (AMR-WB) speech codec; Voice Activity Detector (VAD)".
- [13] 3GPP TS 22.011: "Service accessibility".
- [14] 3GPP TS 23.122: "Non-Access-Stratum (NAS) functions related to Mobile Stations (MS) in idle mode".
- [15] 3GPP TS 22.280: "Mission Critical Services Common Requirements (MCCoRe)".
- [16] ISBN 2-7461-1832-4: "UIC Project EIRENE System Requirements Specification".
- [17] ETSI EN 301 515 V3.0.0 (2018-03): "Global System for Mobile communication (GSM); Requirements for GSM operation on railways".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1]. Definitions provided in 3GPP TS 22.280 [15] also apply to this specification.

Affiliated MCPTT Group Member: An MCPTT Group Member who has indicated an interest in the group and is prepared to receive and/or transmit Group Communications from/to the particular MCPTT Group.

Automatic Commencement Private Call: A Private Call in which the initiation of the Private Call does not require any action on the part of the receiving MCPTT User.

Broadcast Group Call: A group call where the initiating MCPTT User expects no response from the other MCPTT Users, so that when his transmission is complete, so is the call.

Call Commencement Mode: This is a setting that determines the conditions under which a call is started.

Dispatcher: An MCPTT User who participates in MCPTT communications for command and control purposes.

Floor control: An arbitration system in an MCPTT Service that determines who has the authority to transmit (talk) at a point in time during an MCPTT call.

Group-Broadcast Group: A collection of groups defined by the MCPTT Administrator (e.g., representing a particular organizational structure) and intended to be the recipients of Broadcast Group Calls.

Group Regroup: The temporary combining of a multiplicity of groups into a single group.

Hang Time: A configurable maximum length of the inactivity (silence) period between consecutive MCPTT transmissions within the same call.

Imminent Peril Call: An urgent MCPTT Group call that highlights the potential of death or serious injury, but is less critical than an MCPTT Emergency Group Call. For example a call prioritized in the event of immediate threat to any human life such as resulting from an MCPTT User's observation of or engagement in a situation involving imminent peril to the general public (e.g., a forest fire about to encircle campers, tanker truck ready to explode near a school, casualties at the scene of a car bombing).

In-progress Emergency: An emergency condition for a group that has been accepted by the MCPTT Service, but has not yet been cancelled by an authorized user.

In-progress Imminent Peril: An imminent peril condition for a group that has been accepted by the MCPTT Service and has not yet been cancelled by an authorized MCPTT User.

Late call entry: An Affiliated MCPTT Group Member joins in an in progress MCPTT Group Call.

Location: The current physical location (i.e., co-ordinates plus estimated accuracy and timestamp) of the MCPTT UE that can be cross-referenced to a map.

Losing audio: Audio of an overridden talker that is routed to selected authorized MCPTT Users.

Manual Commencement Private Call: A Private Call in which the initiation of the Private Call requires the receiving MCPTT User to perform some action to accept or reject the Private Call setup.

MCPTT Administrator: An individual authorized to control parameters of the MCPTT Service for an organization including, for example, user and group definition, user/group aliases, user priorities, group membership/priorities/hierarchies, security and privacy controls.

MCPTT Emergency Alert: A notification from the MCPTT UE to the MCPTT Service that the MCPTT User has an emergency condition.

MCPTT Emergency Group Call: An urgent MCPTT Group call that highlights the potential of death or serious injury to the initiator.

MCPTT Emergency Private Call: An urgent MCPTT Private Call that highlights the potential of death or serious injury to the initiator.

MCPTT Emergency State: A heightened condition of alarm for an MCPTT User indicating a need for immediate assistance due to a personal life-threatening situation.

MCPTT Group: A defined set of MCPTT Users identified independently of transport or network type.

MCPTT Group Member: An MCPTT User who has been authorized to participate in Group Communications of a particular MCPTT Group.

MCPTT Request: The action taken by an MCPTT User to request the permission to transmit voice on a call.

MCPTT Service: A Push To Talk communication service supporting applications for Mission Critical Organizations and mission critical applications for other businesses and organizations (e.g., utilities, railways) with fast setup times, high availability, reliability and priority handling.

MCPTT system: The collection of applications, services, and enabling capabilities required to provide Mission Critical Push To Talk for a Mission Critical Organization.

MCPTT UE: A UE that enables an MCPTT User to participate in MCPTT Service.

MCPTT User: A user of an MCPTT Service, who has a device with the capability to participate in MCPTT Services.

MCPTT User Profile: The set of information that allows an MCPTT User to employ the MCPTT Service in a given role and/or from a given MCPTT device.

Mission Critical Push To Talk: A group communication service with fast setup times, ability to handle large groups, strong security and priority handling.

Off-Network MCPTT Service: The collection of functions and capabilities required to provide MCPTT using ProSe Discovery and the ProSe Communication path for MCPTT Users using Public Safety ProSe-enabled UEs as a direct communication between UEs.

Partner MCPTT System: Allied MCPTT system that provides MCPTT Services to an MCPTT User based on the MCPTT User Profile that is defined in the Primary MCPTT System of that MCPTT User.

Pre-emption: The act of terminating on-going calls in order to free up resources for a higher priority call request.

Primary MCPTT System: MCPTT system where the MCPTT User Profile of an MCPTT User is defined.

Private Call: A call between a pair of MCPTT Users using the MCPTT Service with or without MCPTT Floor control.

Project 25 RFSS: A Project 25 Radio Frequency (RF) Subsystem as defined in TSB-102-B [2].

Receiving MCPTT Group Member: An Affiliated MCPTT Group Member who is currently receiving Group Communication from an MCPTT Group.

Selected MCPTT Group: The MCPTT Group that a particular Affiliated MCPTT Group Member uses for transmission.

System Call: A special case of a Broadcast Group Call that is transmitted to all users in a dynamically defined geographic area.

Transmitting MCPTT Group Member: An Affiliated MCPTT Group Member who is currently transmitting a Group Communication to a Selected MCPTT Group.

User-Broadcast Group: A collection of users defined by the MCPTT Administrator (e.g., representing a particular organizational structure) and intended to be the recipients of Broadcast Group Calls.

User ID: The main unique identifier for an MCPTT User.

User Regroup: The temporary combining of a multiplicity of users into a new group.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

FIFO	First In First Out
GCSE_LTE	Group Communication System Enablers for LTE
KPI	Key Performance Indicator
MCPTT	Mission Critical Push To Talk
MOS-LQO	Mean Opinion Score – Listening Quality Objective
P25	Project 25
PESQ	Perceptual Evaluation of Speech Quality
POLQA	Perceptual Objective Listening Quality Assessment
ProSe	Proximity Services
PTT	Push To Talk
RFSS	Radio Frequency (RF) Subsystem as defined in the TIA-102 specifications (P25)
TETRA	Terrestrial Trunked Radio
TIA	Telecommunications Industry Association
UIC	Union Internationale des Chemins de Fer

4 Mission Critical Push To Talk overview

4.1 General

A Push To Talk service provides an arbitrated method by which two or more users may engage in communication. Users may request permission to transmit (e.g., traditionally by means of a press of a button). The Mission Critical Push To Talk (MCPTT) service supports an enhanced PTT service, suitable for mission critical scenarios, based upon 3GPP system services. The requirements for Mission Critical Push To Talk (MCPTT) service defined within can also form the basis for a non-mission critical Push To Talk (PTT) service.

The MCPTT Service is intended to support communication between several users (a group call), where each user has the ability to gain access to the permission to talk in an arbitrated manner. However, the MCPTT Service also supports Private Calls between pairs of users. The MCPTT Service builds on the existing 3GPP transport communication mechanisms provided by the 3GPP architectures to establish, maintain, and terminate the actual communication path(s) among the users.

The MCPTT Service also builds upon service enablers: Group Communications System Enablers and Proximity Services. To the extent feasible, it is expected that the end user's experience to be similar regardless if the MCPTT Service is used under coverage of a 3GPP network or based on ProSe without network coverage. To clarify this intent, the requirements are grouped according to applicability to on-network use, off-network use, or both.

Though the MCPTT Service primarily focuses on the use of the 3GPP system there might be users who access the MCPTT Service through non-3GPP access technology, dispatchers and administrators are examples of this. Dispatchers and administrators are special users who have particular admin and call management privileges which normal users might not have. In MCPTT dispatchers can use an MCPTT UE (i.e., 3GPP) or a non-3GPP access connection to the MCPTT Service based on a "dispatcher and Administrator" interface. Through this interface a user is able to access and manage the services related to on the network and those common to on the network and off the network.

The MCPTT Service allows users to request the permission to talk (transmit voice/audio) and provides a deterministic mechanism to arbitrate between requests that are in contention (i.e., Floor control). When multiple requests occur, the determination of which user's request is accepted and which users' requests are rejected or queued is based upon a number of characteristics (including the respective priorities of the users in contention). MCPTT Service provides a means for a user with higher priority (e.g., MCPTT Emergency condition) to override (interrupt) the current talker. MCPTT Service also supports a mechanism to limit the time a user talks (hold the floor) thus permitting users of the same or lower priority a chance to gain the floor.

The MCPTT Service provides the means for a user to monitor activity on a number of separate calls and enables the user to switch focus to a chosen call. An MCPTT Service user may join an already established MCPTT Group call (Late