ETSI Plugtests Report V1.0.0 (2022-12)

7th ETSI MCX Plugtests
Malaga, Spain
07 November – 11 November 2022

ETSI

Keywords
Testing, Interoperability, Mission-Critical, LTE,
MCPTT, MCData, MCVideo, FRMCS

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Executive Summary

The capabilities of Mission Critical Push to Talk (MCPTT), Mission Critical Data (MCData) and Mission Critical Video (MCVideo) – together abbreviated as MCX services – were tested during the seventh MCX Plugtests from 07th November to 11th November 2022 at the University of Malaga (UMA) using 4G and 5G test networks. More than 1200 test cases were executed between vendors, based on 3GPP Release-17.

The 7th ETSI MCX Plugtests have concluded with a success rate of 96.0% of the executed tests in the validation of 3GPP mission critical services vendor interoperability. More than 150 delegates participated during the 7th MCX Plugtests event in Malaga.

These tests are essential to ensure seamless access to mission critical services over 4G and 5G networks across different vendors' products and implementations.

The MCX ETSI Plugtests series is the first independent testing of public safety and other mission critical services over LTE and 5G networks. FRMCS (Future Rail Mobile Communications System) features as well as the Interworking Function IWF to LMR systems like TETRA or P25 and conformance test tools were tested in these 7th MCX Plugtests. The preparations for the seventh Plugtests started in June 2022, were followed by two weeks of integration with the test network in October 2022, a one week pre-testing in October 2022, and were finalized with a one week of face-to-face end to end interoperability testing with 4G and 5G test networks. For the first time a 5G network was used for a MCS and FRMCS Plugtests and also for the first time eMBMS network elements were integrated into the test networks setup.

Note: TETRA IWF implementations was based on draft standards from ETSI TCCA.

The tests were based on 3GPP Release-17 and more than 1200 tests were executed between the different vendors in more than 150 test sessions. The test cases have been amended with additional test scenarios which will be included in a future version of ETSI TS 103 564 (after the ETSI committee TCCE approval). A total of more than 330 test cases are now available for the MCX Plugtests. Besides the MCPTT, MCData and MCVideo Application Servers and Clients, the testing also included devices, railways-oriented features, Interworking with TETRA, IMS (IP Multimedia Subsystem), eMBMS (Evolved Multimedia Broadcast Multicast Services) components, Server to Server and inter-MCX communication. A test stream was dedicated for 3GPP RAN5 conformance testing.

The observations from the Plugtests events provide essential feedback to 3GPP Working Groups as work continues in mission critical communication specifications.

The testing during the 7th MCX Plugtests was complemented by an observer program with presentations, round-table discussions and demos for the observers.

This seventh MCX Plugtests was organized by ETSI with the support of the European Commission, EFTA, TCCA, 5G-EPICENTRE project and UIC.

The Plugtests event was a pure interoperability testing event, and no products were certified.

The next FRMCS and MCX Plugtests events are planned for June and November 2023 respectively.

The companies participating in this MCX Plugtests registered the following equipment for the indicated Test Streams:

MCX Application Servers:	**Stream A** MCX over RAN	**Stream B** FRMCS over RAN	**Stream C** Interworking IWF	**Stream D** Test Tools	**Stream E** Over the Top
Airbus	X			n/a	
Alea	X			n/a	
Aselsan	X			n/a	
Consort Digital	X	X		n/a	
Ericsson	X			n/a	
Hytera China	X			n/a	
Hytera Mobilfunk	X			n/a	X
Kontron	X	X		n/a	
MCLabs	X	X		n/a	X
Motorola	X			n/a	X
Nemergent	X	X	X	n/a	

MCX Application Servers:	**Stream A** MCX over RAN	**Stream B** FRMCS over RAN	**Stream C** Interworking IWF	**Stream D** Test Tools	**Stream E** Over the Top
Nokia	X	X		n/a	
Streamwide	X		X	n/a	X
TASSTA	X	X	X	n/a	X
Valid8	X	X	X	n/a	X

MCX Application Clients:	**Stream A** MCX over RAN	**Stream B** FRMCS over RAN	**Stream C** Interworking IWF	**Stream D** Test Tools	**Stream E** Over the Top
Alea	X		n/a		
Alstom		X	n/a	X	
Consort Digital	X	X	n/a		
Ericsson	X		n/a		
ErvoCom	X		n/a		
Funkwerk	X	X	n/a	X	X
Hytera China	X		n/a		
Kontron	X	X	n/a		
MCLabs	X	X	n/a		X
Nemergent	X		n/a	X	
Softil			n/a		X
TASSTA			n/a		X
Teltronic	X		n/a		

User Equipment (UE):	**Stream A** MCX over RAN	**Stream B** FRMCS over RAN
Alstom (On-Board Gateway		X
Aselsan (device)	X	
Consort Digital (cab radio)	X	X
Crosscall (device)	X	X
Ervocom (cab radio)	X	
Funkwerk (cab radio)	X	X
Teltronic (cab radio)	X	

Land Mobile Radio (LMR):	**Stream C** Interworking IWF
Rohill (TETRA System)	X
Teltronic (TETRA System)	X

Evolved Node B (eNB):	**Stream A** MCX over RAN	**Stream B** FRMCS over RAN	**Stream C** Interworking IWF
University of Malaga Test System	X	X	X

Next Generation Node B (gNB):	**Stream A** MCX over RAN	**Stream B** FRMCS over RAN	**Stream C** Interworking IWF
University of Malaga Test System	X	X	X

Evolved Packet Core (EPC):	**Stream A** MCX over RAN	**Stream B** FRMCS over RAN	**Stream C** Interworking IWF
Athonet	X	X	X
Teltronic	X	X	X

Evolved Packet Core (EPC):	**Stream A** MCX over RAN	**Stream B** FRMCS over RAN	**Stream C** Interworking IWF
University of Malaga Test System	X	X	X

5G Core:	**Stream A** MCX over RAN	**Stream B** FRMCS over RAN	**Stream C** Interworking IWF
Athonet	X	X	X

Evolved Multimedia Broadcast Multicast Services (eMBMS) Components:	**Stream A** MCX over RAN	**Stream B** FRMCS over RAN
Aselsan	X	X
Teltronic	X	X

IP Multimedia Subsystem (IMS):	**Stream A** MCX over RAN	**Stream B** FRMCS over RAN	**Stream C** Interworking IWF	**Stream D** Test Tools	**Stream E** Over the Top
Aselsan	X	X	X	n/a	X

Dispatcher:	**Stream A** MCX over RAN	**Stream B** FRMCS over RAN
Alstom		X
Frequentis	X	X
Kolibri	X	
Kontron	X	X
Prescom	X	
Softil	X	X
Teltronic	X	
Zetron	X	

Test Tool Vendors:	**Stream D** Test Tools
MCS-TaaSting	X
Valid8	X

The following observer organsiations participated in this Plugtests:

- A.S.T.R.I.D, Public saftey network operator, Belgium
- BDBOS, Federal Agency for Public Safety Digital Radio, Germany
- Cybersecurity and Infractructure Security Agency / Department of Homeland Security, USA
- Direzione Centrale Anticrimine della Polizia di Stato, Central Anti-Crime Directorate of the State Police, Italy
- Erillisverkot, Public saftey network operator, Finland
- Home Office, United Kingdom
- French Ministry of Interior, France
- MSB, Swedish Civil Contingencies Agency, Sweden
- NSW Telco Authority, Australia
- National Police ICT-unit, Norway
- SMIT, Information technology and development center of the Ministry of the Interior, Estonia
- SNCF Reseau, Railway operator research, France
- Swedish Police IT-Department, Sweden
- Texas A&M University, USA
- State Infocommunication Foundation, Public saftey network operator, Estonia
- DSB, Norwegian Directorate for Civil Protection, Norway
- Global Certification Forum (GCF)

- TCCA
- UIC Union Internationale des Chemins de Fer

1 Introduction

Mission Critical Push To Talk (MCPTT) is a 3GPP standardized voice service for mobile radio systems which ensures that LTE (and 5G) systems support mission-critical communications.

The Global Mission-Critical Communication Market was valued at USD 17.03 Billion in 2022 and is estimated to reach USD 27.87 Billion by 2028 growing at a CAGR of 8.6% during the forecast period 2022–2028, according to the market research. The first nationwide rollouts in the United States, South Korea, the UK, the Middle East and Asian countries are expected to trigger significant large-scale investments in mission-critical LTE.

Mission Critical Push To Talk (MCPTT) was the first of a number of Mission Critical features which was standardized by 3GPP in Release-13. Mission Critical Video and Mission Critical Data were standardized in Release-14. With the standardization of MCX (Mission-Critical PTT, Video & Data), IOPS (Isolated Operation for Public Safety), and other critical communications features by 3GPP, LTE and 5G NR networks are increasingly gaining recognition as an all-inclusive communications platform for public safety, rail and other critical communications sectors.

Preparations for the 7th ETSI MCX Plugtests event started in June 2022 with the registrations of vendors and observers. During bi-weekly conference calls from June to November 2022 the setup of the tests, the test specification and organizational issues were agreed between the participants. Before the main event, the vendors have done integration with test network and remote pre-testing of their implementations via VPN tunnels which connected their labs to a central exchange hub.

All the information required to organise and manage the 7th MCX Plugtests event was compiled and shared with participants in a dedicated private WIKI which was put in place by ETSI. All participants were provided with credentials that allowed them to access and update their details. All the information presented in this document has been extracted from the 7th MCX Plugtests event wiki: https://wiki.plugtests.net/7th-MCX-Plugtests/index.php?title=Main_Page (login required).

Clause 4 describes the management of the Plugtests event.

The following equipment was tested – please see also clause 5:

- MCX Application Servers (MCX AS)
- MCX Clients
- Evolved Node B (eNB)
- Next Generation Node B (gNB)
- User Equipment (UE)
- Land Mobile Radio (LMR) Systems – TETRA (P25 systems were not registered for this Plugtests)
- Evolved Packet Core (EPC)
- 5G Core (5GC)
- IP Multimedia Subsystem (IMS)
- Broadcast Multicast Service Center (BMSC)
- Evolved Multicast/Broadcast Multimedia Service Gateway (eMBMS-GW)
- MCX Conformance Test Tools
- Dispatchers

In this Plugtests the railways-oriented Application Servers and Clients were evaluated in a dedicated Rail test stream (Stream B) and Interworking with LMR systems was evaluated in another dedicated IWF test stream (Stream C).

Note: TETRA IWF implementations were based on draft standards from ETSI TCCA.

Stream A was available for vendors to evaluate their equipment for end-to-end interoperability testing over 4G and 5G networks.

A dedicated Test Tools test stream (Stream D) was available for test tool vendors and other vendors to check their tools and the conformance of the implementations with these test tools.

The remote test infrastructure is described in clause 6; the test procedures are described in clause 7.

The vendors and ETSI have set up VPN-Tunnels from the vendors' premises to the ETSI VPN hub. This allowed the vendors to start integration work and pre-testing of MCX services.

For the 7th MCX Plugtests 63 additional test cases were developed by ETSI. In total, the MCX test specification has now more than 330 test cases. See clause 8. An updated version of the test specification will be published as a new version of ETSI document ETSI TS 103 564 (after ETSI TC TCCE approval).

More than 1200 tests were conducted by the vendors. 96.0% of the tests were successful, the remaining 4% failed for various reasons. The detailed results of the tests are available for the involved vendors in these test sessions but are not disclosed to the other vendors or to the public. All participants had to sign a Non-Disclosure Agreement and Rules of Engagement before joining the Plugtests event. The statistics of the test results are listed in clause 9.

The failed tests are very valuable because they give the vendors valuable information to improve their implementations. They also help to discover errors or ambiguities in the standards and to clarify and improve the specifications.

ETSI plan to conduct more FRMCS/MCX Plugtests in the future. The next FRMCS/MCX Plugtests sessions are planned for Q2 and Q4 2023. Vendors and observers who have not participated in the previous MCX Plugtests events are welcomed and encouraged to join the next MCX Plugtests event.

2 References

The following documents have been used as references in the Plugtests. The participants in the Plugtests agreed on a set of specific documents and Release 16 versions for the sixth MCX Plugtests. Please see also the test specification document for the references.

[1] ETSI TS 103 564: Plugtests scenarios for Mission Critical Services.

[2] 3GPP TS 22.179: Mission Critical Push to Talk (MCPTT) over LTE.

[3] 3GPP TS 23.280: Common functional architecture to support mission critical services.

[4] 3GPP TS 23.379: Functional architecture and information flows to support Mission Critical Push To Talk (MCPTT)

[5] 3GPP TS 24.229: IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP).

[6] 3GPP TS 24.281: Mission Critical Video (MCVideo) signalling control.

[7] 3GPP TS 24.282: Mission Critical Data (MCData) signalling control.

[8] 3GPP TS 24.379: Mission Critical Push To Talk (MCPTT) call control.

[9] 3GPP TS 24.380: Mission Critical Push To Talk (MCPTT) media plane control.

[10] 3GPP TS 24.481: Mission Critical Services (MCS) group management.

[11] 3GPP TS 24.482: Mission Critical Services (MCS) identity management.

[12] 3GPP TS 24.483: Mission Critical Services (MCS) Management Object (MO).

[13] 3GPP TS 24.484: Mission Critical Services (MCS) configuration management.

[14] 3GPP TS 24.581: Mission Critical Video (MCVideo) media plane control.

[15] 3GPP TS 24.582: Mission Critical Data (MCData) media plane control.

[16] 3GPP TS 26.179: Mission Critical Push To Talk (MCPTT); Codecs and media handling.

[17] 3GPP TS 26.346: Multimedia Broadcast/Multicast Service (MBMS).

[18] 3GPP TS 29.212: Policy and Charging Control (PCC).

[19] 3GPP TS 29.214: Policy and Charging Control over Rx reference point.

[20] 3GPP TS 29.468: Group Communication System Enablers for LTE(GCSE_LTE); MB2 reference point.

[21] 3GPP TS 33.180: Security of the mission critical service.

[22] IETF RFC 3515: The Session Initiation Protocol (SIP) Refer Method.

[23] IETF RFC 3856: A Presence Event Package for the Session Initiation Protocol (SIP).

[24] IETF RFC 3903: Session Initiation Protocol (SIP) Extension or Event State Publication.

[25] IETF RFC 4488: Suppression of Session Initiation Protocol (SIP) REFER Method Implicit Subscription,.

[26] IETF RFC 4825: The Extensible Markup Language (XML) Configuration Access Protocol (XCAP).

[27] IETF RFC 5366: Conference Establishment Using Request-Contained Lists in the Session Initiation Protocol (SIP).

[28] IETF RFC 5373: Requesting Answering Modes for the Session Initiation Protocol (SIP).

[29] IETF RFC 5875: An Extensible Markup Language (XML) Configuration Access Protocol (XCAP) Diff Event Package.

[30] IETF RFC 6135: An Alternative Connection Model for the Message Session Relay Protocol (MSRP).

[31] IETF RFC 6665: SIP-Specific Event Notification.

[32] IETF RFC 7647: Clarifications for the use of REFER with RFC6665.

[33] OMA. OMA-TS-XDM_Core-V2_1-20120403-A: XML Document Management (XDM) Specification.

[34] OMA. OMA-TS-XDM_Group-V1_1_1-20170124-A: Group XDM Specification.

[35] IETF RFC 7230: Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing.

[36] IETF RFC 5246: The Transport Layer Security (TLS).

[37] IETF RFC 6101: The Secure Sockets Layer (SSL).

[38] IETF RFC 4975: The Message Session Relay Protocol (MSRP).

[39] 3GPP TR 21.905: Vocabulary for 3GPP Specifications.

[40] ETSI TS 100 392-19-1: Interworking between TETRA and Broadband systems: Critical Communications Architecture for Interworking between TETRA and Broadband applications. (not published)

[41] ETSI TS 100 392-19-2: Interworking between TETRA and Broadband systems: Format for the transport of TETRA speech over mission critical broadband systems.

[42] TIA-102.BACA-B-3: Project 25 Inter-RF Subsystem Interface Messages and Procedures for Voice Services, Mobility Management, and RFSS Capability Polling Services.

[43] TIA-102.BACD-B-3: Inter-RF Subsystem Interface (ISSI) - Messages and Procedures for Supplementary Data.

[44] OMA. OMA-TS-REST-NetAPI-NMS-V1-0-20190528-C: RESTful Network API for Network Message Storage".

[45] OMA. OMA-TS-REST-NetAPI-NotificationChannel-V1-0-20200319-C: RESTful Network API for Notification Channel

3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [39] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [39].

AMR	Adaptative Multi-Rate Audio Codec
AMR-WB	Adaptative Multi-Rate Audio Codec Wideband
APP	Application
AS	Application Server
CMS	Configuration Management Server
CSC	Common Services Core
CSCF	Call Session Control Function
CSK	Client-Server Key
DUT	Device Under Test
E-UTRAN	Evolved Universal Terrestrial Radio Access Network
EPC	Evolved Packet Core
EPS	Evolved Packet System
ETSI	European Telecommunications Standard Institute
EUT	Equipment Under Test
FD	File Distribution
FE	Functional Element
FRMCS	Future Railway Mobile Communication System
GCSE	Group Communication Service Enabler
GMK	Group Master Key
GMS	Group Management Server
iFC	Initial Filter Criteria
IFS	Interoperable Functions Statement
IMPI	IP Multimedia Private Identity
IMPU	IP Multimedia Public identity
IMS	IP Multimedia Subsystem
IP	Internet Protocol
IdMS	Identity Management Server
IWF	Interworking Function
KMS	Key Management Server
MBMS	Multimedia Broadcast and Multicast Service
MCData	Mission Critical Data
MCPTT ID	MCPTT user identity
MCPTT	Mission Critical Push-To-Talk
MCVideo	Mission Critical Video
MCX	Mission Critical Services (X stands for PTT, Data and Video)
OAM	Operation and Maintenance
OTT	Over the Top
P25	Project 25
PCC	Policy and Charging Control
PCRF	Policy and Charging Rules Function
PES	Pre-established Sessions
PSI	Public Service Identity
PSTA	Public Safety Technology Association
PTT	Push-To-Talk
ProSe	Proximity-based Services
RAN	Radio Access Network
RTP	Real-time Transport Protocol
SDS	Short Data Service
SIP	Session Initiation Protocol
SPK	Signalling Protection Key
TCCA	The Critical Communications Association
TD	Test Description
TETRA	Terrestrial Trunked Radio
TR	Technical Recommendation
TRT	Test Reporting Tool

TS	Technical Specification
UE	User Equipment
UIC	International union of railways (Union Internationale des Chemins de fer)
UMA	University of Malaga

4 Technical and Project Management

4.1 Scope

The main goal of the seventh MCX Plugtests was testing the interoperability of the MCPTT, MCData and MCVideo ecosystem signalling and media plane at different levels. The railway related FRMCS functionalities and interworking (IWF) with LMR was also tested during the event.

The basic scenario tested comprised MCX application server(s) -both controlling and participating- and MCX clients deployed over a generic SIP/IMS core, LTE & 5G access network with and without MCX required PCC capabilities with native multicast support (i.e. Release-14 -and higher- eMBMS) and UEs. The following figure (Fig 1) illustrates the basic test infrastructure. Additionally, the server-to-server interface between controlling and non-controlling controlling server for temporary groups has been addressed.

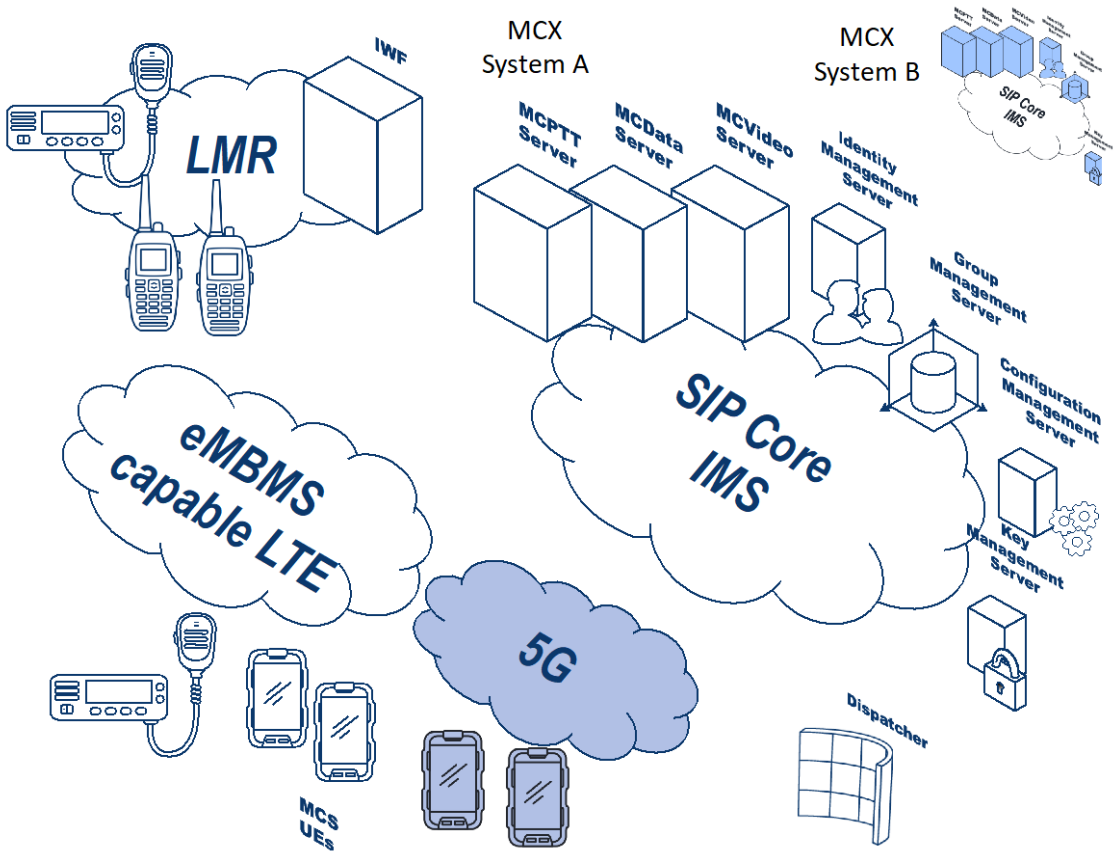


Figure 1. Typical MCPTT/MCData/MCVideo scenario to be considered in the Plugtests

In the scope of this Plugtests event, the following high level test objectives were performed

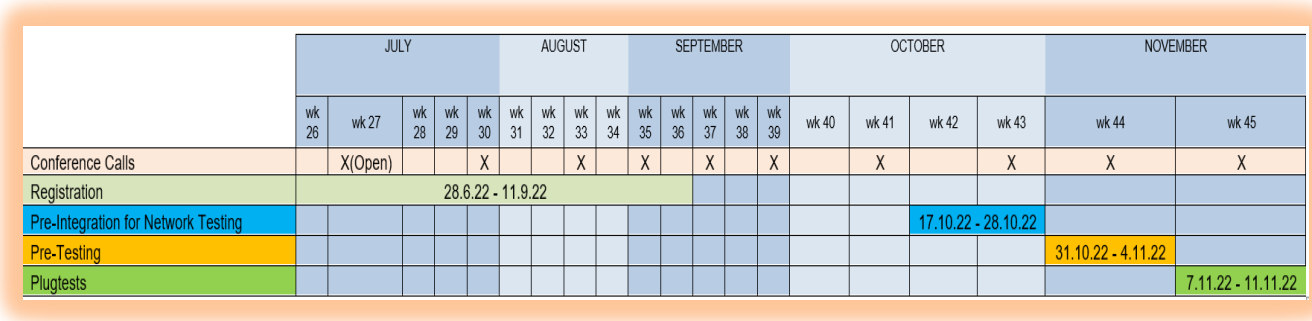
- **Connectivity (CONN)**: Tests covered basic connectivity between functional elements at different levels including Access Network (LTE), IP Network, SIP/IMS and MCPTT/MCData/MCVideo Application level. At LTE level, unicast and more particularly eMBMS multicast connectivity was evaluated. Tests at IP layer targeted pure OTT connectivity regardless the underlying access network. SIP connectivity tests checked proper deployment of MCX AS over the selected SIP Core/IMS so that all SIP messages were successfully delivered from MCX Clients to Participating/Controlling MCPTT Servers and vice versa. In this 7th Plugtests, again, some AS vendors provided their own built in SIP/IMS cores so that Clients registered into different cores depending of the specific test session. Application level refers to e2e signalling, media, floor controlling (and other involved) protocols in use. Although for this Plugtests participants were encouraged to carry on CONN tests over Mission Critical LTE/5G for unicast – or UNI-MC-LTE/5G – and Mission Critical LTE/5G with multicast eMBMS-capabilities – so called MULTI-MC-LTE/5G -, most tests used the OTT (i.e. using WIFI / wired connections) one for its flexibility and the possibility of scheduling parallel test easily. Additionally, low level configuration-specific details (i.e. MCPTT. MC QCI and eMBMS bearer management) were considered in the PCC and eMBMS specific objectives. MCData and MCVideo features were mostly

analysed in test cases associated to the CONN objective while sibling procedures (i.e. registration to different MCPTT/MCData/MCVideo servers) were carried out when needed.

- **Floor Controlling (FC):** Apart from the basic Floor Controlling procedures considered during the first CONN objective, FC comprised comprehensive interoperability analysis of more complex interactions, including prioritization and pre-emptive mechanisms. Additional test cases comprising more advanced floor controlling (i.e. timeouts and revokes) were evaluated.
- **Policing (PCC)**: Comprised specific checking proper LTE dynamic bearer signalling and allocation by eUTRAN/EPC.
- **eMBMS (EMBMS)**: Comprised checking of eMBMS specific signalling both in the MB2-U/C interface and e2e.
- **Registration and authorization (REGAUTH)**: Comprised MCX Client registration.
- **Affiliation (AFFIL)**: Comprised MCX Client explicit and implicite affiliation
- **Location (LOC)**: In the test specification document several location configuration, retrieval and submission procedures were considered.
- **OAM procedures (CSC):** Comprised OAM related IdMS, CMS, GMS and KMS interfacing procedures. Mostly MCPTT mechanisms were evaluated since MCData/MCVideo implementations were not as mature as MCPTT implementations and are also mainly equivalent to MCPTT implementations.
- **Security (SEC):** Comprised security related procedures (including both signalling and media cyphering and key retrieval considered in KMS-related test cases in CSC test cases).
- **MCVideo Transmission Control (TC):** Traditional MCVideo call types and Transmission Control operations covered in previous Plugtests were newly evaluated. Several additional new MCVideo call types were also added for this plugtests.
- **Server-to-server communications (S2S)**: Controlling to non-controlling interface for temporary groups in different trust configurations.
- **FRMCS**: Railway oriented features were implemented to test functional aliases, IP Connectivity, etc.
- **MCData**: SDS and File Distribution mechanisms and newly added emergency alerting mechanisms.
- **IOP**: Interoperability testing oriented complex test cases were added.
- **Observer Test Scenarios**: more complex test scenarios which have been developed by observers.
- **Interworking Function (IWF)**: MCPTT connectivity test cases were re-used to test interworking with LMR systems (Tetra and P25).
- **Inter MCX**: MCPTT/MCVideo connectivity test cases were used to test interworking between application servers.

4.2 Timeline

The preparation was run through different phases as described in the figure below.



	JULY					AUGUST				SEPTEMBER					OCTOBER				NOVEMBER	
	wk 26	wk 27	wk 28	wk 29	wk 30	wk 31	wk 32	wk 33	wk 34	wk 35	wk 36	wk 37	wk 38	wk 39	wk 40	wk 41	wk 42	wk 43	wk 44	wk 45
Conference Calls		X(Open)			X			X		X		X		X		X		X	X	X
Registration	28.6.22 - 11.9.22																			
Pre-Integration for Network Testing																	17.10.22 - 28.10.22			
Pre-Testing																			31.10.22 - 4.11.22	
Plugtests																				7.11.22 - 11.11.22

Figure 2. Plugtests event timeline

Registration to the MCX Plugtests event was open from 18th July 2022 to 11th September 2022 to any organisation willing to participate in testing the MCX Services Ecosystem. A total of 159 people were finally involved in the Plugtests event.

The following clauses describe the different phases of the Plugtests event preparation. It is worth noting that since the start of the documentation phase until the first week of the Plugtests event, bi-weekly conference calls were run among organisers and participants to discuss and track the progress, anticipate and solve technical issues, review the test plan, etc.

4.2.1 Documentation

Once the registration to the Plugtests event was closed, the following documentation activities were launched in parallel:

1) EUT Documentation

Participants documented their EUTs, by providing the information directly to the Plugtests event team. The Plugtests event team compiled the final EUT table for all the participating vendors and was appended to the Plugtests event Test Plan,

All the information described above was made available in the Plugtests event WIKI, so that it could be easily maintained and consumed by participants.

2) Test Plan Development

The Test Plan development was led by ETSI Centre for Testing and Interoperability following the methodology defined by 3GPP TSG SA6 and 3GPP TSG CT1. The Test Plan was scoped around 3GPP Test Specification Release-17 capabilities and concentrated on the features supported by the implementations attending the Plugtests event.

The Test Plan was developed and consolidated in an iterative way, taking into account input and feedback received from Plugtests event participants. See details in clause 8.

4.2.2 Integration & pre-testing

Participants connected their implementations remotely to the Plugtests event infrastructure, known as HIVE: Hub for Interoperability and Validation at ETSI. Participants also integrated their equipment with University of Malaga LTE and 5G test networks to participate in the streams A and B.

During this phase, up to 27 remote labs connected to HIVE and each of them was allocated a dedicated network. The interconnection of remote labs allowed running integration and pre-testing tasks remotely among any combination of participating EUTs, in order to ensure an efficient use of the Plugtests event time and smoother Interoperability test sessions.

A VPN connection to the HIVE was highly recommended for participants providing MCX Application Servers, MCX Clients and IMS for first connectivity tests, trouble shooting and infrastructure access purposes.

Additional details on the remote test infrastructure, remote integration and pre-testing procedures are provided in Clauses 6 and 7.

For the LTE /5G testing at the University of Malaga (UMA) in Spain, MCX AS Servers have been connected to the UMA LTE and 5G test systems. Assistance was provided by the UMA personal to debug integration issues with the test networks.

During this phase, the bi-weekly conference calls were continued among organisers and participants to synchronise, track progress and get ready for the on-site phase.

4.2.3 Plugtests event

From 31st October to 04th November 2022, participants connected their equipment's with ETSI HIVE infrastructure to collaboratively run the pretesting remotely.

From 07th November to 11th November 2022, participants connected their equipment's with UMA test network to collaboratively run the Interoperability Test Sessions remotely. Over the top IP based testing was also performed by some participants.

The scheduling of individual test combinations was done randomly using ETSI Test Reporting tool as well as participants agreed test session slots between themselves. The schedule was adapted during the test session slots on a per need basis.

4.3 Tools

4.3.1 Plugtests event WIKI

The Plugtests event WIKI was the main source of information for the MCX Plugtests event, from logistics aspects to testing procedures. Access to the WIKI was restricted to participating companies.

The main technical information provided in the wiki was organised as follows:

- **Event Information** – Logistics aspects of the Plugtests event.
- **Visa Information** – Visa related information was provided for vendors require visa for travel.
- **List of Participants** – List of participants in the event.
- **Schedule –** Complete schedule of the event.
- **Observer Program** – Information about the Observer presentations and Observer demo during the Plugtests event.
- **Test Tools** – Information from the Test Tool vendors about what kind of tests they are offering for the Plugtests.
- **Network Information –** LTE and 5G test network information.
- **IT Information** - HIVE connection request tool, and remote connections status overview.
- **Specifications -** High Level Test Scope including the test specification and reference to 3GPP and IETF specifications.
- **Equipment under Test** - Participating EUTs overview and contact information.
- **Provisioning Information -** Pre-configured parameters for EUTs.
- **Test Reporting Tool** - Documentation of the Test Reporting Tool.
- **Conf Calls** - Calendar, logistics, agendas and minutes of the bi-weekly conference calls run during the remote integration and pre-testing phase.
- **Observations** - Issues found during Plugtests event.
- **Host Information** – Information about the equipment available at host University of Malaga.
- **Social Event** – Information regarding networking dinner.

- **Logistics Survey Results** – Survey results of logistics of the event.
- **News & Press Release** – Pictures from the event were uploaded.

In addition, Slack was used among the participants to communicate with each other during the pre-testing phase and Test Sessions, include their remote colleagues (back-office support) in the discussions.

4.3.2 Test Reporting Tool (TRT)

The Test Reporting Tool guides participants through the Test Plan test cases during the pre-testing and main Test Sessions. It allows creating Test Session Reports compiling detailed results for the individual scheduled Test Sessions.

Only the companies providing the EUTs for each specific Test Session combination have access to their Test Session Reports contents and specific results. All companies involved in a specific session and who have entered the test results were required to verify and approve the reported results at the end of each session. Only test report which has been approved by all involved parties are considered as valid.

Another interesting feature of this tool is the ability to generate real-time stats (aggregated data) of the reported results, per test case, test group, test session or overall results. These stats are available to all participants and organisers and allow tracking the progress of the testing with different levels of granularity, which is extremely useful to analyse the results.

5 Equipment Under Test

The tables below summarise the different EUTs provided by the Plugtests event participants:

5.1 MCX Application Servers

Organisation	Support
Airbus	MCPTT, MCDATA, MCVIDEO
Alea	MCPTT, MCDATA, MCVIDEO
Aselsan	MCPTT, MCDATA, MCVIDEO
Consort Digital	MCPTT, MCDATA, MCVIDEO, FRMCS
Ericsson	MCPTT, MCDATA, MCVIDEO
Hytera China	MCPTT, MCDATA, MCVIDEO
Hytera Mobilfunk	MCPTT, MCDATA
Kontron Transportation	MCPTT, MCDATA, FRMCS
MCLabs	MCPTT, MCDATA, MCVIDEO, FRMCS
Motorola Solutions	MCPTT, MCDATA, MCVIDEO
Nemergent Solutions	MCPTT, MCDATA, MCVIDEO, FRMCS, IWF
Nokia	MCPTT, MCDATA, MCVIDEO, FRMCS
StreamWide	MCPTT, MCDATA, MCVIDEO, IWF
TASSTA	MCPTT, MCDATA, MCVIDEO, FRMCS, IWF
Valid8	MCPTT

Table 1. MCX Application Servers Under Test

5.2 MCX Clients

Organisation	Support
Alea	MCPTT, MCDATA, MCVIDEO
Alstom	MCDATA, FRMCS
Consort Digital	MCPTT, MCDATA, FRMCS
Ericsson	MCPTT
ErvoCom	MCPTT, MCDATA
Funkwerk	MCPTT, MCDATA, FRMCS
Hytera China	MCPTT, MCDATA, MCVIDEO
Kontron Transportation	MCPTT, MCDATA, FRMCS
MCLabs	MCPTT, MCVIDEO, FRMCS
Nemergent Solutions	MCPTT, MCDATA, MCVIDEO
Softil	MCPTT, MCDATA, MCVIDEO
TASSTA	MCPTT, MCDATA, MCVIDEO
Teltronic	MCPTT, MCDATA

Table 2. MCX Clients Under Test

5.3 Dispatcher (DISP)

Organisation	Support
Alstom	MCDATA, FRMCS
Frequentis	MCPTT, MCDATA, MCVIDEO, FRMCS
Kolibri	MCPTT
Kontron	MCPTT, MCDATA, FRMCS
Prescom	MCPTT, MCDATA, MCVIDEO

Organisation	Support
Softil	MCPTT, MCDATA, MCVIDEO, FRMCS
Teltronic	MCPTT
Zetron	MCPTT

Table 3. Dispatcher (DISP) Under Test

5.4 IP Multimedia Subsystem (IMS)

Organisation	Support
Aselsan	

Table 4. IP Multimedia Subsystem (IMS) Under Test

5.5 Evolved Packet Core (EPC)

Organisation	Support
Athonet	
Teltronic	
University of Malaga	Test system

Table 5. Evolved Packet Core Under Test

5.6 Evolved Node B (ENB)

Organisation	Support
University of Malaga	Test system

Table 6. Evolved Node B Under Test

5.7 5G Core (5GC)

Organisation	Support
Athonet	

Table 7. 5G Core Under Test

5.8 5G New Radio (5GNR)

Organisation	Support
University of Malaga	Test system

Table 8. 5G NR Under Test

5.9 User Equipment (UE)

Organisation	Support
Alstom	FRMCS, on-board gateway
Aselsan	Device
Consort Digital	FRMCS, cab radio
Crosscall	Device
ErvoCom	FRMCS, cab radio
Funkwerk	FRMCS, cab radio
Teltronic	FRMCS, cab radio

Table 9. User Equipment Under Test

5.10 Land Mobile Radio (LMR)

Organisation	Support
Rohill	TETRA System
Teltronic	TETRA System

Table 10. Land Mobile Radio Under Test

5.11 Evolved Multimedia Broadcast Multicast Services (eMBMS) Components

Organisation	Support
Aselsan	
Teltronic	

Table 11. Evolved Multimedia Broadcast Multicast Services (eMBMS) Components Under Test

5.12 Test Tools

Organisation	Support
MCS-TaaSting	MCX Conformance Tester
Valid8	MCX Conformance Tester

Table 12. Testers Under Test

6 Test Infrastructure

6.1 Remote Test Infrastructure

The remote testing and pre-testing phase were enabled by the setup as shown in Figure 4:

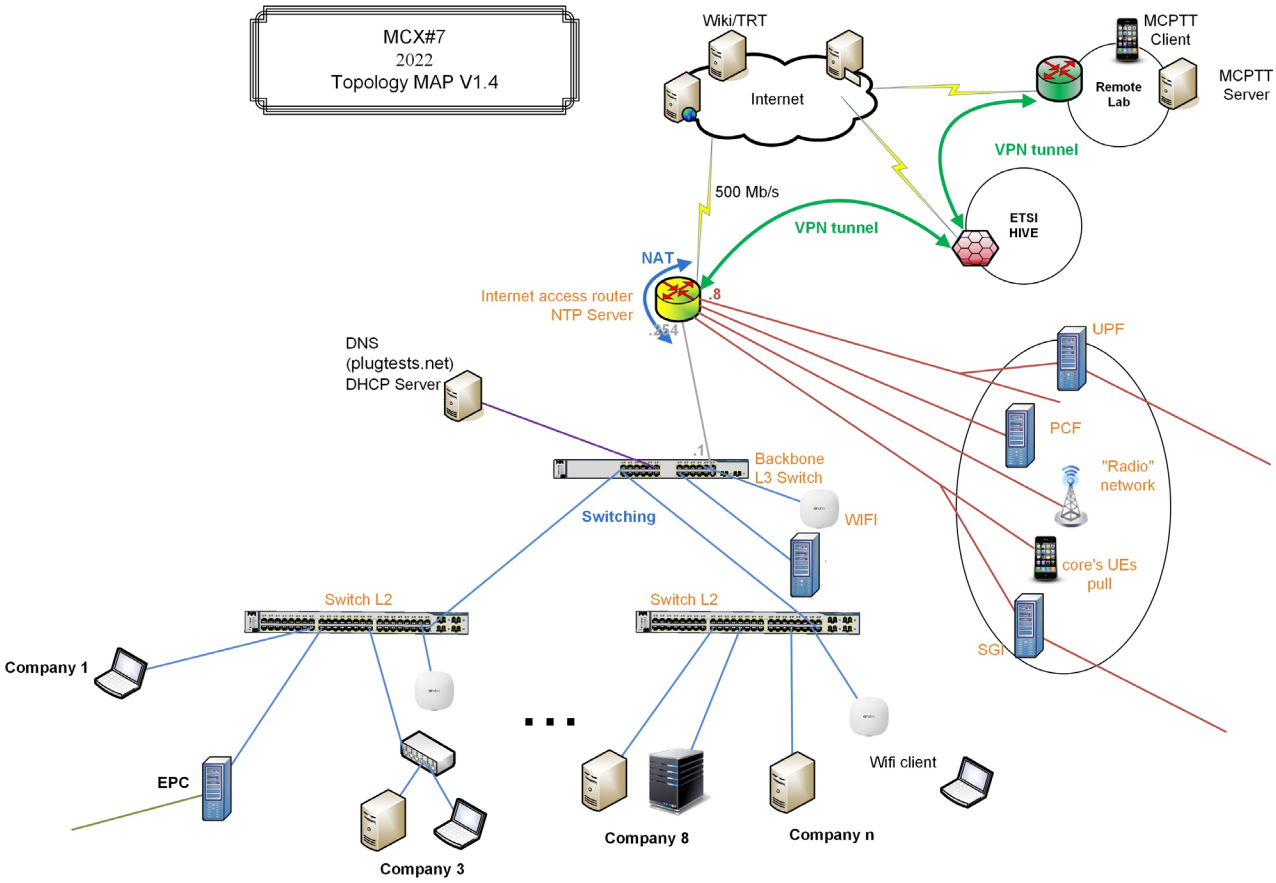


Figure 3. Remote Test Infrastructure

Once HIVE was deployed, a number of VPN tunnels were created to interconnect the equipment of the participants where the EUTs were running.

A total of 27 Remote Labs connected to the setup described above as a participant's lab.

7 Test Procedures

7.1 Remote Integration & Pre-testing Procedure

During the remote integration and pre-testing phase the following procedures were followed by the participating Equipment Under Test. Once the EUT documentation and HIVE connection had been successfully completed, the test cases from the test specifications were executed as part of the pre-testing

The progress of these procedures for the different combinations of EUTs was captured in the reporting function of TRT. The following Pre-Testing configurations were used in the pretesting phase

Config Name	Pre-testing Configuration
Config Pre-test OTT	MCX Client + MCX AS
Config Pre-test IWF	MCX Client + MCX AS (P+C) + LMR

Table 13. Pre-testing Configuration

7.2 Interoperability Testing Procedure

During the Plugtests event, a daily Test Session Schedule was added and shared via the TRT. Test Sessions were organised in several parallel tracks, ensuring that all participants had at least one Test Session scheduled any time. The different test configurations were used for the main event.

Config Name	Main Test Configuration
Config FRMCS 4G	EPC + eNB + MCX Client + MCX AS (P+C) + UE + Dispatcher
Config FRMCS 5G	5GC + gNB + MCX Client + MCX AS (P+C) + UE + Dispatcher
Config LMR	MCX Client + MCX AS (P+C) + UE + eNB + EPC + LMR
Config MCX 4G	MCX Client + MCX AS (P+C) + UE + eNB + EPC
Config MCX 4G Multi Client	MCX Client + MCX Client + MCX AS (P+C) + UE + eNB + EPC
Config MCX 5G	MCX Client + MCX AS (P+C) + UE + gNB + 5GC
Config MCX IMS	MCX Client + MCX AS (P+C) + IMS
Config-LMR-OTT	MCX Client + MCX AS + LMR
Config Tester Client	Tester + MCX Client

Table 14. Main Test Configurations

During each test session, for each tested combinations the Interoperability testing procedure was as follows:

1. The participating vendors opened the Test Session Report and the Test Plan.

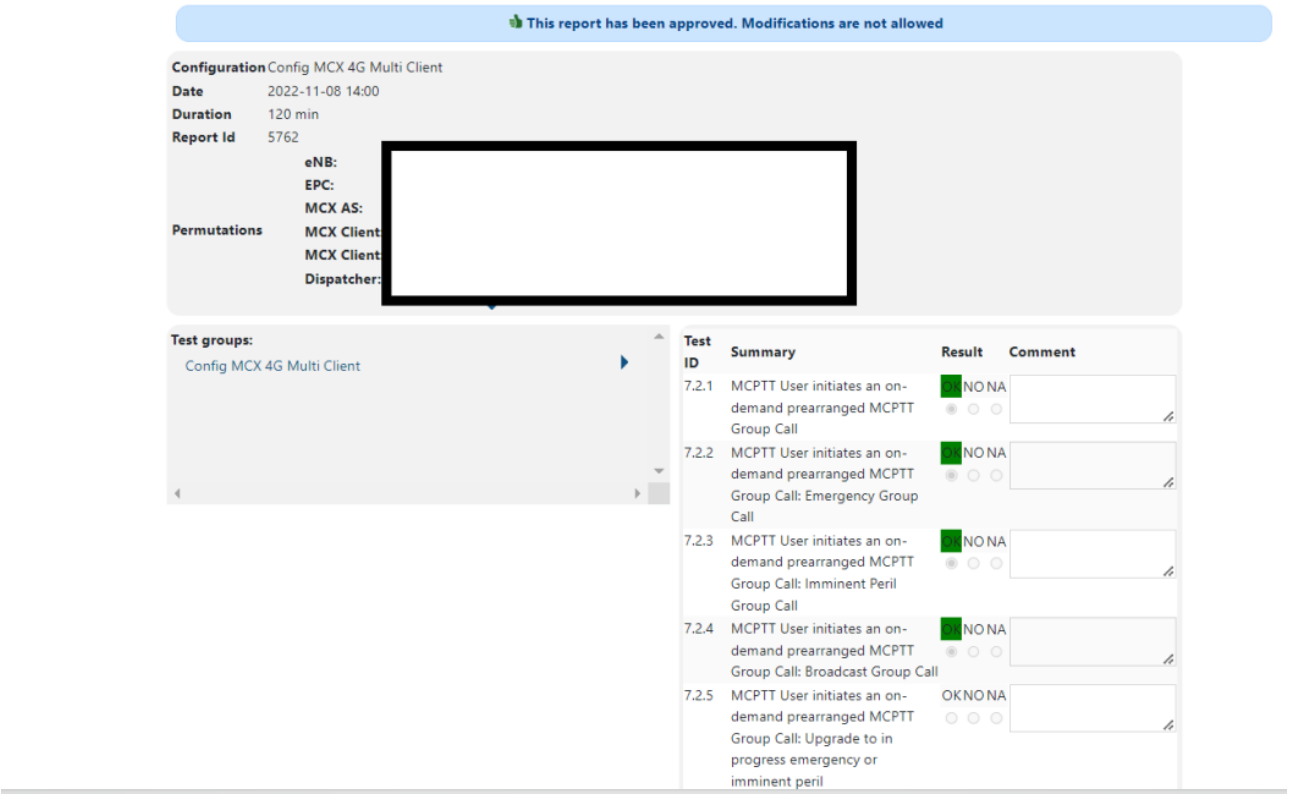


Figure 4. Test Session Report

2. For each Test in the Test Plan:

   a. The corresponding Test Description and EUT Configuration were followed.

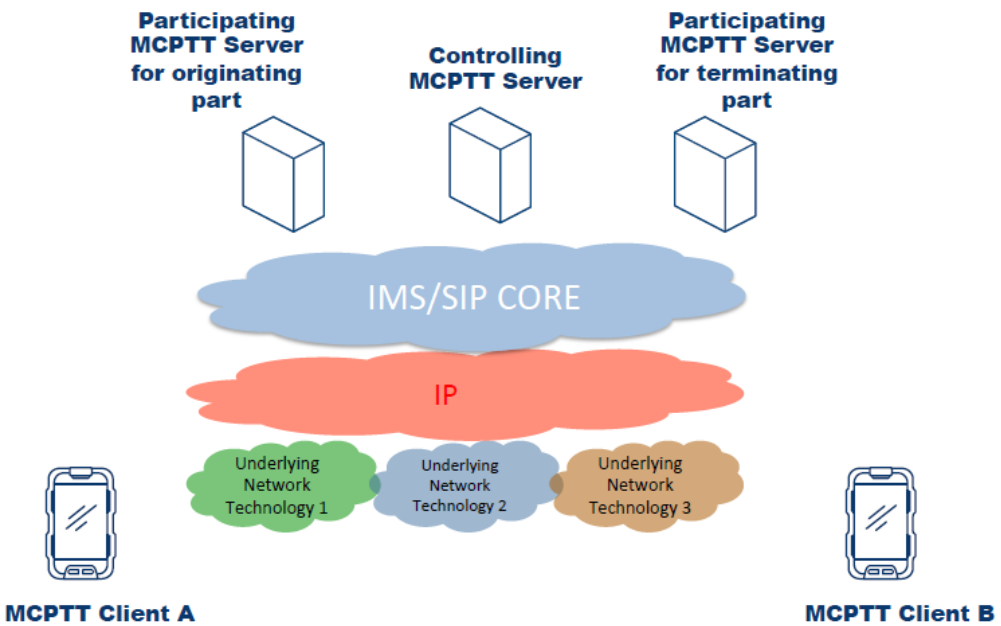


Figure 5. System Under Test (SUT) Configuration – MCPTT example

Interoperability Test Description			
Identifier	CONN/ONN/GROUP/PREA/ONDEM/NFC/01		
Test Objective	Verify IP connectivity, SIP core/IMS configuration and proper routing and SIP signaling of a pre-arranged on demand Group Call		
Configuration(s)	- CFG_ONN_OTT-1 (5.2) - CFG_ONN_UNI-MC-LTE-1 (5.3) - CFG_ONN_MULTI-MC-LTE-1 (5.4)		
References	- SIP (see [n.4] and other references in [n.5]) - MCPT (see [n.6] and other references in [n.5]) - RTP (see [n.4] and other references in [n.5])		
Applicability	- MCPTT-Client_ONN-MCPTT-CALL, MCPTT-Client_AMR-WB, MCPTT-Client_AFFIL, MCPTT-Client_MCPTT-FC (6.2) - MCPTT-Part_ONN-MCPTT-CALL, MCPTT-Part_AFFIL (see NOTE), MCPTT-Part_MCPTT-FC, MCPTT-Part_RX (CFG_ONN_UNI-MC-LTE-1 only), MCPTT-Part_GCSE (CFG_ONN_MULTI-MC-LTE-1 only), (6.5) - MCPTT-Ctrl_ONN-MCPTT-CALL, MCPTT-Ctrl_AFFIL (see NOTE) (6.6)		
Pre-test conditions	- IP connectivity among all elements of the specific scenario - Proper configuration of the SIP core/IMS to forward the signaling to the specific controlling and participating servers - UEs properly registered to the SIP core/IMS and MCPTT system - Calling user is affiliated to the called group		
Test Sequence	**Step**	**Type**	**Description**
	1	stimulus	User 1 (mcptt_id_clientA@example.com) calls mcptt-group-A
	2	check	Dialog creating INVITE received at the MCPTT participating server of mcptt_id_clientA@example.com after traversing SIP core/IMS
	3	check	INVITE received at the MCPTT controlling server
	4	check	The MCPTT controlling server loads the affiliated members of the mcptt-group-A (either preconfigured or retrieved from the GMS) and creates an INVITE per each of the "n" members
	5	check	"n" INVITEs received at the MCPTT participating servers of each mcptt_id_clientX (where X:1..n)
	6	check	"n" INVITEs received at the affiliated mcptt_id_clientX
	7	check	"n" SIP dialogs established
	8	verify	Call connected and multiple media flows exchanged

Figure 6. Test Description example

3. MCX equipment providers jointly executed the different steps specified in the test description and evaluated interoperability through the different IOP Checks prescribed in the Test Description

   b. The MCX equipment provider recorded the Test Result in the Test Session Report, as follows:

      i. OK: all IOP Checks were successful

      ii. NOK: at least one IOP Check failed. A comment was requested.

      iii. NA: the feature was not supported by at least 1 of the involved EUTs. A comment was requested.

4. Once all the tests in the Test Session Report were executed and results recorded, the participants reviewed the Report and approved it.

8 Test Plan Overview

8.1 Introduction

This 7th MCX Plugtests Test Plan was developed following ETSI guidelines for interoperability. Additional Release-17 based test cases were included comprising group regrouping, Inter MCX, MCData Message Store and eMBMS.

The Test Plan was reviewed and discussed with participants during the preparation and pre-testing phase. Considering the huge number of resulting test cases and difference expected maturity of the implementations and differences from participants in the previous Plugtests event and new companies, vendors selected the subset of test cases to evaluate in a per-testing slot basis.

The following sections summarise the methodology used for identifying the different configuration and test objectives leading to different test cases subgroups.

8.2 Test configurations

The overall MCX ecosystem comprises both controlling and participating MCPTT/MCData/MCVideo application server(s), MCPTT Clients deployed over a generic SIP Core/IMS, LTE/5G access network with and without MCPTT required PCC capabilities and native multicast support (i.e. Release-14 eMBMS). Furthermore, a series of support servers were integrated in the so-called Common Services Core provide configuration, identity, group, and key management capabilities. Note, again 3GPP Release-17 compliant On-Network operations only were considered.

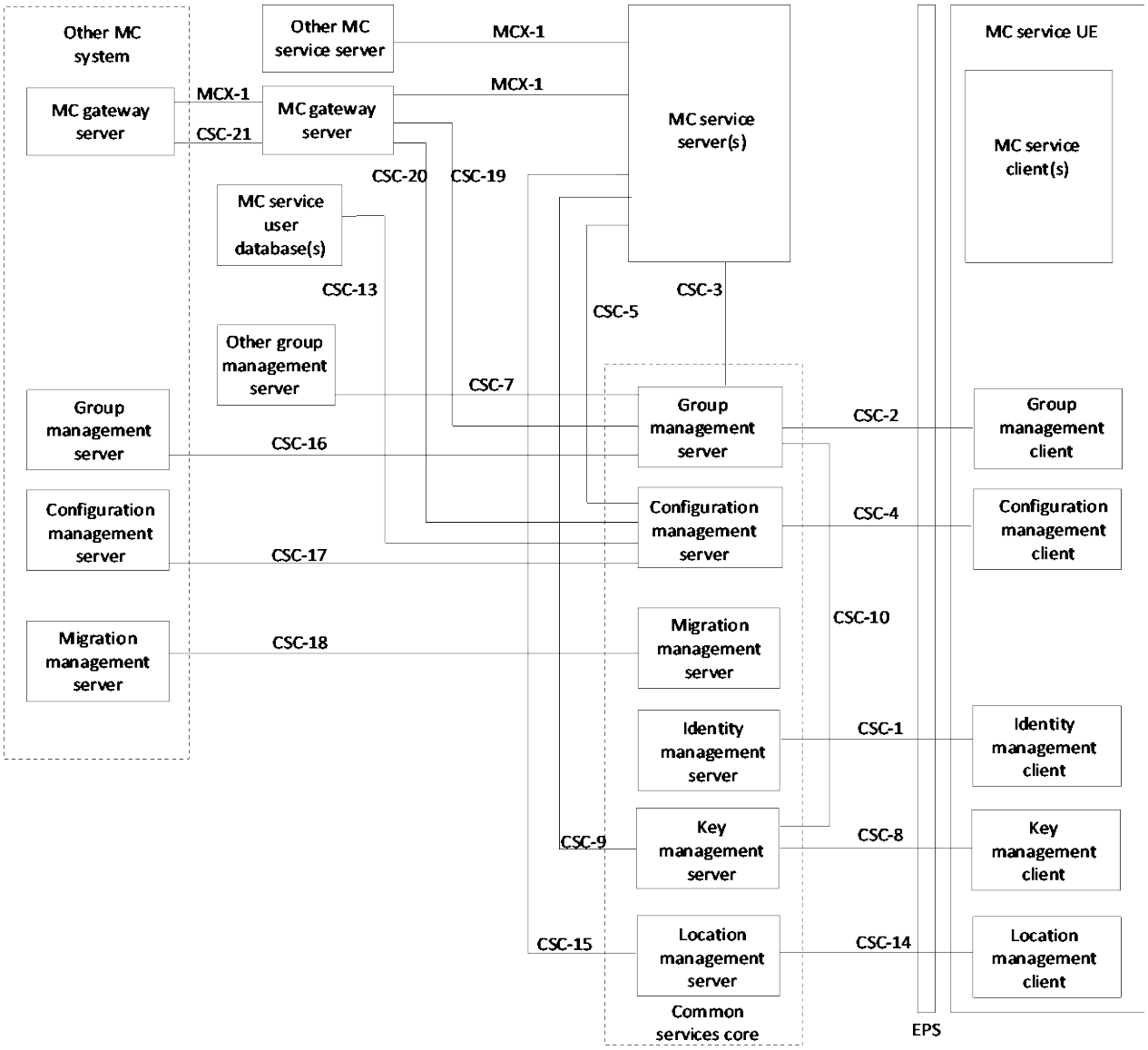


Figure 7. Functional model for application plane Figure 7.3.1-1 in 3GPP TS 23.280 [3].

Figure 7.3.1-1 in 3GPP TS 23.280 [3] describes the overall architecture and the reference points considered for the interoperability testing for any (MCPTT/MCData/MCVideo) MC Service (MCS). As can be seen, the resulting number of functional elements, interfaces and protocols involved is quite large. Furthermore, there are MCPTT/MCData/MCVideo-only specific interfaces and others (like Rx/N5/N33 and MB2-C/MB2-U) involving other supporting technologies like LTE EPS, 5G, etc. In order to focus on MCS signalling the following three different configuration were initially considered: MCPTT/MCData/MCVideo as an application service over IP networks (Over-the-Top), unicast Mission Critical LTE/5G and multicast Mission Critical LTE/5G (all of them for On-Network calls only).

8.2.1 Over-The-Top Configuration for On-Network calls (CFG_ONN_OTT-1)

This configuration considered On-Network Calls (ONN) with a pure Over-The-Top (OTT) approach. It emulated a scenario where any underlying network (i.e. commercial LTE/5G, WiFi or any wired technology such as Ethernet) would provide a bit-pipe type only access. No QoS/prioritization enforcement neither access-layer multi/broadcasting capabilities would be provided (i.e. nor unicast PCC support or multicast mechanisms in LTE/5G). Therefore, although not usable in a real world Mission Critical environment, it was used for connectivity tests since it did not require any binding between the IMS/SIP Core and the underlying LTE/5G infrastructure and allowed both signalling and media plane parallel testing easily.

8.2.2 Unicast Mission Critical LTE/5G for On-Network calls (CFG_ONN_UNI-MC -1)

In this configuration the LTE network (both EPC and eUTRAN) and 5G network (both 5GC and gNB) provided PCC capabilities and therefore enforced QoS policies in terms of prioritization and pre-emptiveness of Mission Critical unicast bearers. That included new Public Safety QCI 65/69 support in UEs and EPC/eUTRAN (or 5G Qi 65/69), and the availability of a PCRF with MCPTT compliant Rx/MCPTT-5 interface. Specific Rx/MCPTT-5 reference points and unicast bearer setup and update triggering mechanisms were tested using this configuration. Note that, although MCPTT only is mentioned and depicted in the following figure, MCVideo/MCData could follow the same approach.

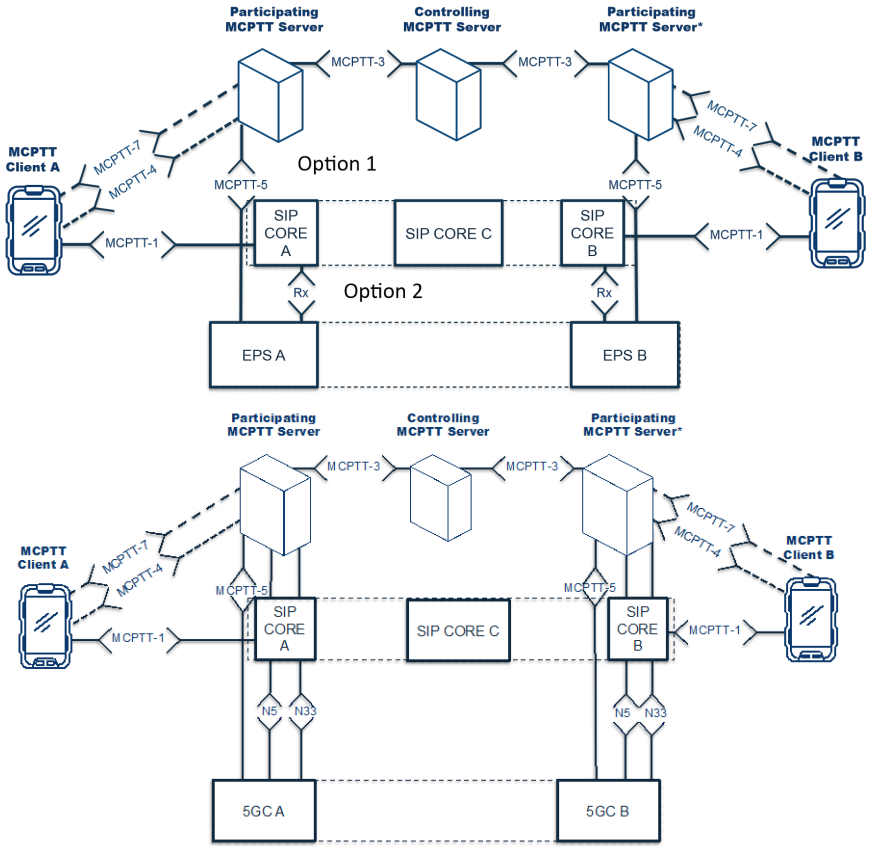


Figure 8. CFG_ONN_UNI-MC-LTE-1 configuration

8.2.3 Multicast Mission Critical LTE for On-Network calls (CFG_ONN_MULTI-MC-LTE-1)

In this configuration LTE/5G provided multicast capability including Rel. 14 (and beyond) LTE-A Pro eMBMS and needed interfaces both in the core side (MB2-C and MB2-U with the BM-SC) and in the eUTRAN/UE side. It was used to test eMBMS bearer setup and update related test cases.

NOTE: In this 7th MCX Plugtests both configurations (unicast and multicast scenarios) were possible.

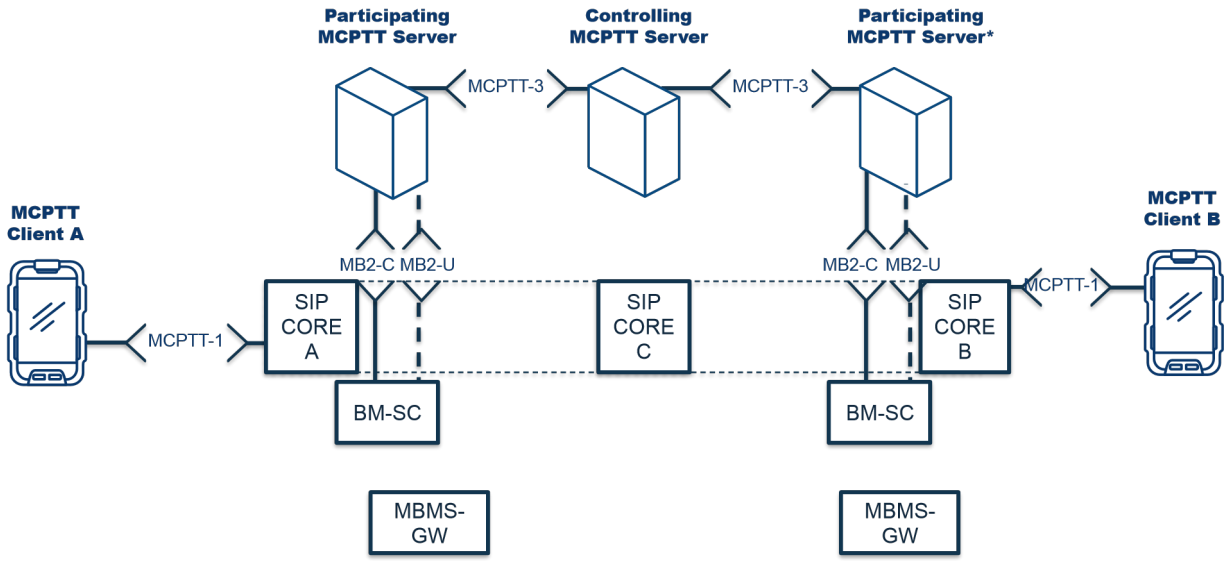


Figure 9. CFG_ONN_MULTI-MC-LTE-1 configuration

In order to deal with the different test setting according to the three aforementioned configurations and cover specific more complex test configuration involving different clients and Observer test cases, the following configuration modes were defined in the TRT tool.

Configuration	Resulting configuration mode in the Plugtests (TRT)
ONN-OTT	Config Pre-test OTT Config Pre-test IWF Config-LMR-OTT
ONN-LTE	Config FRMCS 4G Config LMR Config MCX 4G Config MCX 4G Multi Client Config MCX IMS Config Tester Client
ONN-5G	Config FRMCS 5G Config MCX 5G

Table 15. Mapping of scenario architecture configurations and Plugtests event practical configurations

8.2.4 Mapping of Test Cases to Test Case Numbers

Number	Name
7.2	**Connectivity (CONN)**
7.2.1	MCPTT User initiates an on-demand prearranged MCPTT Group Call [CONN-MCPTT/ONN/GROUP/PREA/ONDEM/NFC/01]
7.2.2	MCPTT User initiates an on-demand prearranged MCPTT Group Call: Emergency Group Call [CONN-MCPTT/ONN/GROUP/PREA/ONDEM/NFC/02]
7.2.3	MCPTT User initiates an on-demand prearranged MCPTT Group Call: Imminent Peril Group Call [CONN-MCPTT/ONN/GROUP/PREA/ONDEM/NFC/03]
7.2.4	MCPTT User initiates an on-demand prearranged MCPTT Group Call: Broadcast Group Call [CONN-MCPTT/ONN/GROUP/PREA/ONDEM/NFC/04]
7.2.5	MCPTT User initiates an on-demand prearranged MCPTT Group Call: Upgrade to in progress emergency or imminent peril [CONN-MCPTT/ONN/GROUP/PREA/ONDEM/NFC/05]
7.2.6	MCPTT User initiates the termination of an on-demand prearranged MCPTT Group Call [CONN-MCPTT/ONN/GROUP/PREA/ONDEM/NFC/06]
7.2.7	MCPTT User initiates a prearranged MCPTT Group Call using pre-established session [CONN-MCPTT/ONN/GROUP/PREA/PRE/NFC/01]
7.2.8	MCPTT User initiates the termination of a prearranged MCPTT Group Call using pre-established session [CONN-MCPTT/ONN/GROUP/PREA/PRE/NFC/02]
7.2.9	MCPTT User initiates an on-demand Chat Group Call [CONN-MCPTT/ONNGROUP/CHAT/ONDEM/NFC/01]
7.2.10	MCPTT User upgrades an ongoing on-demand Chat Group Call to emergency call [CONN-MCPTT/ONN/GROUP/CHAT/ONDEM/NFC/02]

Number	Name
7.2.11	MCPTT User upgrades an ongoing on-demand Chat Group Call to imminent-peril call [CONN-MCPTT/ONN/GROUP/CHAT/ONDEM/NFC/03]
7.2.12	MCPTT User cancels the emergency condition of an on-demand Chat Group Call [CONN-MCPTT/ONN/GROUP/CHAT/ONDEM/NFC/04]
7.2.13	MCPTT User cancels the imminent-peril condition of an on-demand Chat Group Call [CONN-MCPTT/ONNGROUP/CHAT/ONDEM/NFC/05]
7.2.14	MCPTT User initiates a Chat group Call using pre-established session [CONN-MCPTT/ONNGROUP/CHAT/PRE/NFC/01]
7.2.15	MCPTT User initiates an on-demand private MCPTT call in automatic commencement model with floor control [CONN-MCPTT/ONN/PRIV/AUTO/ONDEM/WFC/NFC/01]
7.2.16	MCPTT User initiates an on-demand private MCPTT call in manual commencement mode with floor control [CONN-MCPTT/ONN/PRIV/MANUAL/ONDEM/WFC/NFC/01]
7.2.17	MCPTT User initiates a pre-established private MCPTT call in automatic commencement mode with floor control [CONN-MCPTT/ONN/PRIV/AUTO/PRE/WFC/NFC/01]
7.2.18	MCPTT User initiates a pre-established private MCPTT call in manual commencement mode with floor control [CONN-MCPTT/ONN/PRIV/MANUAL/PRE/WFC/NFC/01]
7.2.19	MCPTT User initiates an on-demand private MCPTT call in automatic commencement mode without floor control [CONN-MCPTT/ONN/PRIV/AUTO/ONDEM/WOFC/01]
7.2.20	MCPTT User initiates an on-demand private MCPTT call in manual commencement mode without floor control [CONN-MCPTT/ONN/PRIV/MANUAL/ONDEM/WOFC/01]
7.2.21	MCPTT User initiates a pre-established private MCPTT call in automatic commencement mode without floor control [CONN-MCPTT/ONN/PRIV/AUTO/PRE/WOFC/01]
7.2.22	MCPTT User initiates a pre-established private MCPTT call in manual commencement mode without floor control [CONN-MCPTT/ONN/PRIV/MANUAL/PRE/WOFC/01]
7.2.23	MCPTT User initiates an on-demand first-to-answer MCPTT call with floor control [CONN-MCPTT/ONN/FIRST/MANUAL/ONDEM/WFC/NFC/01]
7.2.24	MCPTT User initiates an on-demand first-to-answer MCPTT call without floor control [CONN-MCPTT/ONN/FIRST/MANUAL/ONDEM/WOFC/01]
7.2.25	MCPTT User initiates an on-demand first-to-answer MCPTT call with floor control using pre-established sessions [CONN-MCPTT/ONN/FIRST/MANUAL/PRE/WFC/NFC/01]
7.2.26	MCPTT User initiates a pre-established first-to-answer MCPTT call in manual commencement mode without floor control [CONN-MCPTT/ONN/FIRST/MANUAL/PRE/WOFC/01]
7.2.27	MCPTT User setups a private-call callback [CONN-MCPTT/ONN/CALLBACK/SETUP-/01]
7.2.28	MCPTT User cancels a private-call callback [CONN-MCPTT/ONN/CALLBACK/CANCEL-/01]
7.2.29	MCPTT User fulfils a private-call callback [CONN-MCPTT/ONN/CALLBACK/FULFIL-/01]
7.2.30	MCPTT User setups locally an on-demand ambient listening call [CONN-MCPTT/ONN/AMBIENT/ONDEM/LOCAL/01]
7.2.31	MCPTT User releases locally an on-demand ambient listening call [CONN-MCPTT/ONN/AMBIENT/ONDEM/LOCAL/02]
7.2.32	MCPTT User setups locally an ambient listening call using pre-established session [CONN-MCPTT/ONN/AMBIENT/PRE/LOCAL/01]
7.2.33	MCPTT User releases locally an ambient listening call using pre-established session [CONN-MCPTT/ONN/AMBIENT/PRE/LOCAL/02]
7.2.34	MCPTT User setups remotely an on-demand ambient listening call [CONN-MCPTT/ONN/AMBIENT/ONDEM/REMOTE/01]
7.2.35	MCPTT User releases remotely an on-demand ambient listening call [CONN-MCPTT/ONN/AMBIENT/ONDEM/REMOTE/02]
7.2.36	MCPTT User setups remotely an ambient listening call using pre-established session [CONN-MCPTT/ONN/AMBIENT/PRE/REMOTE/01]
7.2.37	MCPTT User releases remotely an ambient listening call using pre-established session [CONN-MCPTT/ONN/AMBIENT/PRE/REMOTE/02]
7.2.38	Remote change of selected group [CONN-MCPTT/ONN/GROUPCHANGE/01]
7.2.39	One-to-one standalone SDS over SIP [CONN-MCDATA/ONN/O2O/STANDALONE/SDS-/SIP/01]
7.2.40	One-to-one standalone SDS over media plane (MSRP) [CONN-MCDATA/ONN/O2O/STANDALONE/SDS/MSRP/01]
7.2.41	One-to-one SDS session [CONN-MCDATA/ONN/O2O/SESSION/SDS/MSRP/01]
7.2.42	Group standalone SDS over SIP [CONN-MCDATA/ONN/GROUP/STANDALONE/SDS-/SIP/01]
7.2.43	Group standalone SDS over media plane (MSRP) [CONN-MCDATA/ONN/GROUP/STANDALONE/SDS/MSRP/01]
7.2.44	Group SDS session [CONN-MCDATA/ONN/GROUP/SESSION/SDS/MSRP/01]
7.2.45	One-to-one FD using HTTP [CONN-MCDATA/ONN/O2O/FD/HTTP/01]
7.2.46	Group FD using HTTP [CONN-MCDATA/ONN/GROUP/FD/HTTP/01]
7.2.47	One-to-one FD using media plane (MSRP) [CONN-MCDATA/ONN/O2O/FD/MSRP/01]

Number	Name
7.2.48	Group FD using media plane (MSRP) [CONN-MCDATA/ONN/GROUP/FD/MSRP/01]
7.2.49	Standalone SDS with delivered and read notification [CONN-MCDATA/ONN/DISNOT/SDS/01]
7.2.50	Group standalone SDS with delivered and read notification [CONN-MCDATA/ONN/DISNOT/SDS/02]
7.2.51	One-to-one FD using HTTP with file download completed notification [CONN-MCDATA/ONN/DISNOT/FD/01]
7.2.52	Group FD using HTTP with file download completed notification [CONN-MCDATA/DISNOT/FD/02]
7.2.53	Network triggered FD notifications [CONN-MCDATA/NET/FD/01]
7.2.54	MCVideo User initiates an on-demand private MCVideo call in automatic commencement mode with transmission control [CONN-MCVIDEO/ONN/PRIV/AUTO/ONDEM/WTC/NTC/01]
7.2.55	MCVideo User initiates an on-demand private MCVideo call in automatic commencement mode without transmission control [CONN-MCVIDEO/ONN/PRIV/AUTO/ONDEM/WOTC/01]
7.2.56	MCVideo User initiates an on-demand prearranged MCVideo Group Call [CONN-MCVIDEO/ONN/GROUP/PREA/ONDEM/NTC/01]
7.2.57	MCVideo User initiates an on-demand prearranged MCVideo Chat Group Call [CONN-MCVIDEO/ONN/GROUP/CHAT/ONDEM/NTC/01]
7.2.58	Late call entry of a MCPTT User during an on-demand prearranged MCPTT Group Call [CONN-MCPTT/ONN/GROUP/PREA/ONDEM/NFC/07]
7.2.59	Late call entry of a MCPTT User during a prearranged MCPTT Group Call using pre-established session [CONN-MCPTT/ONN/GROUP/PREA/PRE/NFC/03]
7.2.60	Rejoin of a MCPTT User during an on-demand prearranged MCPTT Group Call [CONN-MCPTT/ONN/GROUP/PREA/ONDEM/NFC/08]
7.2.61	Rejoin of a MCPTT User during an on-demand prearranged MCPTT Group Call using pre-established session [CONN-MCPTT/ONN/GROUP/PREA/PRE/NFC/04]
7.2.62	Subscription to Conference Event Package [CONN-MCPTT/ONN/GROUP/CHAT/ONDEM/SUBCONF/01]
7.2.63	MCPTT User initiates an on-demand private MCPTT emergency call in automatic commencement model with floor control [CONN-MCPTT/ONN/PRIV/AUTO/ONDEM/WFC/NFC/02]
7.2.64	MCPTT User initiates an emergency alert by sending a SIP MESSAGE [CONN-MCPTT/ONN/EMERG-ALERT/MSG/01]
7.2.65	MCPTT User cancels an emergency alert by sending a SIP MESSAGE [CONN-MCPTT/ONN/EMERG-ALERT/MSG/02]
7.2.66	MCPTT User cancels an emergency alert originated by other user by sending a SIP MESSAGE [CONN-MCPTT/ONN/EMERG-ALERT/MSG/03]
7.2.67	MCPTT client receives a notification of entry into a group geographic area [CONN-MCPTT/ONN/EMERG-ALERT/MSG/04]
7.2.68	MCPTT client receives a notification of exit from a group geographic area [CONN-MCPTT/ONN/EMERG-ALERT/MSG/05]
7.2.69	MCPTT User exits an ongoing an on-demand prearranged MCPTT Group Call upon de-affiliation to this group [CONN-MCPTT/ONN/GROUP/PREA/ONDEM/NFC/09]
7.2.70	Receive O2O FD request with mandatory download [CONN-MCDATA/ONN/O2O/FD/HTTP/02]
7.2.71	Receive O2O FD request without mandatory download [CONN-MCDATA/ONN/O2O/FD/HTTP/03]
7.2.72	Request a list of deferred group communications [CONN-MCDATA/ONN/DEFER/01]
7.2.73	Send an enhanced status to an MCData group [CONN-MCDATA/ONN/GROUP/STANDALONE/SDS/SIP/02]
7.2.74	MCVideo User upgrades an ongoing on-demand Chat Group Call to emergency call [CONN-MCVIDEO/ONN/GROUP/CHAT/ONDEM/NTC/02]
7.2.75	MCVideo User upgrades an ongoing on-demand Chat Group Call to imminent-peril call [CONN-MCVIDEO/ONN/GROUP/CHAT/ONDEM/NTC/03]
7.2.76	MCVideo User cancels the emergency condition of an on-demand Chat Group Call [CONN-MCVIDEO/ONN/GROUP/CHAT/ONDEM/NTC/04]
7.2.77	MCVideo User cancels the imminent-peril condition of an on-demand Chat Group Call [CONN-MCVIDEO/ONN/GROUP/CHAT/ONDEM/NTC/05]
7.2.78	MCVideo User initiates an on-demand prearranged MCVideo Group Call: Emergency Group Call [CONN-MCVIDEO/ONN/GROUP/PREA/ONDEM/NTC/02]
7.2.79	MCVideo User initiates an on-demand prearranged MCVideo Group Call: Imminent Peril Group Call [CONN-MCVIDEO/ONN/GROUP/PREA/ONDEM/NTC/03]
7.2.80	MCVideo User initiates an on-demand prearranged MCVideo Group Call: Broadcast Group Call [CONN-MCVIDEO/ONN/GROUP/PREA/ONDEM/NTC/04]
7.2.81	MCVideo User initiates an on-demand prearranged MCVideo Group Call: Upgrade to in progress emergency or imminent peril [CONN-MCVIDEO/ONN/GROUP/PREA/ONDEM/NTC/05]
7.2.82	MCVideo User initiates the termination of an on-demand prearranged MCVideo Group Call [CONN-MCVIDEO/ONN/GROUP/PREA/ONDEM/NTC/06]
7.2.83	MCVideo User initiates an on-demand private MCVideo call in manual commencement mode without transmission control [CONN-MCVIDEO/ONN/PRIV/MANUAL/ONDEM/WOTC/NTC/01]
7.2.84	MCVideo User initiates an on-demand private MCVideo call in manual commencement mode with transmission control [CONN-MCVIDEO/ONN/PRIV/MANUAL/ONDEM/WTC/NTC/01]

Number	Name
7.2.85	MCVideo User setups locally an on-demand ambient viewing call [CONN-MCVIDEO/ONN/AMBIENT/ONDEM/LOCAL/01]
7.2.86	MCVideo User releases locally an on-demand ambient viewing call [CONN-MCVIDEO/ONN/AMBIENT/ONDEM/LOCAL/02]
7.2.87	MCVideo User setups remotely an on-demand ambient viewing call [CONN-MCVIDEO/ONN/AMBIENT/ONDEM/REMOTE/01]
7.2.88	MCVideo User releases remotely an on-demand ambient viewing call [CONN-MCVIDEO/ONN/AMBIENT/ONDEM/REMOTE/02]
7.2.89	MCVideo User initiates a one-to-one video pull in automatic commencement mode with transmission control [CONN-MCVIDEO/ONN/ONE-TO-ONE/VIDEOPULL/01]
7.2.90	MCVideo User initiates a one-from-server video pull in automatic commencement mode with transmission control [CONN-MCVIDEO/ONN/ONE-FROM-SERVER/VIDEOPULL/01]
7.2.91	MCVideo User initiates a one-to-one video push in automatic commencement mode with transmission control [CONN-MCVIDEO/ONN/ONE-TO-ONE/VIDEOPUSH/01]
7.2.92	MCVideo User initiates a one-to-server video push in automatic commencement mode with transmission control [CONN-MCVIDEO/ONN/ONE-TO-SERVER/VIDEOPUSH/01]
7.2.93	MCVideo User initiates an emergency alert by sending a SIP MESSAGE [CONN-MCVIDEO/ONN/EMERG-ALERT/MSG/01]
7.2.94	MCVideo User cancels an emergency alert by sending a SIP MESSAGE [CONN-MCVIDEO/ONN/EMERG-ALERT/MSG/02]
7.2.95	MCVideo User cancels an emergency alert originated by other user by sending a SIP MESSAGE [CONN-MCVIDEO/ONN/EMERG-ALERT/MSG/03]
7.2.96	MCVideo client receives a notification of entry into a group geographic area [CONN-MCVIDEO/ONN/EMERG-ALERT/MSG/04]
7.2.97	Participating checks the status of the functional alias during the setup an on-demand prearranged MCPTT Group Call [CONNMCPTT/ONN/GROUP/PREA/ONDEM/NFC/10]
7.2.98	Participating checks the status of the functional alias during the setup of an on-demand Chat Group Call [CONN-MCPTT/ONN/GROUP/CHAT/ONDEM/NFC/06]
7.2.99	Participating checks the status of the functional alias during the setup of on-demand private MCPTT call in automatic commencement model with floor control [CONN-MCPTT/ONN/PRIV/AUTO/ONDEM/WFC/NFC/03]
7.2.100	Participating checks the status of the functional alias during the setup of an on-demand first-to-answer MCPTT call with floor control [CONN-MCPTT/ONN/FIRST/MANUAL/ONDEM/WFC/NFC/02]
7.2.101	MCPTT User includes the FA in an on-demand first-to-answer MCPTT call with floor control using pre-established sessions [CONN-MCPTT/ONN/FIRST/MANUAL/PRE/WFC/NFC/02]
7.2.102	MCPTT User includes the FA in an on-demand private MCPTT call in automatic commencement model with floor control [CONN-MCPTT/ONN/PRIV/AUTO/ONDEM/WFC/NFC/04]
7.2.103	MCPTT User calls a FA using an on-demand first-to-answer MCPTT call with floor control [CONN-MCPTT/ONN/FIRST/MANUAL/ONDEM/WFC/NFC/03]
7.2.104	MCPTT User calls a FA using an on-demand first-to-answer MCPTT call without floor control [CONN-MCPTT/ONN/FIRST/MANUAL/ONDEM/WOFC/02]
7.2.105	MCPTT User calls a FA using an on-demand first-to-answer MCPTT call with floor control using pre-established sessions [CONN-MCPTT/ONN/FIRST/MANUAL/PRE/WFC/NFC/03]
7.2.106	MCPTT User calls a FA using a pre-established first-to-answer MCPTT call in manual commencement mode without floor control [CONN-MCPTT/ONN/FIRST/MANUAL/PRE/WOFC/02]
7.2.107	A not-authorized MCPTT User initiates an on-demand private MCPTT call in automatic commencement model with floor control [CONN-MCPTT/ONN/PRIV/AUTO/ONDEM/WFC/NFC/05]
7.2.108	A not-authorized MCPTT User initiates an on-demand private MCPTT call in manual commencement mode with floor control [CONN-MCPTT/ONN/PRIV/MANUAL/ONDEM/WFC/NFC/02]
7.2.109	A not-authorized MCPTT User initiates a pre-established private MCPTT call in automatic commencement mode with floor control [CONN-MCPTT/ONN/PRIV/AUTO/PRE/WFC/NFC/02]
7.2.110	A not-authorized MCPTT User initiates a pre-established private MCPTT call in manual commencement mode with floor control [CONN-MCPTT/ONN/PRIV/MANUAL/PRE/WFC/NFC/02]
7.2.111	A not-authorized MCPTT User initiates an on-demand private MCPTT call in automatic commencement mode without floor control [CONN-MCPTT/ONN/PRIV/AUTO/ONDEM/WOFC/02]
7.2.112	A not-authorized MCPTT User initiates an on-demand private MCPTT call in manual commencement mode without floor control [CONN-MCPTT/ONN/PRIV/MANUAL/ONDEM/WOFC/02
7.2.113	A not-authorized MCPTT User initiates a pre-established private MCPTT call in automatic commencement mode without floor control [CONN-MCPTT/ONN/PRIV/AUTO/PRE/WOFC/02]
7.2.114	A not-authorized MCPTT User initiates a pre-established private MCPTT call in manual commencement mode without floor control [CONN-MCPTT/ONN/PRIV/MANUAL/PRE/WOFC/02]
7.2.115	A not-authorized MCPTT User initiates an on-demand private MCPTT emergency call in automatic commencement model with floor control [CONN-MCPTT/ONN/PRIV/AUTO/ONDEM/WFC/NFC/06]
7.2.116	Handling of non acknowledged user information during an on-demand prearranged MCPTT Group Call [CONN-MCPTT/ONN/GROUP/PREA/ONDEM/NFC/11]
7.2.117	Handling of TNG1 timer during the setup of an on-demand prearranged MCPTT Group Call [CONN-MCPTT/ONN/GROUP/PREA/ONDEM/NFC/12]

Number	Name
7.2.118	Handling of non acknowledged user information during a prearranged MCPTT Group Call using pre-established session [CONN-MCPTT/ONN/GROUP/PREA/PRE/NFC/05]
7.2.119	Handling of TNG1 timer during the setup of a prearranged MCPTT Group Call using pre-established session [CONN-MCPTT/ONN/GROUP/PREA/PRE/NFC/06]
7.2.120	MCData client establishes a IP Connectivity session with another MCData client [CONN-MCDATA/ONN/IPCONN/01]
7.2.121	MCData client establishes a IP Connectivity session with another MCData client by using the target IP Information [CONN-MCDATA/ONN/IPCONN/02]
7.2.122	MCData User initiates an emergency alert by sending a SIP MESSAGE [CONN-MCDATA/ONN/EMERG-ALERT/MSG/01]
7.2.123	MCData User cancels an emergency alert by sending a SIP MESSAGE [CONN-MCDATA/ONN/EMERG-ALERT/MSG/02]
7.2.124	MCData User cancels an emergency alert originated by other user by sending a SIP MESSAGE [CONN-MCDATA/ONN/EMERG-ALERT/MSG/03]
7.2.125	MCPTT user to send a remotely initiated private call request to the remote MCPTT user [CONN-MCVIDEO/ONN/REMOTE/PRIV/01]
7.2.126	MCPTT user requests to transfer an ongoing MCPTT private call to a target MCPTT user [CONN-MCVIDEO/ONN/TRANSF/PRIV/01]
7.2.127	MCPTT user decides to forward an incoming MCPTT private call to a new target MCPTT ID [CONN-MCVIDEO/ONN/FORW/PRIV/01]
7.2.128	MCPTT User initiates a prearranged MCPTT Group Call using pre-established session: Emergency Group Call [CONN-MCPTT/ONN/GROUP/PREA/PRE/NFC/05]
7.2.129	MCPTT User initiates a prearranged MCPTT Group Call using pre-established session: Upgrade to in progress emergency or imminet peril [CONN-MCPTT/ONN/GROUP/PREA/PRE/NFC/06]
7.2.130	MCPTT User cancels the emergency condition of a prearranged MCPTT Group Call using pre-established session [CONN-MCPTT/ONN/GROUP/PREA/PRE/NFC/07]
7.2.131	MCPTT User initiates a pre-established private MCPTT emergency call in automatic commencement mode with floor control [CONN-MCPTT/ONN/PRIV/AUTO/PRE/WFC/NFC/03]
7.2.132	Subscription to Conference Event Package for pre-arranged group call [CONN-MCPTT/ONN/GROUP/PREA/ONDEM/SUBCONF/01]
7.3	**Floor Control (FC)**
7.3.1	Basic FC functionality [FC/BASIC/01]
7.3.2	Basic FC functionality. Effect of Priorities [FC/BASIC/02]
7.3.3	Advanced FC functionality. Floor control revoking upon expires (T2) [FC/ADV/01]
7.3.4	Advanced FC functionality. Floor control queueing upon release [FC/ADV/02]
7.3.5	Advanced FC functionality. Floor control queueing upon revoke [FC/ADV/03]
7.3.6	Sharing/Display of FA during basic FC operations [FC/FA/BASIC/01]
7.3.7	Multi-talker basic operation [FC/MT/BASIC/01]
7.3.8	Sharing location information during FC operations [FC/LOC/BASIC/01]
7.3.9	Sharing location information during multi-talker FC operations [FC/MT/LOC/BASIC/01]
7.4	**Registration and Service Authorization (RegAuth)**
7.4.1	MCPTT User authenticates to the IdMS [REGAUTH/IDMSAUTH/01]
7.4.2	MCPTT User gets registered and authorized using third-party registration [REGAUTH/3PRTYREG/REGISTER/01]
7.4.3	MCPTT User gets authorized using PUBLISH mechanism [REGAUTH/PUBLISH/REGISTER/01]
7.4.4	MCPTT service server limits the number of simultaneous successful service authorisations while using third-party registration [REGAUTH/3PRTYREG/REGISTER/02
7.4.5	MCPTT service server limits the number of simultaneous successful service authorisations while using PUBLISH mechanism [REGAUTH/PUBLISH/REGISTER/02]
7.5	**Policing (PCC)**
7.5.1	Setup of a Unicast MC Bearer by SIP Core/IMS [PCC/BEARERSETUP/01]
7.5.2	Setup of a Unicast MC Bearer by MCPTT Participating AS [PCC/BEARERSETUP/02]
7.5.3	Update of a Unicast MC Bearer by SIP Core/IMS [PCC/BEARERUPDATE/01]
7.5.4	Update of a Unicast MC Bearer by MCPTT Participating AS [PCC/BEARERUPDATE/02]
7.5.5	Setup of a Unicast MC Bearer by SIP Core/IMS using pre-established sessions [PCC/BEARERSETUP/03]
7.5.6	Setup of a Unicast MC Bearer by MCPTT Participating AS using pre-established sessions [PCC/BEARERSETUP/04]
7.5.7	Setup of a Unicast 5GS QoS Flow by SIP Core/IMS using Rx [

Number	Name
	PCC/5GSQOSFLOWSETUP/Rx/01]
7.5.8	Setup of a Unicast 5GS QoS Flow by MCPTT Participant AS using Rx [PCC/5GSQOSFLOWSETUP/Rx/02]
7.5.9	Setup of a Unicast 5GS QoS Flow by SIP Core/IMS using N5 [PCC/5GSQOSFLOWSETUP/N5/01]
7.5.10	Setup of a Unicast 5GS QoS Flow by MCPTT Participating AS using N5 [PCC/5GSQOSFLOWSETUP/N5/02]
7.5.11	Setup of a Unicast 5GS QoS Flow by SIP Core/IMS using N33 [PCC/5GSQOSFLOWSETUP/N33/01]
7.5.12	Setup of a Unicast 5GS QoS Flow by MCPTT Participating AS using N33 [PCC/5GSQOSFLOWSETUP/N33/02]
7.5.13	Update of a Unicast 5GS QoS Flow by SIP Core/IMS using Rx [PCC/5GSQOSFLOWUPDATE/Rx/01]
7.5.14	Update of a Unicast 5GS QoS Flow by MCPTT Participating AS using Rx [PCC/5GSQOSFLOWUPDATE/Rx/02]
7.5.15	Update of a Unicast 5GS QoS Flow by SIP Core/IMS using N5 [PCC/5GSQOSFLOWUPDATE/N5/01]
7.5.16	Update of a Unicast 5GS QoS Flow by MCPTT Participating AS using N5 [PCC/5GSQOSFLOWUPDATE/N5/02]
7.5.17	Update of a Unicast 5GS QoS Flow by SIP Core/IMS using N33 [PCC/5GSQOSFLOWUPDATE/N33/01]
7.5.18	Update of a Unicast 5GS QoS Flow by MCPTT Participating AS using N33 [PCC/5GSQOSFLOWUPDATE/N33/02]
7.6	**eMBMS (EMBMS)**
7.6.2	Use of dynamically established MBMS bearers in prearranged MCPTT group calls with pre-allocated TMGIs [EMBMS/ACTIVATEBEARER/WPRETMGI/01]
7.6.3	Use of dynamically established MBMS bearers in prearranged MCPTT group calls without pre-allocated TMGIs [EMBMS/ACTIVATEBEARER/WOPRETMGI/01]
7.6.4	Use of pre-established MBMS bearers in prearranged group calls with pre-allocated TMGIs [EMBMS/PREBEARER/WPRETMGI/01]
7.6.5	Use of pre-established MBMS bearers in prearranged group calls without pre-allocated TMGIs [EMBMS/PREBEARER/WOPRETMGI/01]
7.6.6	Modification of MBMS bearers upon reception of emergency upgrade request [EMBMS/MODIFYBEARER/01]
7.6.7	Deactivation of MBMS bearers after termination of a prearranged MCPTT group call with TMGI deallocation [EMBMS/DEACTBEARER/WTMGIDEA/01]
7.6.8	Deactivation of MBMS bearers after termination of a prearranged MCPTT group call without TMGI deallocation [EMBMS/DEACTBEARER/WOTMGIDEA/01]
7.6.9	Switching to unicast bearer after TMGI expiration [EMBMS/SWITCHTOUNITMGIEXP/01]
7.6.10	Handling of a not-listening report sent by MCPTT Client [EMBMS/NOTLISTENING/01]
7.6.11	Handling of a suspension-status report sent by MCPTT Client [EMBMS/SUSPENSION/01]
7.6.12	Use of dynamically established MBMS bearers in prearranged MCVideo group calls with pre-allocated TMGIs [EMBMS-MCVIDEO/ACTIVATEBEARER/WPRETMGI/01]
7.6.13	Use of dynamically established MBMS bearers in prearranged MCVideo group calls without pre-allocated TMGIs [EMBMS-MCVIDEO/ACTIVATEBEARER/WOPRETMGI/01]
7.6.14	Use of pre-established MBMS bearers in prearranged MCVideo group calls with pre-allocated TMGIs [EMBMS-MCVIDEO/PREBEARER/WPRETMGI/01]
7.6.15	Use of pre-established MBMS bearers in prearranged MCVideo group calls without pre-allocated TMGIs [EMBMS-MCVIDEO/PREBEARER/WOPRETMGI/01]
7.6.16	Modification of MBMS bearers upon reception of emergency upgrade request in an MCVideo group call [EMBMS-MCVIDEO/MODIFYBEARER/01]
7.6.17	Deactivation of MBMS bearers after termination of a prearranged MCVideo group call with TMGI deallocation [EMBMS-MCVIDEO/DEACTBEARER/WTMGIDEA/01]
7.6.18	Deactivation of MBMS bearers after termination of a prearranged MCVideo group call without TMGI deallocation [EMBMS-MCVIDEO/DEACTBEARER/WOTMGIDEA/01]
7.6.19	Switching to unicast bearer after TMGI expiration in an MCVideo call [EMBMS-MCVIDEO/SWITCHTOUNITMGIEXP/01]
7.6.20	Handling of a not-listening report sent by MCVideo Client [EMBMS-MCVIDEO/NOTLISTENING/01]
7.6.21	Handling of a suspension-status report sent by MCVideo Client [EMBMS-MCVIDEO/SUSPENSION/01]
7.7	**Affiliation (AFFIL)**
7.7.1	MCPTT User subscribes to its own affiliation [AFFIL/DET/01]
7.7.2	MCPTT User subscribes to the affiliation of another user [AFFIL/DET/02]
7.7.3	MCPTT User requests its affiliation to a set of groups [AFFIL/CHANGE/01]

Number	Name
7.7.4	MCPTT User requests the affiliation of other User to a set of groups in mandatory mode [AFFIL/CHANGE/02]
7.7.5	MCPTT User requests the affiliation of other User to a set of groups in negotiated mode [AFFIL/CHANGE/03]
7.7.6	Affiliation change triggered by a functional-alias activation criteria [AFFIL/CHANGE/04]
7.7.7	Affiliation change triggered by a functional-alias deactivation criteria [AFFIL/CHANGE/05]
7.7.8	Affiliation change triggered by implicit affiliation in an on demand pre-arranged group call [AFFIL/CHANGE/06]
7.7.9	Affiliation change triggered by implicit affiliation during service authorization [AFFIL/CHANGE/07]
7.8	**Location (LOC)**
7.8.1	MCPTT Client Configuration upon 3rd party register [LOC/3PRTYREG/CONFIG/01]
7.8.2	Explicit Location reporting request sent to the MCPTT Client [LOC/REQUEST/01]
7.8.3	MCPTT Client Location submitted upon some trigger [LOC/SUBMISSION/01]
7.9	**OAM procedures (CSC)**
7.9.1	Subscription and UE configuration document retrieval from the MC UE [CSC-CMS/UECONF/UE/01]
7.9.2	Subscription and user profile configuration document retrieval from the MC UE [CSCCMS/UPROCONF/UE/01]
7.9.3	Subscription and service configuration document retrieval from the MC UE [CSCCMS/SERVCONF/UE/01]
7.9.4	Subscription and service configuration document retrieval from the MCS Server [CSCCMS/SERVCONF/MCSSERV/01]
7.9.5	Subscription and group document retrieval from the MC UE [CSC-GMS/GROUP/UE-/01]
7.9.6	Subscription and group document retrieval from the MCS Server [CSC-GMS/GROUP/MCSSERV/01]
7.9.7	Subscription and retrieval of multiple documents from the CMS using subscription proxy [CSC/MULTIPLESUBS/UE/01]
7.9.8	Subscription and retrieval of multiple documents from the GMS using subscription proxy [CSC/MULTIPLESUBSGMSGROUP/UE/01]
7.10	**Security mechanisms (SEC)**
7.10.1	Key material download from KMS to MCPTT client (CSC-8) with proxy [SEC/KEYMDOWNLOAD/WPROXY/01]
7.10.2	Key material download from KMS to MCPTT server (CSC-9) with proxy [SEC/KEYMDOWNLOAD/WPROXY/02]
7.10.3	Key material download from KMS to MCPTT GMS (CSC-10) with proxy [SEC/KEYMDOWNLOAD/WPROXY/03]
7.10.4	Key material download from KMS to MCPTT client (CSC-8) without proxy [SEC/KEYMDOWNLOAD/WOPROXY/01]
7.10.5	Key material download from KMS to MCPTT server (CSC-9) without proxy [SEC/KEYMDOWNLOAD/WOPROXY/02]
7.10.6	Key material download from KMS to MCPTT GMS (CSC-10) without proxy [SEC/KEYMDOWNLOAD/WOPROXY/03]
7.10.7	Key management from MC client to MC server (CSK upload) [SEC/KEYDIST/CSK/01]
7.10.8	Key management for group communications (GMK) [SEC/KEYDIST/GMK/01]
7.10.9	Key management from MC server to MC client (Key download MuSiK) [SEC/KEYDIST/MUSIK/01]
7.10.10	Encryption of MCPTT private calls (use of derived encryption keys from PCK for the audio and CSK for floor control and RTCP reports) [SEC/ENCRYPTION/PRIVATE/01]
7.10.11	Encryption of MCPTT group calls (use of derived encryption keys from GMK for the audio and CSK for floor control and RTCP reports) [SEC/ENCRYPTION/GROUP/01]
7.10.12	Encryption of MCPTT group calls using eMBMS (use of derived encryption keys from MuSIK for the floor control and MSCCK for eMBMS control) [SEC/ENCRYPTION/GROUPEMBMS/01]
7.10.13	XML contents encryption in MCPTT private calls (mcptt-info and resource-lists) [SEC/XMLENCRYPT/PRIVATE/01]
7.10.14	XML contents encryption in MCPTT group calls (mcptt-info) [SEC/XMLENCRYPT/GROUP/01]
7.10.15	XML contents encryption in affiliation procedure [SEC/XMLENCRYPT/AFFIL/01]
7.10.16	XML contents encryption in location procedure [SEC/XMLENCRYPT/LOC/01]
7.10.17	XML contents encryption in registration and authorization procedures [SEC/XMLENCRYPT/REGAUTH/01]
7.11	**MCVideo Transmission Control (TC)**
7.11.1	Basic TC functionality [TC/BASIC/01]
7.11.2	Basic TC functionality. Maximum number of transmitters [TC/BASIC/02]
7.11.3	Basic TC functionality. Maximum number of receivers [TC/BASIC/03]
7.11.4	Basic TC functionality. Maximum number of transmitters and pre-emptive priority request [TC/BASIC/04]
7.12	**Server-to-Server communications (S2S)**
7.12.1	On-demand prearranged MCPTT Group Call to temporary group in trusted mode [S2S/ONN/GROUP/PREA/ONDEM/TEMP/01]
7.12.2	On-demand prearranged MCPTT Group Call to temporary group in untrusted mode [S2S/ONN/GROUP/PREA/ONDEM/TEMP/02]

Number	Name
7.13	**Functional Alias (FA)**
7.13.1	MCPTT user requests to activate one or more functional aliases [FA/CHANGE/01]
7.13.2	MCPTT user requests to deactivate one or more functional aliases [FA/CHANGE/02]
7.13.3	MCPTT user refreshes the interest on one or more functional aliases [FA/CHANGE/03]
7.13.4	MCPTT user takes over a functional aliases [FA/CHANGE/04]
7.13.5	MCPTT user requests to activate one or more functional aliases upon entering a location area [FA/LOCCHANGE/01]
7.13.6	MCPTT user requests to deactivate one or more functional aliases upon entering a location area [FA/LOCCHANGE/02]
7.13.7	MCPTT user determines the functional aliases successfully activated [FA/DET/01]
7.13.8	MCPTT user determines the functional aliases successfully activated for another user [FA/DET/02]
7.13.9	MCPTT server requests a resolution of the Functional alias from the MCPTT server owning that FA [FA/RESOL/01]
7.13.10	Automatic deactivation of FA [FA/CHANGE/05]
7.14	**Interoperability Scenarios (IOP)**
7.14.1	Effect of (de)affiliating another user during an ongoing group call [IOP/01]
7.14.2	GEOFENCING [IOP/02]
7.14.3	Complete group-regrouping procedure [IOP/03]
7.14.4	Effect of adding a user to a group and CSC subscriptions [IOP/04]
7.14.5	Missed call and private call callback [IOP/05]
7.14.6	EMBMS switch from unicast to multicast and back to unicast [IOP/06]
7.14.7	one-to-server video push & one-from-server video pull operation [IOP/07]
7.15	**User Regroup (USERREG)**
7.15.1	MCPTT user requests a users regroup using a preconfigured group [REGRPREC/USERREG/01]
7.15.2	MCPTT user removes a users regroup using a preconfigured group [REGRPREC/USERREG/02]
7.15.3	MCPTT user requests a group regroup using a preconfigured group [REGRPREC/GROUPREG/01]
7.15.4	MCPTT user removes a group regroup using a preconfigured group [REGRPREC/GROUPREG/02]
7.16	**MCData Message Store (MCDATAMS)**
7.16.1	MCData message store client retrieves an object [MCDATAMS/RETR/01
7.16.2	MCData message store client searches for information about a selected set of objects
7.16.3	MCData message store client updates an existing object [MCDATAMS/UPDATE/01]
7.16.4	MCData message store client deletes an object [MCDATAMS/DEL/01]
7.16.5	MDData server deposits an object of an MCData user [MCDATAMS/DEP/01]
7.16.6	MCData message store client copies object(s) and/or folder(s) to a destination folder [MCDATAMS/COPY/01]
7.16.7	MCData message store client deletes a folder [MCDATAMS/DEL/02]
7.16.8	MCData message store client creates a folder [MCDATAMS/CRE/01]
7.16.9	MCData message store client moves an object to a destination folder [MCDATAMS/MOVE/01]
7.16.10	MCData message store client searches for information about a selected set of folders [MCDATAMS/SEARCH/02]
7.16.11	MCData message store client subscribes to changes in the store [MCDATAMS/SUBS/01]
7.16.12	MCData message store client cancels the subscription to changes in the store [MCDATAMS/SUBS/02]
7.16.13	MCData message store client updates a subscription to changes in the store [MCDATAMS/SUBS/03]
7.16.14	MCData message store client uploads an object [MCDATAMS/UP/01]
7.16.15	MCData message store function sends a notification of changes [MCDATAMS/SYNC/01]
7.16.16	MCData message store client searches for changes [MCDATAMS/SYNC/02]
7.16.17	MCData message store client lists subfolders of a folder [MCDATAMS/LIST/01]
7.16.18	Message notification client in the MCData Client creates a notification channel [MCDATAMS/NOTCH/01]
7.16.19	Message notification client in the MCData Client deletes a notification channel [MCDATAMS/NOTCH/02]
7.16.20	Message notification client in the MCData Client updates a notification channel [MCDATAMS/NOTCH/03]
7.16.21	Message notification client in the MCData Client opens a notification channel [MCDATAMS/NOTCH/04]
7.16.22	MCData message store function sends a notification of changes using notification channel [MCDATAMS/SYNC/03]
8	**eMBMS complementary test cases**
8.2.1	TMGI allocation management [EMBMS-ADDITIONAL/MB2C/FUNCT/ALLOCTMGI/01]
8.2.2	TMGI deallocation management [EMBMS-ADDITIONAL/MB2C/FUNCT/DEALLOCTMGI-/01]

Number	Name
8.2.3	Successful bearer activation [EMBMS-ADDITIONAL/MB2C/FUNCT/ACTIVATEBEARER-/01]
8.2.4	Successful bearer deactivation [EMBMS-ADDITIONAL/MB2c/FUNCT/DEACTBEARER-/01]
8.2.5	Successful bearer modification [EMBMS-ADDITIONAL/MB2C/FUNCT/MODBEARER/01]
8.2.6	Management of TMGI expiration [EMBMS-ADDITIONAL/MB2C/FUNCT/TMGIEXP/01]
8.2.7	Management of aggregated requests [EMBMS-ADDITIONAL/MB2C/FUNCT/AGGREQUEST-/01]
8.2.8	Management of Bearer Pre-emption [EMBMS-ADDITIONAL/MB2C/PRIO/PREEM/01]
8.2.9	Management of Bearer Resumption [EMBMS-ADDITIONAL/MB2C/PRIO/RESUM/01]
8.2.10	MB2-C security using TLS over TCP [EMBMS-ADDITIONAL/MB2C/SECURITY/TLS-/01]
8.2.11	MB2-C security using DTLS over SCTP [EMBMS-ADDITIONAL/MB2C/SECURITY/DTLS-/01]
8.2.12	Restoration procedure management [EMBMS-ADDITIONAL/MB2C/ROBUSTNESS/RES-TORATION/01]
8.2.13	TMGI allocation failure [EMBMS-ADDITIONAL/MB2C/ROBUSTNESS/ALLOCATE/TMGI-/01]
8.2.14	TMGI deallocation failure [EMBMS-ADDITIONAL/MB2C/ROBUSTNESS/DEALLOCATE/TMGI/01]
8.2.15	Bearer activation failure [EMBMS-ADDITIONAL/MB2c/ROBUSTNESS/ACTIVATE/BEARER-/01]
8.2.16	Bearer deactivation failure [EMBMS–ADDITIONAL/MB2C/ROBUSTNESS/DEACTIVATE-/BEARER/01]
8.2.17	Bearer modification failure [EMBMS-ADDITIONAL/MB2C/ROBUSTNESS/MODIFY/BEARER-/01]
8.2.18	Multiple GCS-AS management [EMBMS-ADDITIONAL/MB2C/LOAD/MUL-TIPLEGCS-/01]
8.2.19	Activation of multiple (100) bearers [EMBMS-ADDITIONAL/MB2C/LOAD/100BEARER-/01]
9	**Observers scenarios**
9.3	Emergency call [OS1]
9.4	Emergency call handling [OS2]
9.5	Encrypted private call [OS3]
9.6	eMBMS MCPTT [OS4.1]
9.7	eMBMS MCVideo [OS4.2]
9.8	Switching on [OS5]
9.9	Encrypted MCPTT group call [OS6]
9.10	Enhanced status [OS7.1]
9.11	MCDATA SDS [OS7.2]
9.12	Encrypted MCVideo Group Call [OS8]
9.13	Parallel MCPTT and MCVIDEO [OS9]
9.14	Initiation of the Railway emergency alert [OS10]
	IWF - Affilation
11.2.1	Affiliation status determination from MCPTT server owning the MCPTT group(s) [IWF/MCPTT/AFFIL/DET/01]
11.2.2	Sending affiliation status change towards MCPTT server owning MCPTT group procedure [IWF/MCPTT/AFFIL/CHANGE/01]
11.2.3	Receiving subscription to affiliation status of users by the IWF in terminating participating role [IWF/MCPTT/AFFIL/DET/02]
11.2.4	Sending notification of affiliation changes of users by the IWF in terminating participating role [IWF/MCPTT/AFFIL/CHANGE/02]
11.2.5	Remarks regarding procedures of IWF owning the MCPTT group [IWF/MCPTT/AFFIL/IWFOWNED/***/01]
	IWF – MCPTT Calls
11.3.1	IWF in participating role originates an on-demand prearranged MCPTT group call on behalf of an LMR user [IWF/MCPTT/CONN/ONN/PAR/GROUP/PREA/ONDEM/NFC/01]
11.3.2	IWF in participating role initiates an on-demand chat MCPTT group call on behalf of an LMR user [IWF/MCPTT/CONN/ONN/PAR/GROUP/CHAT/ONDEM/NFC/01]
11.3.3	IWF in participating role joins an ongoing on-demand chat MCPTT group call on behalf of an LMR user [IWF/MCPTT/CONN/ONN/PAR/GROUP/CHAT/ONDEM/NFC/02]
11.3.4	IWF performing the terminating participating procedures receives an on-demand prearranged MCPTT group call targeting a user homed in the IWF [IWF/MCPTT/CONN/ONN/PAR/GROUP/PREA/ONDEM/NFC/02]
11.3.5	IWF performing the terminating participating procedures receives an INVITE associated to a chat MCPTT group call targeting a user homed in the IWF [IWF/MCPTT/CONN/ONN/PAR/GROUP/CHAT/ONDEM/NFC/03]
11.3.6	IWF performing the terminating participating procedures receives a reINVITE associated to a chat MCPTT group call targeting a user homed in the IWF [IWF/MCPTT/CONN/ONN/PAR/GROUP/CHAT/ONDEM/NFC/04]
11.3.7	IWF in participating role originates an on demand MCPTT private call in manual commencement mode with floor control on behalf of an LMR user [IWF/MCPTT/CONN/ONN/PAR/PRIV/MANUAL/ONDEM/WFC/NFC/01]
11.3.8	IWF in participating role originates an on demand MCPTT private call in automatic commencement mode with floor control on behalf of an LMR user [IWF/MCPTT/CONN/ONN/PAR/PRIV/AUTO/ONDEM/WFC/NFC/01]

Number	Name
11.3.9	IWF performing the terminating participating procedures receives an on demand MCPTT private call in manual commencement mode with floor control on behalf of an LMR user [IWF/MCPTT/CONN/ONN/PAR/PRIV/MANUAL/ONDEM/WFC/NFC/02]
11.3.10	IWF performing the terminating participating procedures receives an on demand MCPTT private call in automatic commencement mode with floor control on behalf of an LMR user [IWF/MCPTT/CONN/ONN/PAR/PRIV/AUTO/ONDEM/WFC/NFC/02]
11.3.11	IWF in participating role originates an on demand MCPTT private call in manual commencement mode without floor control on behalf of an LMR user [IWF/MCPTT/CONN/ONN/PAR/PRIV/MANUAL/ONDEM/WOFC/NFC/01]
11.3.12	IWF in participating role originates an on demand MCPTT private call in automatic commencement mode without floor control on behalf of an LMR user [IWF/MCPTT/CONN/ONN/PAR/PRIV/AUTO/ONDEM/WOFC/NFC/01]
11.3.13	IWF performing the terminating participating procedures receives an on demand MCPTT private call in manual commencement mode without floor control on behalf of an LMR user [IWF/MCPTT/CONN/ONN/PAR/PRIV/MANUAL/ONDEM/WOFC/NFC/02]
11.3.14	IWF performing the terminating participating procedures receives an on demand MCPTT private call in automatic commencement mode without floor control on behalf of an LMR user [IWF/MCPTT/CONN/ONN/PAR/PRIV/AUTO/ONDEM/WOFC/NFC/02]
11.3.15	IWF in controlling role invites an MCPTT user to an on-demand prearranged MCPTT group call initiated by an LMR user [IWF/MCPTT/CONN/ONN/CTRL/GROUP/PREA/ONDEM/NFC/01]
11.3.16	IWF in controlling role receives the request to establish an on-demand prearranged MCPTT group call initiated by an MCPTT user [IWF/MCPTT/CONN/ONN/CTRL/GROUP/PREA/ONDEM/NFC/02]
11.3.17	IWF in controlling role receives the request to establish an MCPTT chat session [IWF/MCPTT/CONN/ONN/CTRL/GROUP/CHAT/ONDEM/NFC/01]
11.3.18	IWF in controlling role receives the request to join an MCPTT chat session [IWF/MCPTT/CONN/ONN/CTRL/GROUP/CHAT/ONDEM/NFC/02]
11.3.19	IWF in controlling role originates an on demand MCPTT private call in automatic commencement mode with floor control on behalf of an LMR user [IWF/MCPTT/CONN/ONN/CTRL/PRIV/AUTO/ONDEM/WFC/NFC/01]
11.3.20	IWF in controlling role originates an on demand MCPTT private call in manual commencement mode with floor control on behalf of an LMR user [IWF/MCPTT/CONN/ONN/CTRL/PRIV/MANUAL/ONDEM/WFC/NFC/01]
11.3.21	IWF in controlling role originates an on demand MCPTT private call in automatic commencement mode without floor control on behalf of an LMR user [IWF/MCPTT/CONN/ONN/CTRL/PRIV/AUTO/ONDEM/WOFC/NFC/01]
11.3.22	IWF in controlling role originates an on demand MCPTT private call in manual commencement mode without floor control on behalf of an LMR user [IWF/MCPTT/CONN/ONN/CTRL/PRIV/MANUAL/ONDEM/WOFC/NFC/01]
11.3.23	IWF in controlling role receives the request to establish an on demand MCPTT private call in automatic commencement mode with floor control targeting a user homed in the IWF [IWF/MCPTT/CONN/ONN/CTRL/PRIV/AUTO/ONDEM/WFC/NFC/02]
11.3.24	IWF in controlling role receives the request to establish an on demand MCPTT private call in manual commencement mode with floor control targeting a user homed in the IWF [IWF/MCPTT/CONN/ONN/CTRL/PRIV/MANUAL/ONDEM/WFC/NFC/02]
11.3.25	IWF in controlling role receives the request to establish an on demand MCPTT private call in automatic commencement mode without floor control targeting a user homed in the IWF [IWF/MCPTT/CONN/ONN/CTRL/PRIV/AUTO/ONDEM/WOFC/NFC/02]
11.3.26	IWF in controlling role receives the request to establish an on demand MCPTT private call in manual commencement mode without floor control targeting a user homed in the IWF [IWF/MCPTT/CONN/ONN/CTRL/PRIV/MANUAL/ONDEM/WOFC/NFC/02]
	IWF - INTERWORKING SECURITY DATA MESSAGES (ISDM)
11.4.1	IWF originates Interworking Security Data message [IWF/IDSM/01]
11.4.2	IWF receivess Interworking Security Data message [IWF/IDSM/02]
	Inter-MCX (IMCX) - MCPTT
12.2.2	MCPTT User in an MCS system owning the temporary group initiates an on-demand prearranged MCPTT Group Call in trusted mode [IMCX/CONN/MCPTT/ONN/GROUP/PREA/ONDEM/CTRL/TRUSTED/NFC/01]
12.2.3	MCPTT User in an MCS system owning the temporary group initiates an on-demand prearranged MCPTT Group Call in untrusted mode [IMCX/CONN/MCPTT/ONN/GROUP/PREA/ONDEM/CTRL/UNTRUSTED/NFC/01]
12.2.4	MCPTT User in an MCS system owning a constituent group initiates an on-demand prearranged MCPTT Group Call [IMCX/CONN/MCPTT/ONN/GROUP/PREA/ONDEM/NONCTRL/NFC/01]
12.2.5	MCPTT User in an MCS system owning the temporary group initiates an on-demand chat MCPTT Group Call [IMCX/CONN/MCPTT/ONN/GROUP/CHAT/ONDEM/CTRL/NFC/01]
12.2.6	MCPTT User in an MCS system owning a constituent group initiates an on-demand chat MCPTT Group Call [IMCX/CONN/MCPTT/ONN/GROUP/CHAT/ONDEM/NONCTRL/NFC/01]
	Inter-MCX (IMCX) - MCvideo
12.3.2	MCVideo User in an MCS system owning the temporary group initiates an on-demand prearranged MCVideo Group Call in trusted mode [IMCX/CONN/MCVIDEO/ONN/GROUP/PREA/ONDEM/CTRL/TRUSTED/NFC/01]

Number	Name
12.3.3	MCVideo User in an MCS system owning the temporary group initiates an on-demand prearranged MCVideo Group Call in untrusted mode [IMCX/CONN/MCVIDEO/ONN/GROUP/PREA/ONDEM/CTRL/UNTRUSTED/NFC/01]
12.3.4	MCVideo User in an MCS system owning a constituent group initiates an on-demand prearranged MCVideo Group Call [IMCX/CONN/MCVIDEO/ONN/GROUP/PREA/ONDEM/NONCTRL/NFC/01]
12.3.5	MCVideo User in an MCS system owning the temporary group initiates an on-demand chat MCVideo Group Call [IMCX/CONN/MCVIDEO/ONN/GROUP/CHAT/ONDEM/CTRL/NFC/01]
12.3.6	MCVideo User in an MCS system owning a constituent group initiates an on-demand chat MCVideo Group Call [IMCX/CONN/MCVIDEO/ONN/GROUP/CHAT/ONDEM/NONCTRL/NFC/01]

Table 16. Mapping of Test Case Numbers to Test Case Names

9 Interoperability Results

9.1 Overall Results

During the Plugtests event, a total of 151 Test Sessions were run: that is, 151 different combinations based on different configurations in Test Scope: MCX Client, MCX Server (Participating and Controlling), eNB, EPC, gNB, 5GC, LMR, Dispatcher, UEs and Testers were tested for interoperability. Overall, 1266 test executions were conducted and reported interoperability and conformance results.

The table below provides the overall results (aggregated data) from all the Test Cases run during all the Test Sessions with all the different combinations of Equipment Under Test from all the participating companies.

Among the executed Test Cases, the possible results were "OK", when interoperability was successfully achieved and "NO" (Not OK) when it was not.

Interoperability		Totals
PASS	**FAIL**	**Run**
1266 (96.1%)	49 (3.9%)	1315

Table 17. Overall Interoperability Results

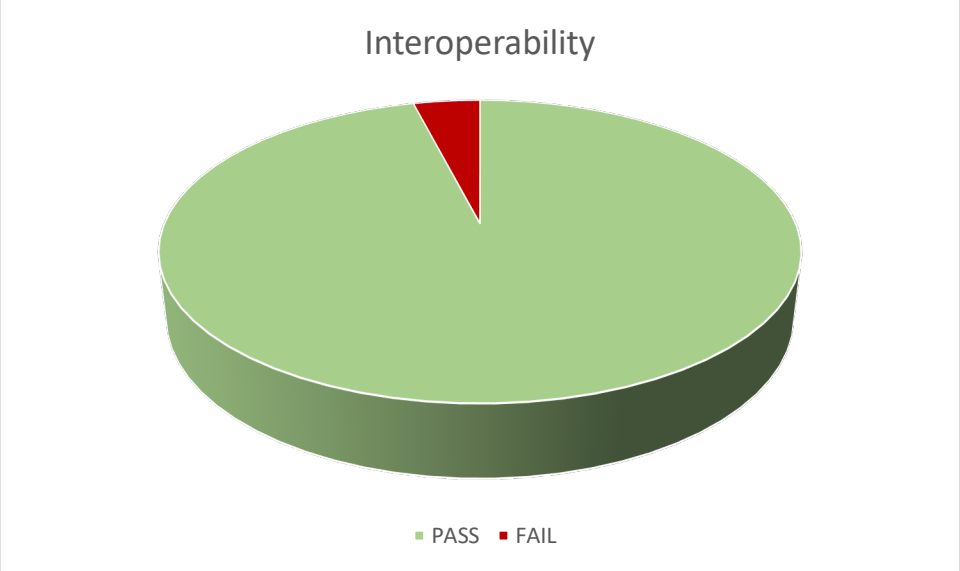


Figure 10. Overall Interoperability results (%)

A overall interoperability success rate of 96% was achieved, which indicates a very high degree of compatibility among the participating implementations (EUTs) in the areas of the Test Plan where features were widely supported and the test cases could be executed in most of the Test Sessions. In the next clauses, we will see that this high rate is also a consequence of the good preparation and involvement of participants during the remote integration and pre-testing phase of the Plugtests.

9.2 Results per Test Configuration

The table 18 below provides the results for each test configuration in the scope of the Plugtests event. The below configurations are defined in clause 7.2.

Interoperability			
	PASS	FAIL	Results
Config MCX 4G	484 (94.9%)	26 (5.1%)	510
Config FRMCS 5G	0 (0.0%)	0 (0.0%)	0
Config MCX 5G	42 (100.0%)	0 (0.0%)	42
Config MCX OTT	388 (96.3%)	15 (3.7%)	403
Config Tester Client	2 (66.7%)	1 (33.3%)	3
Config MCX IMS	4 (100.0%)	0 (0.0%)	4
Config LMR	0 (0.0%)	0 (0.0%)	0
Config Pre-Test OTT	231 (97.1%)	7 (2.9%)	238
Config Pre-Test IWF	17 (100.0%)	0 (0.0%)	17
Config-LMR-OTT	21 (100.0%)	0 (0.0%)	21
Config FRMCS 4G	3 (100.0%)	0 (0.0%)	3
Config MCX 4G Multi Client	25 (100.0%)	0 (0.0%)	25

Table 18. Results per Test Configuration

The table shows that very high execution and interoperability rates for different Test Configurations were achieved.

9.3 Successful Integrations

The following figures 13 to 17 show the integrated equipments for each test stream. The grey lines show the initially planned integrations; the green lines show the successful pre-integrations; and the red lines show the actual integrations which were used for the tests during the Plugtests week.

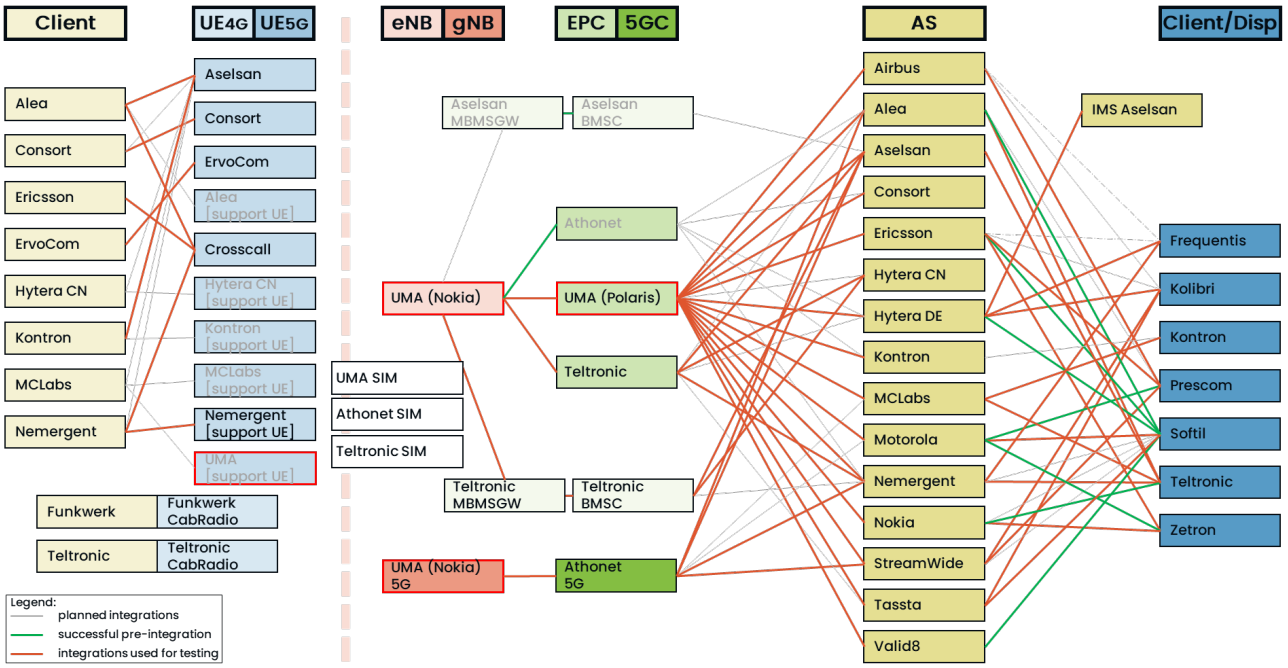


Figure 11. Available Equipment and integrations for Stream A: MCX over RAN

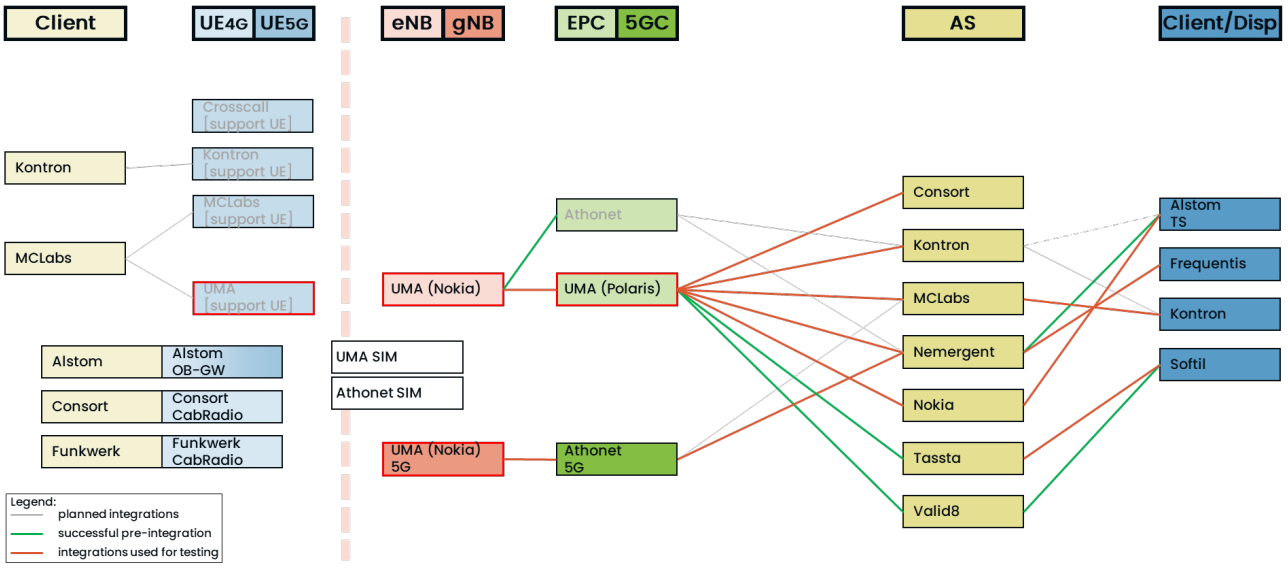


Figure 12. Available Equipment and integrations for Stream B: FRMCS over RAN

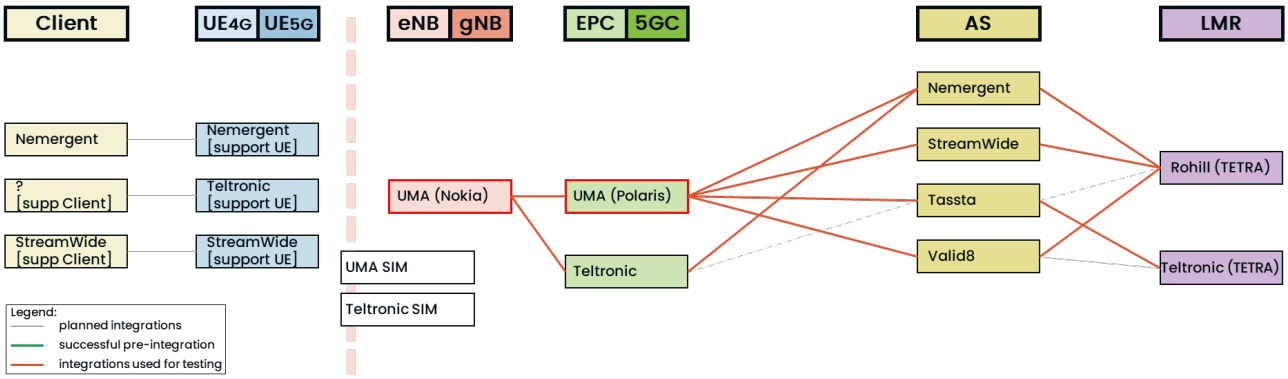


Figure 13. Available Equipment and integrations for Stream C: Interworking with LMR

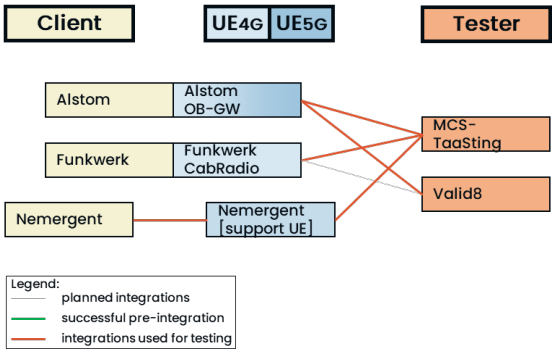


Figure 14. Available Equipment and integrations for Stream D: Test Tools

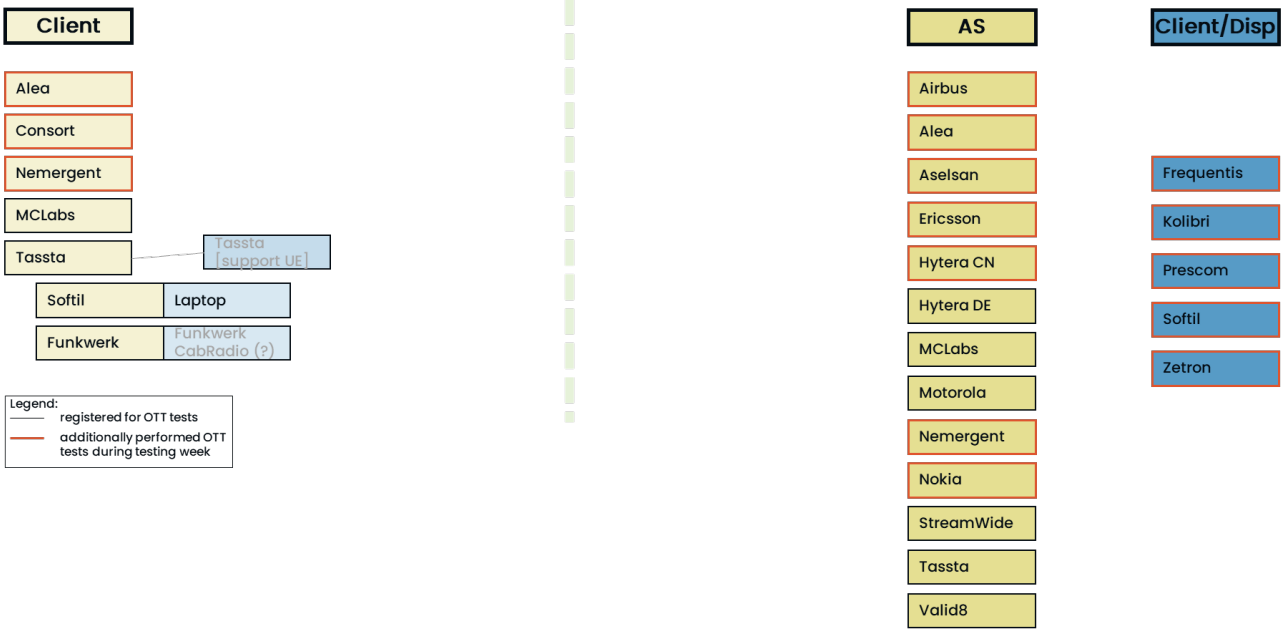


Figure 15. Available Equipment and integrations for Stream E: Over The Top Testing

9.4 Results per Test Case

The table 19 below provides the results for each test case in the scope of the Plugtests event. Test Cases numbering is referred from ETSI TS 103 564.

Table 19. Results per Test Case

TEST CASE #	PASS	FAIL
7.2.1	57 (95.0%)	3 (5.0%)
7.2.2	38 (92.7%)	3 (7.3%)
7.2.3	20 (100.0%)	0 (0.0%)
7.2.4	20 (95.2%)	1 (4.8%)
7.2.5	6 (100.0%)	0 (0.0%)
7.2.6	46 (100.0%)	0 (0.0%)
7.2.7	6 (100.0%)	0 (0.0%)
7.2.8	5 (100.0%)	0 (0.0%)
7.2.9	28 (93.3%)	2 (6.7%)
7.2.10	2 (100.0%)	0 (0.0%)
7.2.11	0 (0.0%)	0 (0.0%)
7.2.12	0 (0.0%)	0 (0.0%)
7.2.13	0 (0.0%)	0 (0.0%)
7.2.14	0 (0.0%)	0 (0.0%)
7.2.15	51 (98.1%)	1 (1.9%)
7.2.16	48 (98.0%)	1 (2.0%)
7.2.17	2 (100.0%)	0 (0.0%)
7.2.18	6 (100.0%)	0 (0.0%)
7.2.19	39 (95.1%)	2 (4.9%)
7.2.20	50 (98.0%)	1 (2.0%)
7.2.21	1 (100.0%)	0 (0.0%)
7.2.22	0 (0.0%)	0 (0.0%)
7.2.23	6 (100.0%)	0 (0.0%)
7.2.24	4 (100.0%)	0 (0.0%)
7.2.25	0 (0.0%)	0 (0.0%)
7.2.26	0 (0.0%)	0 (0.0%)
7.2.27	6 (85.7%)	1 (14.3%)
7.2.28	3 (75.0%)	1 (25.0%)
7.2.29	6 (100.0%)	0 (0.0%)
7.2.30	7 (100.0%)	0 (0.0%)
7.2.31	7 (87.5%)	1 (12.5%)
7.2.32	0 (0.0%)	0 (0.0%)
7.2.33	0 (0.0%)	0 (0.0%)
7.2.34	11 (100.0%)	0 (0.0%)
7.2.35	11 (100.0%)	0 (0.0%)
7.2.36	1 (100.0%)	0 (0.0%)
7.2.37	1 (100.0%)	0 (0.0%)
7.2.38	0 (0.0%)	0 (0.0%)
7.2.39	13 (92.9%)	1 (7.1%)

TEST CASE #	PASS	FAIL
7.2.40	0 (0.0%)	0 (0.0%)
7.2.41	1 (100.0%)	0 (0.0%)
7.2.42	13 (92.9%)	1 (7.1%)
7.2.43	0 (0.0%)	0 (0.0%)
7.2.44	1 (100.0%)	0 (0.0%)
7.2.45	2 (100.0%)	0 (0.0%)
7.2.46	0 (0.0%)	0 (0.0%)
7.2.47	0 (0.0%)	0 (0.0%)
7.2.48	0 (0.0%)	0 (0.0%)
7.2.49	2 (50.0%)	2 (50.0%)
7.2.50	4 (80.0%)	1 (20.0%)
7.2.51	0 (0.0%)	0 (0.0%)
7.2.52	0 (0.0%)	0 (0.0%)
7.2.53	0 (0.0%)	0 (0.0%)
7.2.54	4 (100.0%)	0 (0.0%)
7.2.55	5 (71.4%)	2 (28.6%)
7.2.56	5 (100.0%)	0 (0.0%)
7.2.57	3 (100.0%)	0 (0.0%)
7.2.58	5 (100.0%)	0 (0.0%)
7.2.59	0 (0.0%)	0 (0.0%)
7.2.60	4 (100.0%)	0 (0.0%)
7.2.61	0 (0.0%)	0 (0.0%)
7.2.62	0 (0.0%)	0 (0.0%)
7.2.63	15 (100.0%)	0 (0.0%)
7.2.64	1 (100.0%)	0 (0.0%)
7.2.65	1 (100.0%)	0 (0.0%)
7.2.66	0 (0.0%)	0 (0.0%)
7.2.67	0 (0.0%)	0 (0.0%)
7.2.68	0 (0.0%)	0 (0.0%)
7.2.69	1 (100.0%)	0 (0.0%)
7.2.70	0 (0.0%)	0 (0.0%)
7.2.71	0 (0.0%)	0 (0.0%)
7.2.72	0 (0.0%)	0 (0.0%)
7.2.73	0 (0.0%)	0 (0.0%)
7.2.74	0 (0.0%)	0 (0.0%)
7.2.75	0 (0.0%)	0 (0.0%)
7.2.76	0 (0.0%)	0 (0.0%)
7.2.77	1 (100.0%)	0 (0.0%)
7.2.78	3 (100.0%)	0 (0.0%)
7.2.79	2 (100.0%)	0 (0.0%)

TEST CASE #	PASS	FAIL
7.2.80	0 (0.0%)	0 (0.0%)
7.2.81	0 (0.0%)	0 (0.0%)
7.2.82	4 (100.0%)	0 (0.0%)
7.2.83	3 (75.0%)	1 (25.0%)
7.2.84	3 (100.0%)	0 (0.0%)
7.2.85	0 (0.0%)	0 (0.0%)
7.2.86	0 (0.0%)	0 (0.0%)
7.2.87	0 (0.0%)	0 (0.0%)
7.2.88	0 (0.0%)	0 (0.0%)
7.2.89	0 (0.0%)	0 (0.0%)
7.2.90	0 (0.0%)	0 (0.0%)
7.2.91	0 (0.0%)	0 (0.0%)
7.2.92	3 (100.0%)	0 (0.0%)
7.2.93	0 (0.0%)	0 (0.0%)
7.2.94	0 (0.0%)	0 (0.0%)
7.2.95	0 (0.0%)	0 (0.0%)
7.2.96	0 (0.0%)	0 (0.0%)
7.2.97	3 (100.0%)	0 (0.0%)
7.2.98	0 (0.0%)	0 (0.0%)
7.2.99	0 (0.0%)	0 (0.0%)
7.2.100	0 (0.0%)	0 (0.0%)
7.2.101	0 (0.0%)	0 (0.0%)
7.2.102	3 (100.0%)	0 (0.0%)
7.2.103	1 (100.0%)	0 (0.0%)
7.2.104	1 (100.0%)	0 (0.0%)
7.2.105	0 (0.0%)	0 (0.0%)
7.2.106	0 (0.0%)	0 (0.0%)
7.2.107	1 (100.0%)	0 (0.0%)
7.2.108	1 (100.0%)	0 (0.0%)
7.2.109	0 (0.0%)	0 (0.0%)
7.2.110	0 (0.0%)	0 (0.0%)
7.2.111	1 (100.0%)	0 (0.0%)
7.2.112	1 (100.0%)	0 (0.0%)
7.2.113	0 (0.0%)	0 (0.0%)
7.2.114	0 (0.0%)	0 (0.0%)
7.2.115	1 (100.0%)	0 (0.0%)
7.2.116	1 (100.0%)	0 (0.0%)
7.2.117	2 (100.0%)	0 (0.0%)
7.2.118	1 (100.0%)	0 (0.0%)
7.2.119	2 (100.0%)	0 (0.0%)

TEST CASE #	PASS	FAIL
7.2.120	4 (100.0%)	0 (0.0%)
7.2.121	0 (0.0%)	0 (0.0%)
7.2.122	0 (0.0%)	0 (0.0%)
7.2.123	0 (0.0%)	0 (0.0%)
7.2.124	0 (0.0%)	0 (0.0%)
7.2.125	0 (0.0%)	0 (0.0%)
7.2.126	1 (100.0%)	0 (0.0%)
7.2.127	1 (100.0%)	0 (0.0%)
7.2.128	2 (100.0%)	0 (0.0%)
7.2.129	2 (100.0%)	0 (0.0%)
7.2.130	2 (100.0%)	0 (0.0%)
7.2.131	0 (0.0%)	0 (0.0%)
7.2.132	0 (0.0%)	0 (0.0%)
7.3.1	59 (98.3%)	1 (1.7%)
7.3.2	6 (100.0%)	0 (0.0%)
7.3.3	12 (100.0%)	0 (0.0%)
7.3.4	4 (100.0%)	0 (0.0%)
7.3.5	2 (100.0%)	0 (0.0%)
7.3.6	2 (100.0%)	0 (0.0%)
7.3.7	5 (71.4%)	2 (28.6%)
7.3.8	0 (0.0%)	0 (0.0%)
7.3.9	0 (0.0%)	0 (0.0%)
7.4.1	56 (94.9%)	3 (5.1%)
7.4.2	76 (97.4%)	2 (2.6%)
7.4.3	71 (94.7%)	4 (5.3%)
7.4.4	0 (0.0%)	0 (0.0%)
7.4.5	0 (0.0%)	0 (0.0%)
7.5.1	3 (100.0%)	0 (0.0%)
7.5.2	6 (85.7%)	1 (14.3%)
7.5.3	0 (0.0%)	0 (0.0%)
7.5.4	1 (100.0%)	0 (0.0%)
7.5.5	0 (0.0%)	0 (0.0%)
7.5.6	0 (0.0%)	0 (0.0%)
7.5.7	0 (0.0%)	0 (0.0%)
7.5.8	0 (0.0%)	0 (0.0%)
7.5.9	0 (0.0%)	0 (0.0%)
7.5.10	3 (100.0%)	0 (0.0%)
7.5.11	0 (0.0%)	0 (0.0%)
7.5.12	0 (0.0%)	0 (0.0%)
7.5.13	0 (0.0%)	0 (0.0%)

TEST CASE #	PASS	FAIL
7.5.14	0 (0.0%)	0 (0.0%)
7.5.15	0 (0.0%)	0 (0.0%)
7.5.16	0 (0.0%)	0 (0.0%)
7.5.15	0 (0.0%)	0 (0.0%)
7.5.16	0 (0.0%)	0 (0.0%)
7.6.2	0 (0.0%)	0 (0.0%)
7.6.3	0 (0.0%)	0 (0.0%)
7.6.4	1 (100.0%)	0 (0.0%)
7.6.5	1 (100.0%)	0 (0.0%)
7.6.6	0 (0.0%)	0 (0.0%)
7.6.7	0 (0.0%)	0 (0.0%)
7.6.8	0 (0.0%)	0 (0.0%)
7.6.9	0 (0.0%)	0 (0.0%)
7.6.10	0 (0.0%)	0 (0.0%)
7.6.11	0 (0.0%)	0 (0.0%)
7.6.12	0 (0.0%)	0 (0.0%)
7.6.13	0 (0.0%)	0 (0.0%)
7.6.14	0 (0.0%)	0 (0.0%)
7.6.15	0 (0.0%)	0 (0.0%)
7.6.16	0 (0.0%)	0 (0.0%)
7.6.17	0 (0.0%)	0 (0.0%)
7.6.18	0 (0.0%)	0 (0.0%)
7.6.19	0 (0.0%)	0 (0.0%)
7.6.20	0 (0.0%)	0 (0.0%)
7.6.21	0 (0.0%)	0 (0.0%)
7.7.1	72 (98.6%)	1 (1.4%)
7.7.2	1 (100.0%)	0 (0.0%)
7.7.3	48 (90.6%)	5 (9.4%)
7.7.4	1 (100.0%)	0 (0.0%)
7.7.5	0 (0.0%)	0 (0.0%)
7.7.6	0 (0.0%)	0 (0.0%)
7.7.7	0 (0.0%)	0 (0.0%)
7.7.8	0 (0.0%)	0 (0.0%)
7.7.9	0 (0.0%)	0 (0.0%)
7.8.1	1 (50.0%)	1 (50.0%)
7.8.2	0 (0.0%)	0 (0.0%)
7.8.3	1 (50.0%)	1 (50.0%)
7.9.1	14 (100.0%)	0 (0.0%)
7.9.2	13 (100.0%)	0 (0.0%)
7.9.3	11 (100.0%)	0 (0.0%)

TEST CASE #	PASS	FAIL
7.9.4	4 (100.0%)	0 (0.0%)
7.9.5	9 (100.0%)	0 (0.0%)
7.9.6	0 (0.0%)	0 (0.0%)
7.9.7	3 (100.0%)	0 (0.0%)
7.9.8	2 (100.0%)	0 (0.0%)
7.9.9	0 (0.0%)	0 (0.0%)
7.9.10	2 (100.0%)	0 (0.0%)
7.9.11	0 (0.0%)	0 (0.0%)
7.10.1	3 (100.0%)	0 (0.0%)
7.10.2	1 (100.0%)	0 (0.0%)
7.10.3	1 (100.0%)	0 (0.0%)
7.10.4	1 (100.0%)	0 (0.0%)
7.10.5	0 (0.0%)	0 (0.0%)
7.10.6	0 (0.0%)	0 (0.0%)
7.10.7	3 (100.0%)	0 (0.0%)
7.10.8	3 (100.0%)	0 (0.0%)
7.10.9	0 (0.0%)	0 (0.0%)
7.10.10	3 (100.0%)	0 (0.0%)
7.10.11	2 (100.0%)	0 (0.0%)
7.10.12	0 (0.0%)	0 (0.0%)
7.10.13	0 (0.0%)	0 (0.0%)
7.10.14	0 (0.0%)	0 (0.0%)
7.10.15	0 (0.0%)	0 (0.0%)
7.10.16	0 (0.0%)	0 (0.0%)
7.10.17	0 (0.0%)	0 (0.0%)
7.11.1	3 (100.0%)	0 (0.0%)
7.11.2	0 (0.0%)	0 (0.0%)
7.11.3	0 (0.0%)	0 (0.0%)
7.11.4	0 (0.0%)	0 (0.0%)
7.12.1	0 (0.0%)	0 (0.0%)
7.12.2	0 (0.0%)	0 (0.0%)
7.13.1	10 (90.9%)	1 (9.1%)
7.13.2	9 (100.0%)	0 (0.0%)
7.13.3	2 (100.0%)	0 (0.0%)
7.13.4	2 (100.0%)	0 (0.0%)
7.13.5	0 (0.0%)	0 (0.0%)
7.13.6	0 (0.0%)	0 (0.0%)
7.13.7	6 (85.7%)	1 (14.3%)
7.13.8	1 (100.0%)	0 (0.0%)
7.13.9	0 (0.0%)	0 (0.0%)

TEST CASE #	PASS	FAIL
7.13.10	0 (0.0%)	0 (0.0%)
7.14.1	0 (0.0%)	0 (0.0%)
7.14.2	0 (0.0%)	0 (0.0%)
7.14.3	0 (0.0%)	0 (0.0%)
7.14.4	0 (0.0%)	0 (0.0%)
7.14.5	0 (0.0%)	0 (0.0%)
7.14.6	0 (0.0%)	0 (0.0%)
7.14.7	0 (0.0%)	0 (0.0%)
7.15.1	0 (0.0%)	0 (0.0%)
7.15.2	0 (0.0%)	0 (0.0%)
7.15.3	2 (100.0%)	0 (0.0%)
7.15.4	2 (100.0%)	0 (0.0%)
7.16.1	0 (0.0%)	0 (0.0%)
7.16.2	0 (0.0%)	0 (0.0%)
7.16.3	0 (0.0%)	0 (0.0%)
7.16.4	0 (0.0%)	0 (0.0%)
7.16.5	0 (0.0%)	0 (0.0%)
7.16.6	0 (0.0%)	0 (0.0%)
7.16.7	0 (0.0%)	0 (0.0%)
7.16.8	0 (0.0%)	0 (0.0%)
7.16.9	0 (0.0%)	0 (0.0%)
7.16.10	0 (0.0%)	0 (0.0%)
7.16.11	0 (0.0%)	0 (0.0%)
7.16.12	0 (0.0%)	0 (0.0%)
7.16.13	0 (0.0%)	0 (0.0%)
7.16.14	0 (0.0%)	0 (0.0%)
7.16.15	0 (0.0%)	0 (0.0%)
7.16.16	0 (0.0%)	0 (0.0%)
7.16.17	0 (0.0%)	0 (0.0%)
7.16.18	0 (0.0%)	0 (0.0%)
7.16.19	0 (0.0%)	0 (0.0%)
7.16.20	0 (0.0%)	0 (0.0%)
7.16.21	0 (0.0%)	0 (0.0%)
7.16.22	0 (0.0%)	0 (0.0%)
8.2.1	5 (100.0%)	0 (0.0%)
8.2.2	0 (0.0%)	0 (0.0%)
8.2.3	5 (100.0%)	0 (0.0%)
8.2.4	4 (100.0%)	0 (0.0%)
8.2.5	0 (0.0%)	0 (0.0%)
8.2.6	0 (0.0%)	0 (0.0%)

TEST CASE #	PASS	FAIL
8.2.7	0 (0.0%)	0 (0.0%)
8.2.8	0 (0.0%)	0 (0.0%)
8.2.9	0 (0.0%)	0 (0.0%)
8.2.10	0 (0.0%)	0 (0.0%)
8.2.11	0 (0.0%)	0 (0.0%)
8.2.12	0 (0.0%)	0 (0.0%)
8.2.13	0 (0.0%)	0 (0.0%)
8.2.14	0 (0.0%)	0 (0.0%)
8.2.15	0 (0.0%)	0 (0.0%)
8.2.16	0 (0.0%)	0 (0.0%)
8.2.17	0 (0.0%)	0 (0.0%)
8.2.18	0 (0.0%)	0 (0.0%)
8.2.19	0 (0.0%)	0 (0.0%)
11.2.1	2 (100.0%)	0 (0.0%)
11.2.2	2 (100.0%)	0 (0.0%)
11.2.3	0 (0.0%)	0 (0.0%)
11.2.4	0 (0.0%)	0 (0.0%)
11.2.5	0 (0.0%)	0 (0.0%)
11.3.1	6 (100.0%)	0 (0.0%)
11.3.2	0 (0.0%)	0 (0.0%)
11.3.3	0 (0.0%)	0 (0.0%)
11.3.4	6 (100.0%)	0 (0.0%)
11.3.5	0 (0.0%)	0 (0.0%)
11.3.6	0 (0.0%)	0 (0.0%)
11.3.7	0 (0.0%)	0 (0.0%)
11.3.8	1 (100.0%)	0 (0.0%)
11.3.9	2 (100.0%)	0 (0.0%)
11.3.10	0 (0.0%)	0 (0.0%)
11.3.11	0 (0.0%)	0 (0.0%)
11.3.12	0 (0.0%)	0 (0.0%)
11.3.13	2 (100.0%)	0 (0.0%)
11.3.14	0 (0.0%)	0 (0.0%)
11.3.15	2 (100.0%)	0 (0.0%)
11.3.16	2 (100.0%)	0 (0.0%)
11.3.17	1 (100.0%)	0 (0.0%)
11.3.18	1 (100.0%)	0 (0.0%)
11.3.19	2 (100.0%)	0 (0.0%)
11.3.20	3 (100.0%)	0 (0.0%)
11.3.21	2 (100.0%)	0 (0.0%)
11.3.22	2 (100.0%)	0 (0.0%)

TEST CASE #	PASS	FAIL
11.3.23	0 (0.0%)	0 (0.0%)
11.3.24	2 (100.0%)	0 (0.0%)
11.3.25	0 (0.0%)	0 (0.0%)
11.3.26	0 (0.0%)	0 (0.0%)
11.4.1	0 (0.0%)	0 (0.0%)
11.4.2	0 (0.0%)	0 (0.0%)
12.2.2	0 (0.0%)	0 (0.0%)
12.2.3	0 (0.0%)	0 (0.0%)
12.2.4	1 (100.0%)	0 (0.0%)
12.2.5	0 (0.0%)	0 (0.0%)
12.2.6	0 (0.0%)	0 (0.0%)
7.5.17	0 (0.0%)	0 (0.0%)
7.5.18	0 (0.0%)	0 (0.0%)
12.3.2	0 (0.0%)	0 (0.0%)
12.3.3	0 (0.0%)	0 (0.0%)
12.3.4	0 (0.0%)	0 (0.0%)
12.3.5	0 (0.0%)	0 (0.0%)
12.3.6	0 (0.0%)	0 (0.0%)
Dummy	2 (66.7%)	1 (33.3%)

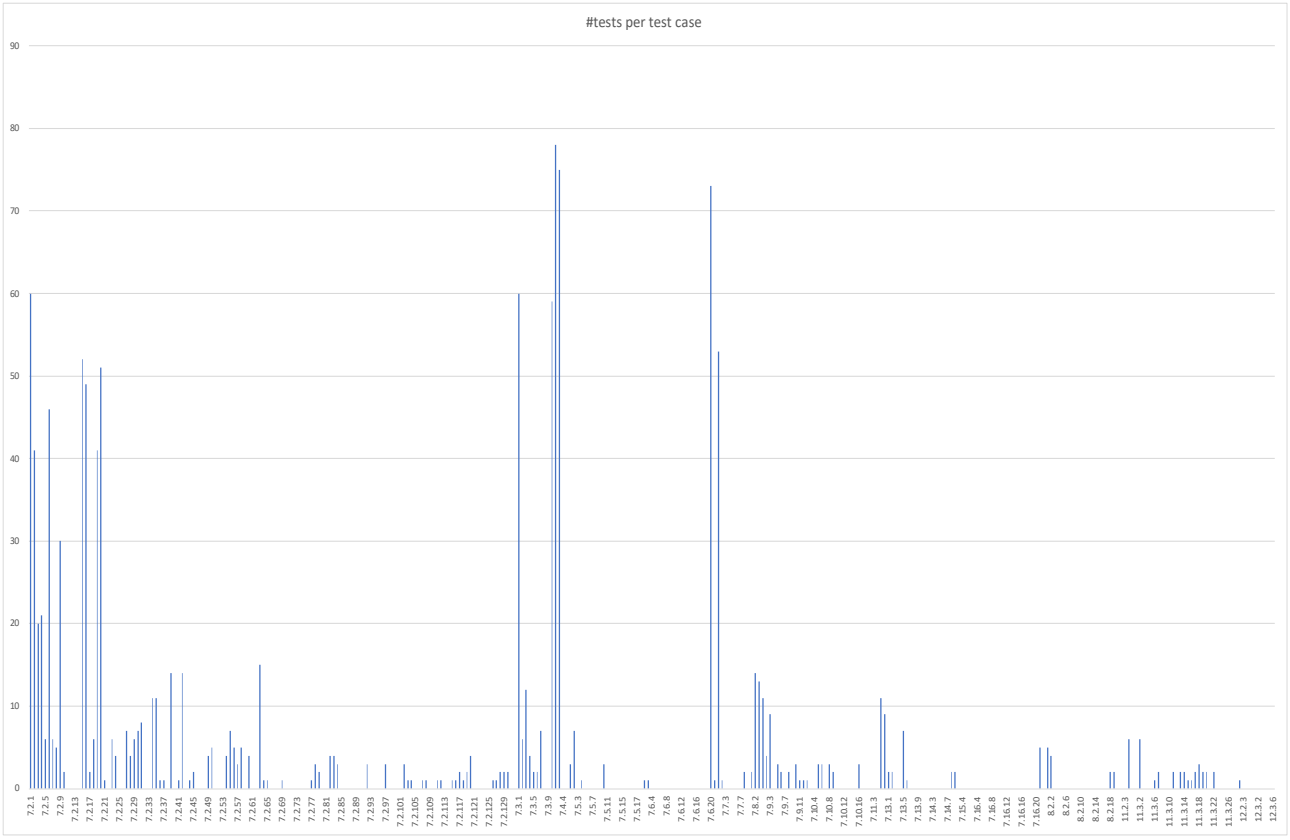


Figure 16. Number of tests done per test case

10 Plugtests Observations

As a result of the Plugtests event activities some issues in 3GPP Technical Specifications (TSs) and related standards were identified together with practical deployment problems that may demand some clarification or feedback from the related SDOs. We have classified those aspects into the following two categories:

- **Observations to MCX Standards**: Missing, erroneous or ambiguous definition of procedures in 3GPP's MCPTT TSs.
- **Technical constraints**: Related to implementation issues, not covered by the standards, but which need to be faced by MCX vendors in most deployments.

The reader should note that 3GPP Release 17 was considered for the seventh MCX Plugtests event.

The 7^{h} MCX Plugtests event team wants to thank all the participants in the Plugtests for kindly sharing the following lessons learned. Specific actions towards pushing this feedback to relevant TSGs in 3GPP have already been started at the time of the release of this report.

10.1 Observations

10.1.1 [EDITORIAL] wrong reference to the terminating participating behaviour for prearranged group call in TS 24.379 from TS 29.379

Section 10.1.3.2 in TS 29.379 refers in step 4) to: "shall perform the steps in 3GPP TS 24.379 [29], clause 10.1.2.1.2."

However, such clause does not exist in TS 24.379 and it seems that it refers either to the terminating participating behaviour in 24.379 10.1.1.3.2: "Upon receipt of a "SIP INVITE request for terminating participating MCPTT function", the participating MCPTT function:" or even clause 10.1.2.2 in 29.379 itself.

10.1.2 Routing of Interworking Security Data messages

Section 14.1.1 in 3GPP TS 29.379 defines how to convey the Interworking Security Data messages to the targeted MCPTT user but no mcptt-calling-user-id nor role of the IWF as controlling is considered.

10.1.3 Uncertainties in N33 related API definition

N33 service definition and actual stage 3 REST API (i.e Nnef_AFsessionWithQoS) is not clear in the core TSs.

10.1.4 [EDITORIAL] wrong order in Section 10.1.2.4.1.1 in TS 24.379

2A) if the group document contains a <list-service> element that contains a <preconfigured-group-use-only> element that is set to the value "true", shall shall reject the SIP INVITE request with a SIP 403 (Forbidden) response with the warning text set to "167 call is not allowed on the preconfigured group" as specified in clause 4.4 "Warning header field" and skip the rest of the steps;

3) if received SIP INVITE request includes an application/vnd.3gpp.mcptt-info+xml MIME body with an <emergency-ind> element included or an <imminentperil-ind> element included, shall validate the request as described in clause 6.3.3.1.17;

4) shall retrieve the necessary group document(s) from the group management server for the group identity contained in the SIP INVITE request and carry out initial processing as specified in clause 6.3.5.2 and continue with the rest of the steps if the checks in clause 6.3.5.2 succeed;

10.1.5 Behaviour of not-controlling in IMCX in chat group call

<associated-group-id> is not used, therefore the originating participating when receiving the INVITE for the temporary group will always call the controlling in the partner system. Therefore, it is not clear how to reach Section 10.1.2.5.1.8 in TS 24.379.Furthermore, the reference to prearranged is unclear: Upon receipt of other final SIP responses with the exception of the SIP 2xx response to the INVITE request sent to the controlling MCPTT function as specified above, the non-controlling MCPTT function: 1) shall send the SIP ACK response to the controlling MCPTT function as specified in 3GPP TS 24.229 [4]; and 2) perform the actions in the clause 10.1.1.5.2.4. NOTE 4: Regardless if the

controlling MCPTT function accepts or rejects the SIP INVITE request sent above the prearranged group session continues to be initiated with only the members of the...

It seems to be a copy and paste from 10.1.1.5.5

10.1.6 Mutual aid trusted relationship in inter-MCX MCVideo

In Clause 9.2.1.4.1.2 TS 24.281 for the controlling the equivalent to MCPTT trusted relationship is suggested but not confirmed due to lack of stage 2 definition.

Upon receiving SIP 403 (Forbidden) response for the SIP INVITE request, if according to local policy and if: 1) the response contains a Warning header field with the MCVideo warning code "128"; and 2) the response contains a P-Refused-URI-List header field and an application/resource-lists+xml MIME body as specified in IETF RFC 5318 [28]; NOTE 9: The application/resource-lists+xml MIME body contains MCVideo IDs identifying MCVideo users in a interconnected MCVideo system that needs to be invited to the prearranged group call in case of group regrouping using interrogating method. Editor's Note: The above note currently isn't defined in the 23.280 and 23.281

Similarly for the non-controlling part in 9.2.1.5.2.2 step 5.

4) if the partner MCVideo system does not have a mutual aid relationship with the primary MCVideo system identified by the contents of the P-Asserted-Identity, shall reject the "SIP INVITE request for non-controlling MCVideo function of an MCVideo group" with a SIP 403 (Forbidden) response, with warning text set to "128 isfocus already assigned" in a Warning header field as specified in clause 4.4, and shall not process the remaining steps; 5) void NOTE : In 3GPP TS 24.379 clause 10.1.1.5.2.2, step 5 deals with "a trusted mutual aid relationship … between the partner MCPTT system and the primary MCPTT system" and references 3GPP TS 23.379 clause 10.6.2.4.2. There is no equivalent clause in 3GPP TS 23.281. If 3GPP TS 23.281 were to include an equivalent clause, this step 5 can be used for a step 5 equivalent to that of 3GPP TS 24.379.

10.1.7 Mutual aid trusted relationship in inter-MCX MCVideo prearranged

How to reach 9.2.1.5.5 in TS 24.281 is unclear since the originating participating part does not define the mechanism to forward the request based on the constituent.

10.1.8 MCVideo inter-MCX chat group call

Reference to the 302 message in 6.3.5.2 was removed in TS 24.281 but still present on the originating participating one related section (9.2.1.3.1.1), therefore, behaviour of the controlling and participated not synched in in V17.8.0).

10.1.9 Terminating participating behaviour (for users in prestablished sessions) upon emergency call

In 10.1.1.3.2 (behaviour of participating in prearranged group call) in 3GPP TS 23.479 there are some prior comments regarding emergency and imminent-peril indications. However later there are no more references to those indications not related behaviour. Furthermore, there is a specific section 8.3.2.2 for participating MCPTT function's needs to modify the pre-established session outside of an MCPTT call but no other section links both participating MCPTT function and controlling.

10.1.10 Unclear update of the prestablished session on the orginating side in a private call over prestablished session

Unlike in group call (where the controlling triggers a reINVITE back to the calling end to modify the session) there is no reference to any similar behaviour for private call.The <mcptt-calling-user-id> needs to be put in the <mcptt-Params>. With this formulation, it seems it should be put in the <mcpttinfo>.

10.1.11 [EDITORIAL] Wording not clear in TS 33.180

Section 7.4.2 in TS 33.180 states "As a result of this mechanism, the group members share a GMK and GUK-ID". However, each group member actually has a different GUK-ID. So according to the feedback of some Plugtests participants, it could be good to be rephrased, since there it may suggest they share the same one.

11 Observer Program

The Observers contributed to the MCX Plugtests in the definition of the scope and scenarios, in the Observer Program and for the Observer demo.

11.1 Preparation Phase

During equipment registration, interested vendors provided their intention to showcase during the observer demo. Test cases from ETSI TS 103 564 were used for the observer demo.

11.2 Observer Round Table Discussion

Observer round table discussions were organised on 8th November 9:00 – 13:00 during MCX Plugtests event which focused on sharing of ideas and strategies for testing mission critical networks and the eco-system.

11.3 Observer Presentations

Observer programme is a presentation program during MCX Plugtests event which focused on the deployment plans and challenges of mission critical services.
The observer program provided a platform to the various stake holders in the critical communication industry to discuss the progress of MCS technology. The speakers were from government organisations, operators, regulators, users, associations which provide updates on deployment plans in their respective countries, pilot projects and updates on standards.

The observer program was conducted during half a day on 09th November 2022. The speakers presented to program outlined in Table 20.
Presentations in the observer program and the Questions & Answers are available on the Plugtests WIKI.

Presentations included:

Moderator – Guillaume Gach

Program	Name/Organisation	Allocated Time
Status of the Finnish Virve 2 program	Kari Juntilla / Erillisverkot	9:30 - 9:50
Update on TCCA Activities	Harald Ludwig / TCCA	9:50 - 10:10
MCS Certification Programme	Asif Hamidullah / GCF	10:10 - 10:30
Broadband Callout (paging) and work done in the TCCA CCBG Task Force	Hans Petter Naper / DSB	10:30 - 10:50
Status of the future French PPDR Broadband network	Renaud Mellies / French MoI	10:50 – 11:10
Coffee Break – 30mins		
FRMCS standardization status	Guillaume Gach / UIC	11:40 - 12:00
FRMCS Conformance Certification Programme	Asif Hamidullah /GCF	12:00 – 12:20
How can base stations recognise MCPTT group calls as half duplex	Nathan Jeyaratnarajah / UK Home Office	12:20 – 12:40
Swedish Rakel G2 project Status	Granath Anders / MSB Sweden	12:40 – 13:00
5G-EPICENTRE Project	Almudena Diaz (UMA)	13:00 – 13:20

Table 20. Observer Program

11.4 Observer Demos

The Observer Demo was a possibility for vendors to present their solutions and features to the observers. The demos took place during the half day on 10 November 2022. The following demos were presented:

Demo no.	Time	Participants	Test Cases
#3	09:00 – 09:20	Ericsson, Zetron	7.2.2, 7.2.9, 7.2.10, 7.2.15, 7.2.16, 7.2.19, 7.2.20, 9.3
#9	09:30 – 09:50	Ericsson, Softil	7.2.9, 7.2.10, 7.2.15, 7.2.16, 7.2.19, 7.2.20
#4	09:50 – 10:20	Motorola, Softil	7.2.128, 7.2.129, 7.2.130, 7.15.3, 7.15.4
#8	10:30 – 10:50	Alea, Athonet, Softil	7.2.1, 7.2.20, 7.2.42, 7.2.55, 7.2.56
#7	10:50 – 11:00	Alea, Athonet, Crosscall	7.5.9
#5	11:00 – 11:20	Motorola, Nemergent	7.10.10, 7.10.11
#2	11:20 – 12:00	Nemergent, Frequentis, Ervocom, Crosscall	7.2.1, 7.2.2, 7.2.3, 7.2.4, 7.2.5, 7.2.9, 7.2.10, 7.2.15, 7.2.16, 7.2.30, 7.2.49, 7.2.50, 7.2.58, 7.2.122, 7.3.1, 7.3.2, 7.3.6, 7.13.1, 7.13.2, 7.13.4, 7.15.1, 7.15.2, 7.15.3, 7.15.4, 7.2.83, 7.2.120
#1	12:10 – 12:30	Nemergent, Rohill, Crosscall	11.3.1, 11.3.4, 11.3.9, 11.3.13, 11.3.20
#6	12:30 – 12:50	MCS-TaaSting, Nemergent, Crosscall	Conformance tests

Table 21. Observer Demos

History

Document history		
V0.0.0	22/11/2022	First Draft
V0.1.0	01/12/2022	Stable Draft
V0.2.0	06/12/2022	Stable Draft with additions to statistics
V0.2.1	07/12/2022	Figures 13-17 updated
V0.3.0	07/12/2022	Logos updated
V0.4.0	13/12/2022	Corrections
V1.0.0	14/12/2022	Final Report Published