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**TETRA and Critical Communications Evolution (TCCE);
Critical Communications Architecture;
Part 2: Critical Communications application
mobile to network interface architecture**

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee TETRA and Critical Communications Evolution (TCCE).

The present document is part 2 of a multi-part deliverable covering TETRA and Critical Communications Evolution (TCCE); Critical Communications Architecture, as identified below:

TR 103 269-1: "Critical Communications Architecture Reference Model";

TS 103 269-2: "Critical Communications application mobile to network interface architecture".

Modal verbs terminology

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1 Scope

The present document presents an overview of the architecture for a generic mission critical service for use by a Critical Communications Application in network and terminal over a broadband IP bearer, with specific focus for LTE. The architecture is part of the overall Critical Communications Architecture Reference Model, described in ETSI TR 103 269-1 [1]. The overall architecture and services are described and the implementation of services equivalent to the existing narrowband technologies, for example those in TETRA and Tetrapol systems. Off network services are for future study and so are outside the scope of the present document.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

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The following referenced documents are necessary for the application of the present document.

- [1] ETSI TR 103 269-1: "TETRA and Critical Communications Evolution (TCCE); Critical Communications Architecture; Part I: Critical Communications Architecture Reference Model".
- [2] IETF RFC 3261: "SIP: Session Initiation Protocol (SIP)".
- [3] IETF RFC 5389: "Session Traversal Utilities for NAT (STUN)".
- [4] IETF RFC 6665: "SIP-Specific Event Notification".
- [5] IETF RFC 3428: "Session Initiation Protocol (SIP) Extension for Instant Messaging".
- [6] IETF RFC 3903: "Session Initiation Protocol (SIP) Extension for Event State Publication".
- [7] IETF RFC 4566: "Session Description Protocol (SDP)".
- [8] IETF RFC 5359: "Session Initiation Protocol Service Examples".
- [9] IETF RFC 791: "Internet Protocol (v4)".
- [10] IETF RFC 2460: "Internet Protocol, version 6".
- [11] IETF RFC 793: "Transmission Control Protocol (TCP)".
- [12] IETF RFC 4960: "Stream Control Transmission Protocol (SCTP)".
- [13] IETF RFC 5246: "Transport Layer Security protocol (TLS)".
- [14] IETF RFC 6347: "Datagram Transport Layer Security (DTLS)".
- [15] IETF RFC 768: "User Datagram Protocol (UDP)".
- [16] IETF RFC 3550: "Real Time Protocol (RTP)".
- [17] IETF RFC 3711: "Secure Real Time Protocol (SRTP)".
- [18] IETF RFC 5245: "Interactive Connectivity Establishment (ICE)".

- [19] IETF RFC 5766: "Traversal Using Relays around NAT (TURN)".

2.2 Informative references

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The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] ETSI TR 102 022-2: "User Requirements Specification Mission Critical Broadband Communications; Part 2: Critical Communications Application".
- [i.2] TETRA and Critical Communications Association; List of TIP features.
- NOTE: Available at <http://www.tandcca.com/Library/Documents/ListofTIPfeaturesv3.0.pdf>
- [i.3] ETSI EN 300 392-12: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3".
- [i.4] 3GPP TS 22.179: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Mission Critical Push to Talk MCPTT".
- [i.5] IEEE 802.11: "IEEE Standard for Information technology- Telecommunications and information exchange between systems Local and metropolitan area networks- Specific requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications".
- [i.6] IEEE 802.16: "IEEE Standard for Air Interface for Broadband Wireless Access Systems".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

affiliation: process of negotiating access to communications with a group

NOTE 1: The TETRA term for affiliation is 'Group Attachment'.

NOTE 2: 3GPP TS 22.179 [i.4] uses the term 'Affiliation'.

call: set of one or more transmissions of media between two or more parties

call hang time: period within a call during which no communications are sent or received, and following expiry of which, the call will be cleared

critical communications application: infrastructure based application which provides critical communications services to its client Mobile Units

migration: obtaining Critical Communications service from a CCA other than the home CCA

mobile unit: combination of access network client terminal and client application for critical communications which provides critical communications services to its user

registration: process of negotiating service from a CCA

roaming: obtaining an IP connection to the home CCA from a broadband IP network other than the home broadband IP network

NOTE: If a 3GPP LTE PLMN provides home service to a user, obtaining service from a different PLMN is an example of roaming.

session: period within a period of affiliation to a group within which transmissions may be sent and received to and from that group by using media control signalling only

session hang time: the period following a call during which the CCA may maintain a session before clearing it

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

3GPP	3 rd Generation Partnership Project
AL	Ambience Listening
APN	Access Point Name
ASSI	Alias Short Subscriber Identity
AVL	Automatic Vehicle Location
BIC	Barring of Incoming Calls
BOC	Barring of Outgoing Calls
BS	Base Station
CAD	Call Authorised by Dispatcher
CCA	Critical Communications Application
CCAS	Critical Communications Application Server
CCS	Critical Communications System
CF	Call Forwarding
CFB	Call Forwarding on Busy
CFU	Call Forwarding Unconditional
CW	Call Waiting
DGNA	Dynamic Group Number Assignment
DHCP	Dynamic Host Control Protocol
DL	Discreet Listening
DMO	Direct Mode Operation
DNS	Domain Name Server
DOTAM	DMO Over The Air Management
DTLS	Datagram Transport Layer Security
DTMF	Dual Tone Multi Frequency
eMBMS	evolved Multimedia Broadcast Multicast Service
EPC	Evolved Packet Core
EPS	Evolved Packet System
E-UTRAN	Evolved Universal Terrestrial Access Network
FFS	For Further Study
GBR	Guaranteed Bit Rate
HPLMN	Home Public Land Mobile Network
ICE	Interactive Connectivity Establishment
IMS	IP Multimedia Subsystem
IMSI	International Mobile Subscriber Identity
IP	Internet Protocol
ISDN	Integrated Services for Digital Network
LIP	Location Information Protocol
LTE	Long Term Evolution
MCP	Media Control Protocol
MU	Mobile Unit
N/A	Not Applicable
NAT	Network Address Translation
PABX	Private Automatic Branch Exchange
PDN	Packet Data Network
PIN	Personal Identification Number
PLMN	Public Land Mobile Network

PMR	Private/Professional Mobile Radio
ProSe	Proximity Services
PSTN	Public Switched Telephone Network
PTT	Press To Talk
RFC	Request For Comment
RTCP	Real-time Transport Control Protocol
RTP	Real-time Transport Protocol
SCTP	Stream Control Transmission Protocol
SDP	Session Description Protocol
SDS	Short Data Service
SDS-TL	Short Data Service – Transport Layer
SIM	Subscriber Information Module
SIP	Session Initiation Protocol
SIP/IP	Session Initial Protocol/Internet Protocol
SMS	Short Message Service
SRTCP	Secure Real-time Transport Control Protocol
SRTP	Secure Real-time Transport Protocol
SS	Supplementary Service
STUN	Session Traversal Utilities for NAT
TBD	To Be Decided
TCP	Transport Control Protocol
TIP	TETRA Interoperability Process
TLS	Transport Layer Security
TMGI	Temporary Mobile Group Identity
TURN	Traversal Using Relays around NAT
TX	Transmitter
UDP	User Datagram Protocol
UE	User Equipment
UMTS	Universal Mobile Telecommunications System
URI	Universal Resource Identifier
URS	User Requirements Specification
UTRAN	UMTS Terrestrial Radio Access Network
VPLMN	Visited Public Land Mobile Network
WAP	Wireless Application Protocol
WCMP	Wireless Control Message Protocol
WLAN	Wireless Local Area Network
WMAN	Wireless Metropolitan Area Network
XML	Extensible Markup Language

4 Architecture overview

4.1 Architecture reference

The Critical Communications Architecture Reference model is detailed in ETSI TR 103 269-1 [1]. The architecture and interfaces are shown in Figure 1.

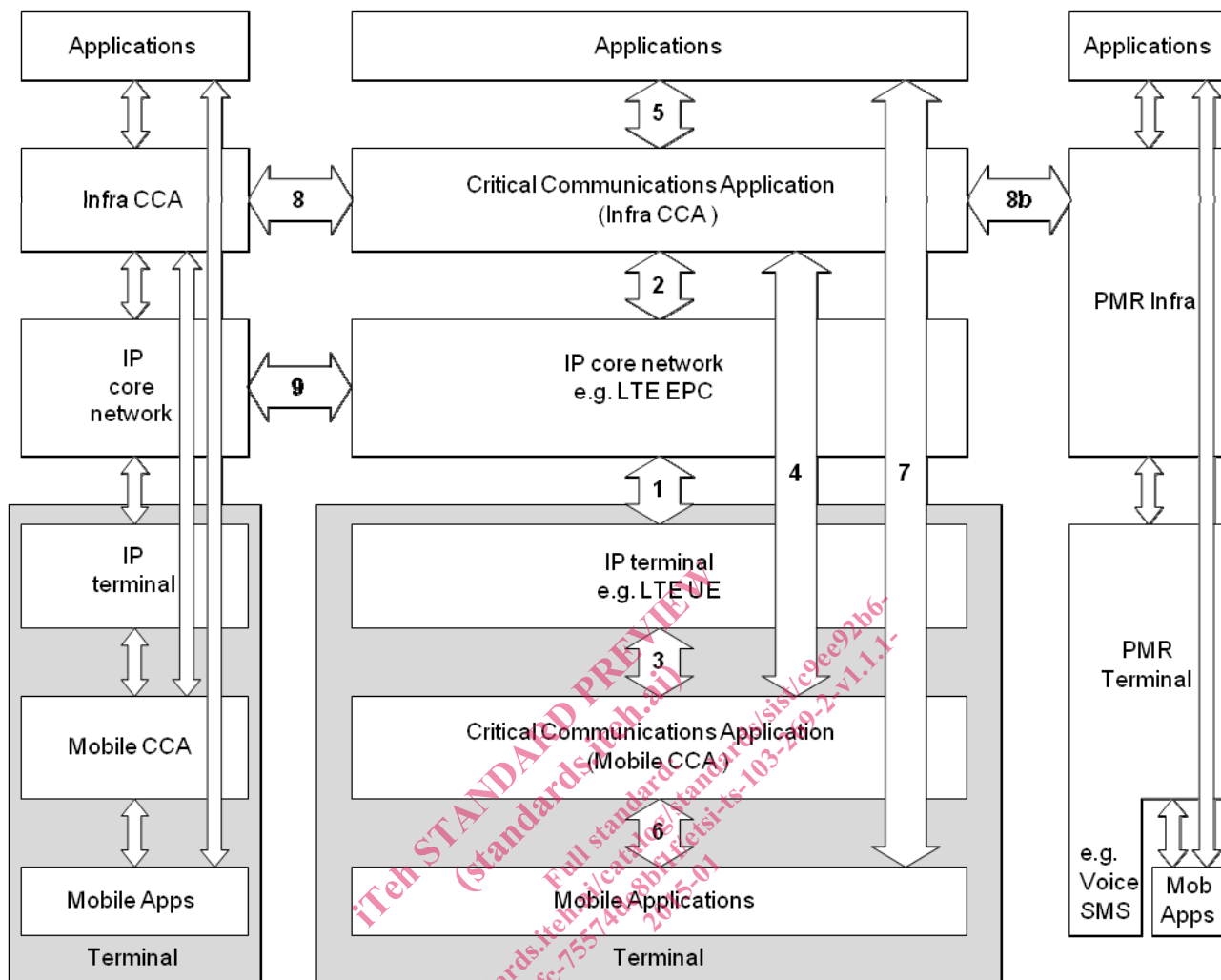


Figure 1: CCS Reference Model

The present document describes the architecture of interface 4 in the reference model shown in the figure.

NOTE: ETSI TR 103 269-1 [1] contains the normative version of this figure.

4.2 Configurations

The functional architecture covered in the present document is presented below.

4.2.1 Single CCA system

The functional architecture for a single CCA system according to the present document is presented in Figure 2.

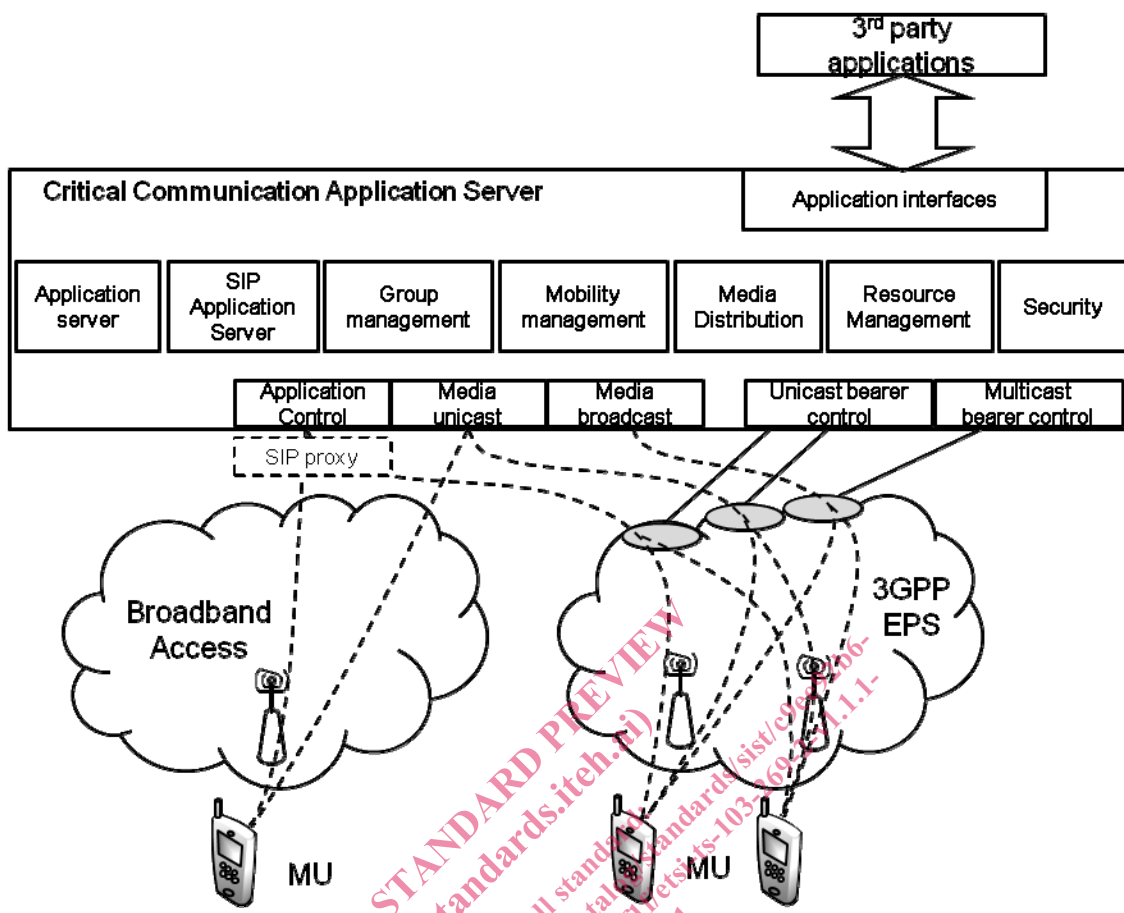


Figure 2: Functional architecture

NOTE 1: The SIP proxy function may be part of the 'application control' interface or may be separate.

The Critical Communications Application Server CCAS has a number of entities responsible for establishing the service and for exchanging individual and group communications with Mobile Units. The various entities of the CCAS use the transport interfaces of the underlying broadband networks to exchange signalling and media with the mobile units. Depending on the nature of the broadband access and of its capabilities and available interfaces, the CCA uses Control interfaces of the broadband network to manage the transport bearers, i.e. to set up and release bearers and to request for specific Quality of Service. This is typically the case when the Broadband access is an LTE Core Network, as illustrated by the '3GPP EPS' in Figure 2. If those Control interfaces do not exist, for instance in the case of WiFi access, or are not available, for instance in the case of an LTE network for which the control interface (Rx) is not made available to the CCAS (for example in a back up commercial operator network), then the CCAS uses transport on default bearers. (Note that in this case, a fully mission critical service may not be available.) This is illustrated by the 'Broadband Access' network in Figure 2.

NOTE 2: The term Critical Communications Application Server is used to denote the set of entities that provide the fixed end part of the CCA, which provide service to the client, or mobile, part of the application in the MUs. The term 'server' does not imply any physical structure or number of physical devices that provide this service.

One CCAS may make use of more than one broadband network. The broadband networks may be of the same type, for example in the case where multiple 3GPP LTE networks are used to provide access to one CCAS. The broadband networks may also be of mixed network types, such as a mixture of 3GPP LTE and WiFi networks which provide service to the same CCAS. Multiple CCASs may also share the same broadband IP access network. Therefore there can be a many-to-many relationship of CCASs and broadband IP access networks.

The CCA provides services to additional third party applications, for example to provide group addressed services, or prioritised access services.