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LTE;
Mission Critical (MC) services over LTE;
Part 5: Abstract test suite (ATS)
(3GPP TS 36.579-5 version 17.4.0 Release 17)



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Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

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The present document is part 1 of a multi-part conformance test specification for Mission Critical services over LTE consisting of:

3GPP TS 36.579-1 [2]: "Mission Critical (MC) services over LTE; Part 1: Common test environment"

3GPP TS 36.579-2 [3]: "Mission Critical (MC) services over LTE; Part 2: Mission Critical Push To Talk (MCPTT) User Equipment (UE) Protocol conformance specification"

3GPP TS 36.579-3 [4]: "Mission Critical (MC) services over LTE; Part 3: Mission Critical Push To Talk (MCPTT) Server Application conformance specification"

3GPP TS 36.579-4 [5]: "Mission Critical (MC) services over LTE; Part 4: Test Applicability and Implementation Conformance Statement (ICS) proforma specification"

3GPP TS 36.579-5: "Mission Critical (MC) services over LTE; Part 5: Abstract test suite (ATS)" (the present specification)

3GPP TS 36.579-6 [59]: "Mission Critical (MC) services over LTE; Part 6: Mission Critical Video (MCVideo) User Equipment (UE) Protocol conformance specification"

3GPP TS 36.579-7 [60]: "Mission Critical (MC) services over LTE; Part 7: Mission Critical Data (MCData) User Equipment (UE) Protocol conformance specification"

1 Scope

The present document specifies the protocol and signalling conformance testing in TTCN-3 for the Mission Critical services over LTE signalling and protocol requirements defined by 3GPP.

The following TTCN test specification and design considerations can be found in the present document:

- the test system architecture;
- the overall test suite structure;
- the test models and ASP definitions;
- the test methods and usage of communication ports definitions;
- the test configurations;
- the design principles and assumptions;
- TTCN styles and conventions;
- the partial Implementation eXtra Information for Testing (IXIT) proforma;
- the test suites.

The Abstract Test Suites designed in the document are based on the test cases specified in 3GPP TS 36.579-2 [3], TS 36.579-6 [59] and TS 36.579-7 [60]. The test cases specified in 3GPP TS 36.579-3 [4] are out of scope of the present document.

The applicability of the individual test cases is specified in the test ICS proforma specification in 3GPP TS 36.579-4 [5]. Where appropriate the Abstract Test Suites belonging to the present specification may refer to other Abstract Test Suites e.g. 3GPP TS 36.523-3 [27] for test requirements related to the EPS (LTE) bearers which carry the Mission Critical services data.

The present document is valid for TTCN development for Mission Critical services clients' conformance tests according to 3GPP Releases starting from Release 14 up to the Release indicated on the cover page of the present document.

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document* unless the context in which the reference is made suggests a different Release is relevant (information on the applicable release in a particular context can be found in e.g. test case title, description or applicability, message description or content).

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 36.579-1: "Mission Critical (MC) services over LTE; Part 1: Common test environment".

[3] 3GPP TS 36.579-2: "Mission Critical (MC) services over LTE; Part 2: Mission Critical Push To Talk (MCPTT) User Equipment (UE) Protocol conformance specification".

[4] 3GPP TS 36.579-3: "Mission Critical (MC) services over LTE; Part 3: Mission Critical Push To Talk (MCPTT) Server Application conformance specification".

- [5] 3GPP TS 36.579-4: "Mission Critical (MC) services over LTE; Part 4: Test Applicability and Implementation Conformance Statement (ICS) proforma specification".
- [6] 3GPP TS 36.523-1: "User Equipment (UE) conformance specification; Part 1: Protocol conformance specification"
- [7] 3GPP TS 22.179: "Mission Critical Push To Talk (MCPTT) over LTE; Stage 1".
- [8] Void.
- [9] 3GPP TS 24.379: "Mission Critical Push To Talk (MCPTT) call control; Protocol specification".
- [10] 3GPP TS 24.380: "Mission Critical Push To Talk (MCPTT) floor control; Protocol specification".
- [11] 3GPP TS 24.481: "Mission Critical Services (MCS) group management; Protocol specification".
- [12] 3GPP TS 24.482: "Mission Critical Services (MCS) identity management; Protocol specification".
- [13] 3GPP TS 24.483: "Mission Critical Services (MCS) Management Object (MO)".
- [14] 3GPP TS 24.484: "Mission Critical Services (MCS) configuration management; Protocol specification".
- [15] 3GPP TS 33.179: "Security of Mission Critical Push-To-Talk (MCPTT)".
- [16] 3GPP TS 24.229: "IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3".
- [17] 3GPP TS 24.237: "IP Multimedia Subsystem (IMS) Service Continuity; Stage 3".
- [18] 3GPP TS 29.468: "Group Communication System Enablers for LTE (GCSE_LTE); MB2 Reference Point; Stage 3".
- [19] 3GPP TS 24.301: "Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3".
- [20] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols; Stage 3".
- [21] 3GPP TS 23.003: "Numbering, addressing and identification".
- [22] ISO/IEC 9646-1: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concepts".
- [23] ISO/IEC 9646-7: "Information technology - Open systems interconnection - Conformance testing methodology and framework - Part 7: Implementation Conformance Statements".
- [24] 3GPP TS 23.303: "Proximity-based services (ProSe); Stage 2".
- [25] IETF RFC 4566 (July 2006): "SDP: Session Description Protocol".
- [26] 3GPP TS 26.171: "Speech codec speech processing functions; Adaptive Multi-Rate - Wideband (AMR-WB) speech codec; General description".
- [27] 3GPP TS 36.523-3: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); User Equipment (UE) conformance specification; Part 3: Test suites".
- [28] 3GPP TS 34.229-3: "Internet Protocol (IP) multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); User Equipment (UE) conformance specification; Part 3: Abstract Test Suites (ATS)".
- [29] ISO/IEC 9646-1: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concepts".
- [30] ISO/IEC 9646-7: "Information technology - Open systems interconnection - Conformance testing methodology and framework - Part 7: Implementation Conformance Statements".

- [31] ETSI ES 201 873-1: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 1: TTCN-3 Core Language".
- [32] IETF RFC 3711: "The Secure Real-time Transport Protocol (SRTP)".
- [33] 3GPP TS 27.007: "AT command set for User Equipment (UE)".
- [34] IETF RFC 4661: "An Extensible Markup Language (XML)-Based Format for Event Notification Filtering".
- [34] IETF RFC 4826: "Extensible Markup Language (XML) Formats for Representing Resource Lists".
- [35] W3C: "XML Encryption Syntax and Processing Version 1.1", <https://www.w3.org/TR/xmlenc-core1/>.
- [36] W3C: "XML Signature Syntax and Processing (Second Edition)", <http://www.w3.org/TR/xmldsig-core/>.
- [37] OMA - poc_listService-v1_0: "List Service".
- [40] OMA - xdm_commonPolicy-V1_0: "XDM - Common Policy".
- [39] OMA - xdm_extensions-v1_0: "XDM - XDM2 - Extensions".
- [40] OMA - xdm_rsrclst_urisusage-v1_0: "Resource List - URI usage".
- [41] W3C: "XML Encryption Syntax and Processing Version 1.1", <https://www.w3.org/TR/xmlenc-core1/>.
- [42] W3C: "XML Signature Syntax and Processing (Second Edition)", <http://www.w3.org/TR/xmldsig-core/>.
- [43] 3GPP TS 33.180: "Security of the mission critical service".
- [44] IETF RFC 6507: "Elliptic Curve-Based Certificateless Signatures for Identity-Based Encryption (ECCSI)".
- [45] IETF RFC 6508: "Sakai-Kasahara Key Encryption (SAKKE)".
- [46] IETF RFC 6509 (February 2012): "MIKEY-SAKKE: Sakai-Kasahara Key Encryption in Multimedia Internet KEYing (MIKEY)".
- [47] IETF RFC 3394: "Advanced Encryption Standard (AES) Key Wrap Algorithm".
- [48] W3C: "XML Signature Syntax and Processing (Second Edition)", <http://www.w3.org/TR/xmldsig-core/>.
- [49] IETF RFC 7515: "JSON Web Signature (JWS)".
- [50] IETF RFC 5261: "An Extensible Markup Language (XML) Patch Operations Framework Utilizing XML Path Language (XPath) Selectors".
- [51] IETF RFC 5874: "An Extensible Markup Language (XML) Document Format for Indicating a Change in XML Configuration Access Protocol (XCAP) Resources".
- [52] IETF RFC 4354: "A Session Initiation Protocol (SIP) Event Package and Data Format for Various Settings in Support for the Push-to-Talk over Cellular (PoC) Service".
- [53] IETF RFC 3986: "Uniform Resource Identifier (URI): Generic Syntax".
- [54] 3GPP TS 23.280: "Common functional architecture to support mission critical services".
- [55] 3GPP TS 24.281: "Mission Critical Video (MCVideo) signalling control; Protocol specification"
- [56] 3GPP TS 24.581: "Mission Critical Video (MCVideo) media plane control; Protocol specification"

- [57] 3GPP TS 24.282: "Mission Critical Data (MCData) signalling control; Protocol specification"
- [58] 3GPP TS 24.582: "Mission Critical Data (MCData) media plane control; Protocol specification"
- [59] 3GPP TS 36.579-6: "Mission Critical (MC) services over LTE; Part 6: Mission Critical Video (MCVideo) User Equipment (UE) Protocol conformance specification"
- [60] 3GPP TS 36.579-7: "Mission Critical (MC) services over LTE; Part 7: Mission Critical Data (MCData) User Equipment (UE) Protocol conformance specification"
- [61] 3GPP TS 36.508: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); Common Test Environments for User Equipment (UE) Conformance Testing".
- [62] IETF RFC 4122: "A Universally Unique IDentifier (UUID) URN Namespace"
- [63] IETF RFC 5245: "Interactive Connectivity Establishment (ICE): A Protocol for Network Address Translator (NAT) Traversal for Offer/Answer Protocols"
- [64] IETF RFC 3830: "MIKEY: Multimedia Internet KEYing".
- [65] IETF RFC 6509 (February 2012): "MIKEY-SAKKE: Sakai-Kasahara Key Encryption in Multimedia Internet KEYing (MIKEY)".
- [66] IETF RFC 6043: "MIKEY-TICKET: Ticket-Based Modes of Key Distribution in Multimedia Internet KEYing (MIKEY)".
- [67] IETF RFC 3550: "RTP: A Transport Protocol for Real-Time Applications".
- [68] IETF RFC 4975: "The Message Session Relay Protocol (MSRP)".
- [69] IETF RFC 2616: "Hypertext Transfer Protocol -- HTTP/1.1".
- [70] ETSI ES 201 873-11: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 11: Using JSON with TTCN-3".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

In addition for the purposes of the present document, the following terms, definitions, symbols and abbreviations apply:

- such given in ISO/IEC 9646-1 [22] and ISO/IEC 9646-7 [23]

NOTE: Some terms and abbreviations defined in [22] and [23] are explicitly included below with small modification to reflect the terminology used in 3GPP.

Implementation eXtra Information for Testing (IXIT): A statement made by a supplier or implementer of an UEUT which contains or references all of the information (in addition to that given in the ICS) related to the UEUT and its testing environment, which will enable the test laboratory to run an appropriate test suite against the UEUT.

IXIT proforma: A document, in the form of a questionnaire, which when completed for an UEUT becomes an IXIT.

Protocol Implementation Conformance Statement (PICS): An ICS for an implementation or system claimed to conform to a given protocol specification.

Protocol Implementation eXtra Information for Testing (PIXIT): An IXIT related to testing for conformance to a given protocol specification.

3.2 Symbols

No specific symbols have been identified so far.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

ASP	Abstract Service Primitive
ICS	Implementation Conformance Statement
IXIT	Implementation eXtra Information for Testing
MC	Mission Critical
MCDATA	Mission Critical Data
MCPTT	Mission Critical Push To Talk
MCS	Mission Critical Services
MCVideo	Mission Critical Video
PTC	Parallel Test Component
RTCP	RTP Control Protocol
RTP	Real-time Transport Protocol
SRTCP	Secure RTCP
SRTP	Secure RTP
SS	System Simulator
SSRC	Synchronization SouRCe
TC	Test Case
UE	User Equipment

4 Test system architecture

4.1 General system architecture

The architecture specified in TS 36.523-3 [27] applies to the present document.

4.2 Component architecture

The architecture specified in TS 36.523-3 [27] applies to the present document, with the exception that only one RAT, E-UTRAN, is within the scope of the present document.

5 Test models

5.1 MCX test model with TTCN based E-UTRA/EPC implementation (MCX EUTRA test model)

5.1.1 MCX Client on-network test model

The MCX Client on-network test model is depicted in figure 5.1.1-1. The test model consists of an IMS component and an HTTP component, on top of the multi-testers test model (E-UTRA) specified in TS 34.229-3 [28]. These parallel test components (PTCs) handle the IMS and HTTP signalling asynchronously.

The IMS PTC controls the IPCanEmu and the IP PTC. IPCanEmu is responsible for handling the E-UTRA cell(s) configuration in the SS as well as the E-UTRA/EPC level signalling and related procedures. The IPCanEmu is based on the TTCN implementation used for E-UTRA/EPC conformance testing according to TS 36.523-3 [27]. The IP PTC

controls the IP related configurations as described in TS 36.523-3[27]. In addition there is an SRTP port at the MCX IMS PTC mapped to the system interface to configure SRTP/SRTCP for media streams and media control messages (see clause 7.1.1.3). The media control messages are exchanged between TTCN and the system simulator via the IP PTC's IP SOCK port (see clause 7.1.1.4 and clause 7.1.1.5) whereas the media stream messages are handled by the SS (see clause 7.1.1.5).

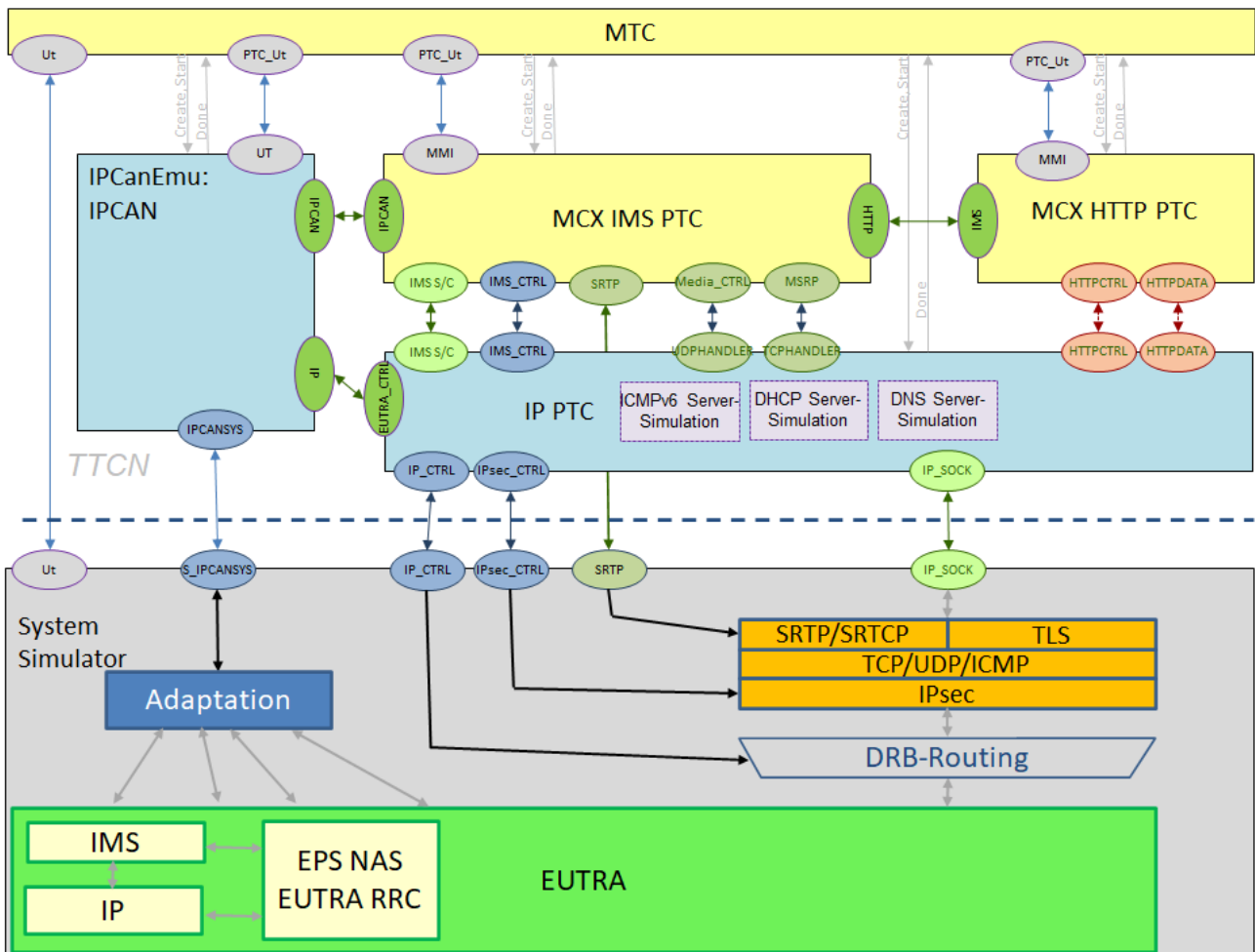


Figure 5.1.1-1: MCX Client on-network test model with TTCN based E-UTRA/EPC implementation

5.1.2 MCX Client off-network test model

This test model is not supported by the present version of the specification.

5.2 MCX test model with SS based E-UTRA/EPC implementation (MCX IPCAN test model)

5.2.1 MCX Client on-network test model

In contrast to the MCX EUTRA test model the MCX IPCAN test model shown in figure 5.2.1-1 uses an external E-UTRA/EPC (black-box) implementation which is integrated in the system simulator. In general this E-UTRA/EPC implementation shall be conformant in terms of TS 36.508 [61] but this is out of the scope for the MCX IPCAN test model as long as the E-UTRA/EPC implementation obeys the commands at the system interface as specified in annex E.

NOTE: Whether or how the MCX IPCAN test model may use other IP-connectivity access networks is out of scope of this specification.

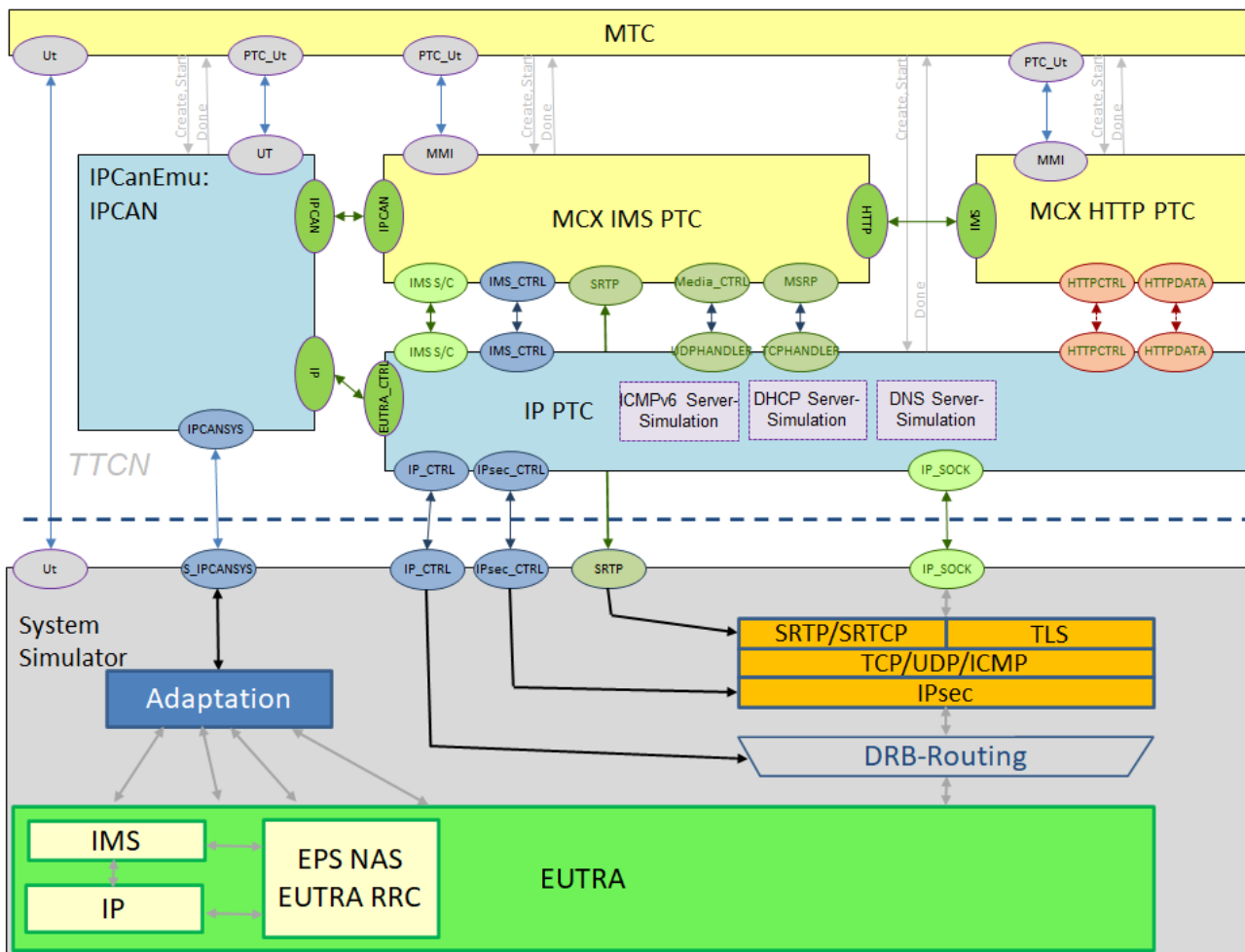


Figure 5.2.1-1: MCX Client on-network test model with SS based E-UTRA/EPC implementation

As described in clause 5.4.1A of TS 36.579-1 [2] after switch on the UE may register to an internet PDN, an IMS PDN and the MCX PDN. Nevertheless in TTCN the MCX IPCAN test model supports signalling for the MCX PDN only: The IPCAN test model does not handle any signalling for the other PDNs and especially not the SIP signalling for an IMS registration to the IMS PDN.

⇒ It is up to SS implementation to handle the potential registrations to an internet PDN and/or an IMS PDN.

To avoid conflicts due to use of one and the same value at the SS and in TTCN, the SS gets configured at the IPCAN configuration port (IPCANSYS) with the information shown in table 5.2.1-1 and table 5.2.1-2.

Table 5.2.1-1: Default EPS bearer(s)

Parameter	PDN	Value/Comment (NOTE 1)
Bearer ID (NOTE 2)	MCX	px_MCX_IPCAN_EpsBearerId_MCX
	IMS	px_MCX_IPCAN_EpsBearerId_IMS
	Internet	px_MCX_IPCAN_EpsBearerId_INTERNET
NW IP address	MCX	Not configured at IPCAN interface but used by TTCN: px_IPv4_Address1_NW, px_IPv6_Address1_NW
	IMS	px_IPv4_Address2_NW, px_IPv6_Address2_NW
	Internet	px_IPv4_Address3_NW, px_IPv6_Address3_NW
UE IP address	MCX	Not configured at IPCAN interface but used by TTCN: px_IPv4_Address1_UE, px_IPv6_Address1_UE
	IMS	px_IPv4_Address2_UE, px_IPv6_Address2_UE
	Internet	px_IPv4_Address3_UE, px_IPv6_Address3_UE

NOTE 1: Values may change depending on TTCN implementation
 NOTE 2: The DRB associated with the EPS bearer shall have the DRB ID := EPS Bearer ID – 4.

Table 5.2.1-2: Dedicated EPS bearer(s)

Parameter	Service	Value/Comment (NOTE 1)		
Bearer ID (NOTE 2)	MCPTT	px_MCX_IPCAN_DedicatedEpsBearerId_MCPTT		
	MCVideo	px_MCX_IPCAN_DedicatedEpsBearerId_MCVideo		
	MCDData	px_MCX_IPCAN_DedicatedEpsBearerId_MCDData		
Packet filters	MCPTT	Audio	Remote port range	tsc_MCX_MediaPort_Audio .. tsc_MCX_MediaPort_Audio + 1
			Protocol	UDP
		Media Control	Single remote port	tsc_MCX_MediaControlPortNW
			Protocol	UDP
	MCVideo	Audio	Remote port range	tsc_MCX_MediaPort_Audio .. tsc_MCX_MediaPort_Audio + 1
			Protocol	UDP
		Video	Remote port range	tsc_MCX_MediaPort_Video .. tsc_MCX_MediaPort_Video + 1
			Protocol	UDP
		Media Control	Single remote port	tsc_MCX_MediaControlPortNW
			Protocol	UDP
	MCDData	Single remote port	tsc_MCDData_MediaPort_MSRP	
		Protocol	TCP	
NOTE 1, 2: see Table 5.2.1-1.				

6 System interface

6.1 Upper tester interface

The Upper Tester (UT) interface is the same as defined in TS 36.523-3 [27] clause 5. In addition there are the MCX specific MMI commands of table 6.1-1 and the MCX specific AT commands of table 6.1-2.

Table 6.1-1: MMI commands

Command	Parameters		ResultString
	Name	Value	
"MCX_USERACTION"	"UserAction"	<charstring>	(none)
"MCX_USERCHECK"	"UserCheck"	<charstring>	"YES" if the check is successful, "NO" otherwise

Table 6.1-2.: AT Commands

Command	Reference
AT+CAPTT	TS 27.007 [33]

6.2 Abstract system primitives

This clause specifies the abstract system primitives (ASPs) used on the system interface to configure and control the SS. The MCX test system interface re-uses the ASPs specified in TS 36.523-3 [27] (see clause 6 and Annex D) and TS 34.229-3 [28] (see clause 6).

7 Test methods and design considerations

7.0 Introduction

The present document focusses on on-network client test cases for MCPTT (TS 36.579-2 [3]), MCVideo (TS 36.579-6 [59]) and MCData (TS 36.579-7 [60]). The major test behaviour and the verdict assignment of the test cases happens at the MCX IMS PTC and the MCX HTTP PTC as shown in Figure 5.2.1-1 and Figure 5.2.1-2.

7.1 Media plane signalling

In addition to the HTTP and SIP signalling over control plane as used for the procedures in TS 24.379 [9], TS 24.281 [55] and TS 24.281 [57] there are MCX-specific procedures using the media plane as specified in TS 24.380 [10], TS 24.581 [56] and TS 24.581 [58].

7.1.1 MCPTT

7.1.1.1 Void

7.1.1.2 UDP/IP handling

The same mechanisms specified in TS 36.523-3 [27] for UDP/IP configuration and Routing Table configuration are applied.

For MCPTT test cases with RTP/RTCP media streams, the TTCN shall configure the loopback mode specified in TS 36.523-3 [27] subclause 4.2.4.4.

7.1.1.3 RTP/RTCP handling

The RTP/RTCP loopback mechanism specified in TS 36.523-3 [27] applies as baseline.

MCPTT test cases require SRTP (secure RTP) for their media stream, which means that the loopback mechanism needs to be enhanced: the RTP/RTCP packet in uplink needs to be decrypted with the Rx or uplink key, encrypted with the Tx or downlink key and then sent back to the UE.

TTCN controls the usage of security for SRTP/SRTCP and provides the necessary security parameters to the SS via the SRTP port. Once security has been configured by TTCN, the SS shall handle media plane encryption and decryption.

The SRTP system interface is defined in Annex C.

7.1.1.4 Media Control handling

MCPTT requires that media control messages for floor control and pre-established session control according to TS 24.380 [10] are made available and handled in TTCN as structured messages.

TTCN uses the IP PTC to handle the UDP socket for media plane control messages: Encoded UDP datagrams are exchanged between the MCX IMS PTC and the IP PTC. The Client's port number is retrieved from the SDP signalling during connection establishment.

Media plane security is configured at the SRTP system port: The SS gets the information how to identify the UDP packets to be encrypted and decrypted together with the key material and the security policy parameters (see annex C).

7.1.1.5 SS pseudo-algorithm for RTP / RTCP / Media Plane Control handling

The following summarizes the requirements on the SS with regards to RTP / RTCP / Media Control handling within the SS:

- Uplink direction:

- Upon reception of an SRTP/SRTCP packet, the SS shall extract the UDP payload and decrypt it using the RX crypto parameters of the respective connection.

In case of an RTP packet or an RTCP packet associated with the (RTP) media stream the SS shall apply the RTP/RTCP loopback as specified in clause 4.2.4.4 of TS 36.523-3 [27] with the following clarification:

The SS shall replace the SSRC in the SRTP/SRTCP packet (octets 8 to 11 for SRTP and octets 4 to 7 for SRTCP, see IETF RFC 3711 [32] clauses 3.1 and 3.4) by the SSRC as configured at the SS for this connection.

The SS shall encrypt the packet using the crypto parameters configured for the connection.-

- For RTCP APP packets the generic mechanisms of the IP test model according to clause 4.2 of TS 36.523-3 [27] apply: A UDP socket is configured by TTCN with corresponding entry in the common IP routing table so that the UDP packets are routed to the IP PTC which routes them to the MCX IMS PTC via the UDPHANDLER/Media_CTRL ports. Decoding of the media control messages is done in TTCN using TTCN-3's decvalue function.
- Downlink direction:

TTCN encodes media control messages using TTCN-3's encvalue function and sends the resulting datagram via the UDPHANDLER/Media_CTRL ports to the IP PTC and from there to the UDP socket configured at the SS. The SS shall encrypt the packet as according to the SRTP configuration for the connection and send it to the remote end.

7.1.2 MCVideo

The same principles apply as specified for MCPTT in clause 7.1.1 with the difference that the media plane control signalling is the transmission control protocol of TS 24.581 [56].

7.1.3 MCDData

For MCDData the Message Session Relay Protocol (MSRP) according to RFC 4975 [68] is used for test cases using the media plane. MSRP uses TCP as transport protocol.

The encoding, decoding and handling of the MSRP messages is done at the MCX IMS PTC which exchanges the encoded MSRP messages with the generic TCP handler of the IP PTC as shown in Figure 5.2.1-1 and Figure 5.2.1-2.

The routing of the MSRP IP data is configured according to the IP Test Model of TS 36.523-3 [27] clause 4.2.4.

7.2 MCX functional architecture: HTTP, SIP

7.2.1 HTTP-Signalling

Figure 7.2.1-1 shows the functional architecture for HTTP-Signalling between the MCX-capable UE and different network entities as emulated by the test models.

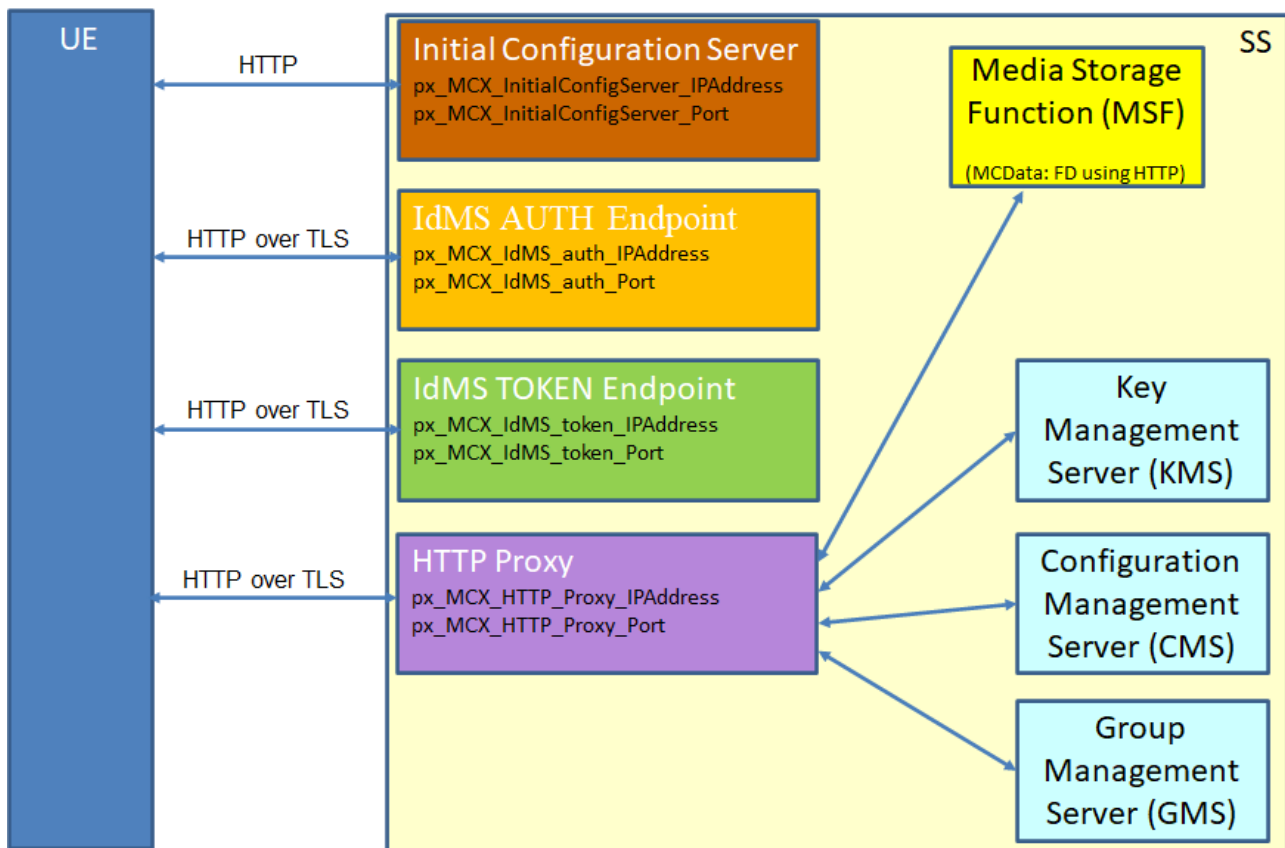


Figure 7.2.1-1: Functional architecture for HTTP-Signalling

The UE is expected to establish HTTP connections to the following entities:

- Initial Configuration Server:
The UE gets configured with IP address (`px_MCX_InitialConfigServer_IPAddress`) and port number (`px_MCX_InitialConfigServer_Port`) of the server from which it retrieves the MCS UE initial configuration document (TS 24.484 [14] clause 7.2).
It depends on UE implementation how the IP address and port are configured at the UE but the UE is expected to support this to be configured.
As there is no requirement by the core specs the HTTP connection is not security protected.
- IdMS AUTH Endpoint:
The UE retrieves IP address (`px_MCX_IdMS_auth_IPAddress`) and port number (`px_MCX_IdMS_auth_Port`) from the MCS UE initial configuration document (TS 24.484 [14] clause 7.2).
The connection shall be TLS protected.
- IdMS TOKEN Endpoint:
The UE retrieves IP address (`px_MCX_IdMS_token_IPAddress`) and port number (`px_MCX_IdMS_token_Port`) from the MCS UE initial configuration document (TS 24.484 [14] clause 7.2).
The connection shall be TLS protected.
- HTTP Proxy:
The UE retrieves IP address (`px_MCX_HTTP_Proxy_IPAddress`) and port number (`px_MCX_HTTP_Proxy_Port`) from the MCS UE initial configuration document (TS 24.484 [14] clause 7.2).
The connection shall be TLS protected.

Design considerations and working assumptions:

- Domain Name Server
DNS is not needed for address resolution as in the URIs of the network entities in the MCS UE initial configuration document the IP address of the respective entity can be used as host name.

- Initial UE configuration
The UE is able to retrieve the MCS UE initial configuration document (TS 24.484 [14] clause 7.2) via an HTTP connection to an Initial Configuration Server. Other means of initial configuration are out of scope for conformance testing.
- HTTP signalling between UE and KMS
The UE is expected to support HTTP signalling with the KMS via the HTTP proxy using a transport key (TrK) according to TS 33.180 [43] clause 4.3.3 and clause 5.3.2.
- Use of TLS
All HTTP traffic between the UE and the HTTP proxy and between the UE and the IdMS is protected using HTTPS (TS 33.180 [43] clause 5.1.3.1, clause 6.1.1 and B.12).
NOTE: Even though NOTE 2 of TS 24.482 [12] clause 6.2.1 might be interpreted as if the HTTP signalling to the authorization endpoint may not be TLS secured, 33.180 [43] mandates TLS to be used.
- IP Addresses and port numbers
IP addresses and port numbers of the network entities as shown in figure 7.2.1-1 are given as PIXIT (see clause 9). As only restriction the tuple {IP address, port number} needs to be unique for each entity, but there is no restriction no to use one and the same IP address for all entities as long as they use different port numbers.
- According to TS 24.282 [57] clause 10.2.2.1 the HTTP signalling between the MCDATA client and the media storage function (MSF) happens via an HTTP proxy according to annex A of TS 24.482 [12]. It is assumed that this is the same proxy as used for signalling with the KMS, CMS and GMS.
- According to RFC 2616 [69] clause 5.1.2 HTTP requests via an HTTP proxy require the Request-URI to be an absolute URI ⇒ HTTP requests to KMS, CMS and GMS shall have an absolute URI as Request-URI.

7.2.2 SIP-Signalling

Figure 7.2.2-1 shows the functional architecture for SIP-Signalling between the MCX-capable UE and different network entities as emulated by the test model(s).

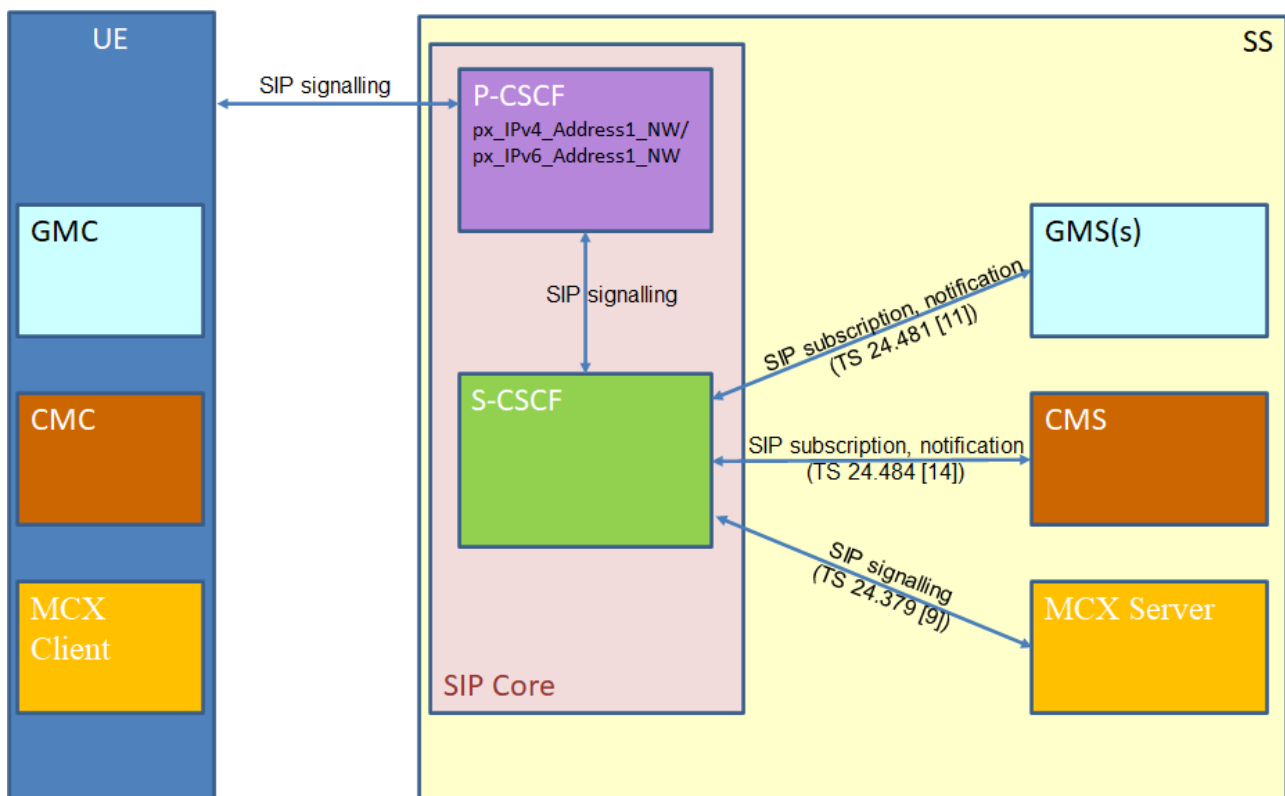


Figure 7.2.2-1: Functional architecture for SIP-Signalling

Regarding lower layer and IP signalling there are no differences compared to the IMS test model (TS 34.229-3 [28]).

The SIP signalling between the UE and the network entities is as specified in the test cases and according to common procedures and message content in TS 36.579-1 [2] with the following clarifications:

- Dialogs between the Group Management Client (GMC) and the Group Management Server (GMS)
In general a GMC may subscribe to more than one GMS and TS 24.481 [11] shall be interpreted so that the GMC may even create more than one dialog with a single GMS.
NOTE 1: In principle this applies for the Configuration Management Server too.
NOTE 2: It is up to test case specification to deal with the possible scenarios and combinations of dialogs.
- Client Server Keys
As not specified otherwise in the core specifications (TS 24.379 [9], TS 24.481 [11], TS 24.484 [14] and TS 33.180 [43]), there are no restriction for the UE regarding the CSK used in a dialog with the GMS(s), the CMS or the MCX server.
⇒ In general for CSK upload the UE may create and use different CSKs for the different servers and even for one and the same server the UE may use different CSKs for different dialogs. Furthermore a CSK download by the MCX server affects the communication between the MCX client and the MCX server only but not the CSKs used in any existing or future dialogs with a GMS or CMS; i.e. when the UE creates a dialog with a GMS or CMS after CSK download, it may use the downloaded CSK or any other CSK.

7.3 Interactive connectivity establishment (ICE) for pre-established session

According to TS 24.379 [9] for establishment of a pre-established session in general the MCPTT client shall gather ICE candidates according to RFC 5245 [63] and provide the candidates in the SDP offer of the initial SIP INVITE. Similar to the client the MCPTT server shall provide ICE candidates in its SDP answer and in general the client starts connectivity checks according to RFC 5245 [63].

Nevertheless, to reduce the test model requirements, the server side (at the system simulator) can be a lite implementation according to RFC 5245 [63] and as reflected in the default message contents for SDP Messages from the SS in TS 36.579-1 [2].

In addition - as working assumption - the UE shall be configured as lite implementation too.

⇒ When both ends are lite implementations none of them will start connectivity checks. Furthermore, there is no need for emulation for a STUN server for the client to gather ICE candidates as a lite implementation only includes host candidates for any media stream (RFC 5245 [63] clause 2.7).

Conclusion:

As long as there are no test requirements regarding ICE and as long as clients can be configured as lite implementations there are no ICE specific requirements for the test model.

8 Other SS requirements with TTCN-3 impact

8.1 Codec requirements

In addition to the requirements specified in TS 36.523-3 [27] clause 8.1 and TS 34.229-3 [28] clause 7 the codec requirements of table 8.1-1 shall be applied.

Table 8.1-1: Codec requirements

Type definitions	Codec requirements	Encoding rule in TTCN-3
MIKEY_TypeDefs	RFC 3830 [64] clause 6 with extensions in RFC 6509 [65] and RFC 6043 [66]	"MIKEY-Codec"
MIKEY_MCX_Extension_TypeDefs	TS 33.180 [43] Annex E.6	"Key Parameter Payload Types"
MCDataMessage_TypeDefs	TS 24.282 [57] clause 15	"MCDATA Messages"
MCPTT_MediaControl_TypeDefs	TS 24.380 [10] clause 8.2	"FloorCtrlCodec"
FloorControl_Group	TS 24.380 [10] clause 8.3	"PreestablishedSessionCtrlCodec"
PreestablishedSessionControl_Group		
MCVideo_TransmissionControl_TypeDefs	TS 24.581 [56] clause 9	"TransmissionCtrlCodec"
JSON, JSON_AliasDefinitions	ES 201 873-11 [70] annex B, B.2	"JSON"

8.2 External function definitions

The external functions specified in TS 36.523-3 [27] clause 8.2 apply to the present document.

In addition there are the following MCX specific external functions:

TTCN-3 External Function		
Name	fx_SAKKE_GeneratePublicKey	
Description	Generate KMS public key (Z_T) for SAKKE (RFC 6508 [45] clause 2.2): $Z_T := [z_T]P$	
Parameters	p_MasterSecret	master secret z_T (octetstring)
	p_ParameterSet	parameter set to be used; 1 per default, indicating use of parameter set 1 as defined in appendix A of RFC 6509 [46]
Return Value	octetstring	

TTCN-3 External Function		
Name	fx_SAKKE_GenerateRSK	
Description	Generate receiver secret key (RSK) for SAKKE (RFC 6508 [45] clause 2.2): $RSK := [(a + z_T)^{-1}]P$ with 'a' being the identifier (UID) corresponding to the receiver's URI	
Parameters	p_MasterSecret	master secret z_T (octetstring)
	p_Identifier	UID for a given URI (octetstring)
	p_ParameterSet	parameter set to be used; 1 per default, indicating use of parameter set 1 as defined in appendix A of RFC 6509 [46]
Return Value	octetstring	

TTCN-3 External Function		
Name	fx_SAKKE_EncapsulateKey	
Description	Generate encapsulated data for SAKKE exchange according to RFC 6508 [45]	
Parameters	p_SSV	Shared secret value (octetstring): Key to be exchanged; according to 33.180 [43] E.1.1: The GMK, PCK, CSK and MuSiK shall be 16 octets in length
	p_SakkePublicKey	SAKKE public key (octetstring) generated with fx_SAKKE_GeneratePublicKey
	p_UID	UID (octetstring) generated for the receiving entity's URI (in general the same URI as in IDRr payload of the MIKEY message carrying the encapsulated data)
	p_ParameterSet	parameter set to be used; 1 per default, indicating use of parameter set 1 as defined in appendix A of RFC 6509 [46]
Return Value	octetstring	

TTCN-3 External Function											
Name	fx_SAKKE_ExtractKey										
Description	Extract and validate 16 octet key from the encapsulated data for SAKKE exchange according to RFC 6508 [45] clause 6.2.2: if validation fails (TEST does not equal R_(b,S)) then omit shall be returned										
Parameters	<table border="1"> <tr> <td>p_EncapsulatedData</td> <td>encapsulated data (octetstring) as received in the SAKKE payload of a MIKEY message</td> </tr> <tr> <td>p_SakkeRSK</td> <td>receiver secret key (RSK) for SAKKE (octetstring)</td> </tr> <tr> <td>p_SakkePublicKey</td> <td>SAKKE public key (octetstring) generated with fx_SAKKE_GeneratePublicKey</td> </tr> <tr> <td>p_UID</td> <td>UID (octetstring) generated for the receiving entity's URI (should be the same URI as in IDRr payload of the MIKEY message carrying the encapsulated data)</td> </tr> <tr> <td>p_ParameterSet</td> <td>parameter set to be used; 1 per default, indicating use of parameter set 1 as defined in appendix A of RFC 6509 [46]</td> </tr> </table>	p_EncapsulatedData	encapsulated data (octetstring) as received in the SAKKE payload of a MIKEY message	p_SakkeRSK	receiver secret key (RSK) for SAKKE (octetstring)	p_SakkePublicKey	SAKKE public key (octetstring) generated with fx_SAKKE_GeneratePublicKey	p_UID	UID (octetstring) generated for the receiving entity's URI (should be the same URI as in IDRr payload of the MIKEY message carrying the encapsulated data)	p_ParameterSet	parameter set to be used; 1 per default, indicating use of parameter set 1 as defined in appendix A of RFC 6509 [46]
p_EncapsulatedData	encapsulated data (octetstring) as received in the SAKKE payload of a MIKEY message										
p_SakkeRSK	receiver secret key (RSK) for SAKKE (octetstring)										
p_SakkePublicKey	SAKKE public key (octetstring) generated with fx_SAKKE_GeneratePublicKey										
p_UID	UID (octetstring) generated for the receiving entity's URI (should be the same URI as in IDRr payload of the MIKEY message carrying the encapsulated data)										
p_ParameterSet	parameter set to be used; 1 per default, indicating use of parameter set 1 as defined in appendix A of RFC 6509 [46]										
Return Value	template (omit) octetstring (16 octets if the key valid, omit otherwise)										

TTCN-3 External Function			
Name	fx_ECCSI_GenerateKPAK		
Description	<p>Generate KMS Public Authentication Key (KPAK) for ECCSI (RFC 6507 [44] clause 4.2): $KPAK := [KSAK]G$</p> <p>The P-256 elliptic curve, base point and SHA-256 function as according to RFC 6509 [46] clause 2.1.1 shall be used.</p>		
Parameters	<table border="1"> <tr> <td>p_KSAK</td> <td>KMS Secret Authentication Key (KSAK): random secret non-zero integer modulo q (octetstring)</td> </tr> </table>	p_KSAK	KMS Secret Authentication Key (KSAK): random secret non-zero integer modulo q (octetstring)
p_KSAK	KMS Secret Authentication Key (KSAK): random secret non-zero integer modulo q (octetstring)		
Return Value	octetstring		

TTCN-3 External Function									
Name	fx_ECCSI_GenerateSskPvtPair								
Description	<p>Generate (SSK,PVT) Pair according to clause 5.1.1 of RFC 6507 [44]; if either the SSK or HS is zero modulo q (step 5 of the algorithm), the function shall return omit</p> <p>The P-256 elliptic curve, base point and SHA-256 function as according to RFC 6509 [46] clause 2.1.1 shall be used.</p>								
Parameters	<table border="1"> <tr> <td>p_UID</td> <td>User ID (octetstring)</td> </tr> <tr> <td>p_KSAK</td> <td>KMS Secret Authentication Key (KSAK) (octetstring)</td> </tr> <tr> <td>p_KPAK</td> <td>KMS Public Authentication Key (KPAK) (octetstring)</td> </tr> <tr> <td>p_EphemeralValue</td> <td>random (ephemeral) non-zero integer value v according to RFC 6507 [44] clause 5.1.1</td> </tr> </table>	p_UID	User ID (octetstring)	p_KSAK	KMS Secret Authentication Key (KSAK) (octetstring)	p_KPAK	KMS Public Authentication Key (KPAK) (octetstring)	p_EphemeralValue	random (ephemeral) non-zero integer value v according to RFC 6507 [44] clause 5.1.1
p_UID	User ID (octetstring)								
p_KSAK	KMS Secret Authentication Key (KSAK) (octetstring)								
p_KPAK	KMS Public Authentication Key (KPAK) (octetstring)								
p_EphemeralValue	random (ephemeral) non-zero integer value v according to RFC 6507 [44] clause 5.1.1								
Return Value	template (omit) type record ECCSI_SskPvtPair_Type { octetstring SSK, octetstring PVT }								

TTCN-3 External Function													
Name	fx_ECCSI_SignMessage												
Description	<p>Sign a message according to RFC 6507 [44] clause 5.2.1: return signature of the message or omit if $HE + r * SSK$ is non-zero modulo q (step 4 of the algorithm)</p> <p>The P-256 elliptic curve, base point and SHA-256 function as according to RFC 6509 [46] clause 2.1.1 shall be used.</p>												
Parameters	<table border="1"> <tr> <td>p_Message</td> <td>Message to be signed (octetstring)</td> </tr> <tr> <td>p_KPAK</td> <td>KMS Public Authentication Key (KPAK) (octetstring)</td> </tr> <tr> <td>p_UID</td> <td>Signer's User ID (octetstring)</td> </tr> <tr> <td>p_SSK</td> <td>Secret Signing Key (octetstring)</td> </tr> <tr> <td>p_PVT</td> <td>Public Validation Token (octetstring)</td> </tr> <tr> <td>p_EphemeralValue</td> <td>random (ephemeral) non-zero integer value j according to RFC 6507 [44] clause 5.2.1</td> </tr> </table>	p_Message	Message to be signed (octetstring)	p_KPAK	KMS Public Authentication Key (KPAK) (octetstring)	p_UID	Signer's User ID (octetstring)	p_SSK	Secret Signing Key (octetstring)	p_PVT	Public Validation Token (octetstring)	p_EphemeralValue	random (ephemeral) non-zero integer value j according to RFC 6507 [44] clause 5.2.1
p_Message	Message to be signed (octetstring)												
p_KPAK	KMS Public Authentication Key (KPAK) (octetstring)												
p_UID	Signer's User ID (octetstring)												
p_SSK	Secret Signing Key (octetstring)												
p_PVT	Public Validation Token (octetstring)												
p_EphemeralValue	random (ephemeral) non-zero integer value j according to RFC 6507 [44] clause 5.2.1												
Return Value	template (omit) octetstring												

TTCN-3 External Function									
Name	fx_ECCSI_VerifySignature								
Description	Verify a signature according to RFC 6507 [44] clause 5.2.2: return true, when the signature is valid, false otherwise The P-256 elliptic curve, base point and SHA-256 function as according to RFC 6509 [46] clause 2.1.1 shall be used.								
Parameters	<table border="1"> <tr> <td>p_Message</td> <td>Message (octetstring)</td> </tr> <tr> <td>p_Signature</td> <td>Message's signature (octetstring)</td> </tr> <tr> <td>p_KPAK</td> <td>KMS Public Authentication Key (KPAK) (octetstring)</td> </tr> <tr> <td>p_UID</td> <td>Signer's User ID (octetstring)</td> </tr> </table>	p_Message	Message (octetstring)	p_Signature	Message's signature (octetstring)	p_KPAK	KMS Public Authentication Key (KPAK) (octetstring)	p_UID	Signer's User ID (octetstring)
p_Message	Message (octetstring)								
p_Signature	Message's signature (octetstring)								
p_KPAK	KMS Public Authentication Key (KPAK) (octetstring)								
p_UID	Signer's User ID (octetstring)								
Return Value	boolean								

TTCN-3 External Function									
Name	fx_XML_Encrypt								
Description	Encrypt data NOTE: the function is defined similar to openssl_encrypt and in principle it is independent from XML; nevertheless it is used for XML encryption in context of MCX								
Parameters	<table border="1"> <tr> <td>p_Data</td> <td>(octetstring)</td> </tr> <tr> <td>p_Method</td> <td>type enumerated XML_EncryptionMethod_Type { AES_128_GCM, // AES-GCM according to clause 5.2.4 of // https://www.w3.org/TR/xmlenc-core1/ [41] // with 96 bit Initialization Vector and //128 bit Authentication Tag AES_256_KEY_WRAP // according to RFC 3394 [47] }</td> </tr> <tr> <td>p_Key</td> <td>key for encryption (bitstring)</td> </tr> <tr> <td>p_IV</td> <td>initial vector (octetstring)</td> </tr> </table>	p_Data	(octetstring)	p_Method	type enumerated XML_EncryptionMethod_Type { AES_128_GCM, // AES-GCM according to clause 5.2.4 of // https://www.w3.org/TR/xmlenc-core1/ [41] // with 96 bit Initialization Vector and //128 bit Authentication Tag AES_256_KEY_WRAP // according to RFC 3394 [47] }	p_Key	key for encryption (bitstring)	p_IV	initial vector (octetstring)
p_Data	(octetstring)								
p_Method	type enumerated XML_EncryptionMethod_Type { AES_128_GCM, // AES-GCM according to clause 5.2.4 of // https://www.w3.org/TR/xmlenc-core1/ [41] // with 96 bit Initialization Vector and //128 bit Authentication Tag AES_256_KEY_WRAP // according to RFC 3394 [47] }								
p_Key	key for encryption (bitstring)								
p_IV	initial vector (octetstring)								
Return Value	octetstring In case of an authenticated encryption mechanism (e.g. AES_128_GCM) the Authentication Tag is added at the end of the encrypted data.								

TTCN-3 External Function									
Name	fx_XML_Decrypt								
Description	Decrypt data								
Parameters	<table border="1"> <tr> <td>p_Data</td> <td>In case of an authenticated encryption mechanism (e.g. AES_128_GCM) the input data is the concatenation of the encrypted data and Authentication Tag (octetstring)</td> </tr> <tr> <td>p_Method</td> <td>type enumerated XML_EncryptionMethod_Type { AES_128_GCM, // AES-GCM according to clause 5.2.4 of // https://www.w3.org/TR/xmlenc-core1/ [41] // with 96 bit Initialization Vector and //128 bit Authentication Tag AES_256_KEY_WRAP // according to RFC 3394 [47] }</td> </tr> <tr> <td>p_Key</td> <td>key for encryption (bitstring)</td> </tr> <tr> <td>p_IV</td> <td>initial vector (octetstring)</td> </tr> </table>	p_Data	In case of an authenticated encryption mechanism (e.g. AES_128_GCM) the input data is the concatenation of the encrypted data and Authentication Tag (octetstring)	p_Method	type enumerated XML_EncryptionMethod_Type { AES_128_GCM, // AES-GCM according to clause 5.2.4 of // https://www.w3.org/TR/xmlenc-core1/ [41] // with 96 bit Initialization Vector and //128 bit Authentication Tag AES_256_KEY_WRAP // according to RFC 3394 [47] }	p_Key	key for encryption (bitstring)	p_IV	initial vector (octetstring)
p_Data	In case of an authenticated encryption mechanism (e.g. AES_128_GCM) the input data is the concatenation of the encrypted data and Authentication Tag (octetstring)								
p_Method	type enumerated XML_EncryptionMethod_Type { AES_128_GCM, // AES-GCM according to clause 5.2.4 of // https://www.w3.org/TR/xmlenc-core1/ [41] // with 96 bit Initialization Vector and //128 bit Authentication Tag AES_256_KEY_WRAP // according to RFC 3394 [47] }								
p_Key	key for encryption (bitstring)								
p_IV	initial vector (octetstring)								
Return Value	octetstring								

TTCN-3 External Function					
Name	fx_MCX_XML_AddEnvelopedSignature				
Description	Add XML signature to the given XML document and return resulting XML document; according to W3C: "XML Signature Syntax and Processing (Second Edition)" [48]: 1. The given document has a Signature element with the name of the key to be used to sign the Signature's SignedInfo 2. Elements(s) to be signed: For elements which are addressed by a reference URI in the Signature's SignedInfo the DigestValue shall be generated and added to the corresponding Reference element of the Signature's SignedInfo 3. The SignedInfo shall be signed by generating the hash for the Signature's SignedInfo using the given key; this hash value shall be added to the Signature's SignatureValue.				
Parameters	<table border="1"> <tr> <td>p_XmlDocument</td> <td>XML document (charstring) to be signed; the document contains all information to get signed with the given key: - id(s) for the object(s) to be signed (e.g. KMS response) - SignedInfo with reference(s) to objects to be signed within the document ("same-document" reference(s) according to RFC 3986 [53] clause 4.4), DigestAlgorithm, empty DigestValue</td> </tr> <tr> <td>p_Key</td> <td>Key corresponding to the KeyName in the Signature's KeyInfo element (bitstring)</td> </tr> </table>	p_XmlDocument	XML document (charstring) to be signed; the document contains all information to get signed with the given key: - id(s) for the object(s) to be signed (e.g. KMS response) - SignedInfo with reference(s) to objects to be signed within the document ("same-document" reference(s) according to RFC 3986 [53] clause 4.4), DigestAlgorithm, empty DigestValue	p_Key	Key corresponding to the KeyName in the Signature's KeyInfo element (bitstring)
p_XmlDocument	XML document (charstring) to be signed; the document contains all information to get signed with the given key: - id(s) for the object(s) to be signed (e.g. KMS response) - SignedInfo with reference(s) to objects to be signed within the document ("same-document" reference(s) according to RFC 3986 [53] clause 4.4), DigestAlgorithm, empty DigestValue				
p_Key	Key corresponding to the KeyName in the Signature's KeyInfo element (bitstring)				
Return Value	universal charstring containing the document with all DigestValues and the signature of the SignedInfo				

TTCN-3 External Function							
Name	fx_MCX_XML_CreateDetachedSignature						
Description	Create XML signature for the given XML document and return resulting (encoded) XML signature (detached signature); according to TS 33.180 [43] clause 9.3.5, TS 24.379 [9] clause 6.6.3.1 and W3C: "XML Signature Syntax and Processing (Second Edition)" [48]: p_SignatureInfo contains the parameters needed to create the signature and to sign the document; the whole document gets signed irrespective of the Reference URI						
Parameters	<table border="1"> <tr> <td>p_XmlDocument</td> <td>XML document to be signed</td> </tr> <tr> <td>p_XmlDsigDocument</td> <td>XML xmldsig document with signature element containing all information to sign the document (p_XmlDocument)</td> </tr> <tr> <td>p_Key</td> <td>Key corresponding to the KeyName in the Signature's KeyInfo element</td> </tr> </table>	p_XmlDocument	XML document to be signed	p_XmlDsigDocument	XML xmldsig document with signature element containing all information to sign the document (p_XmlDocument)	p_Key	Key corresponding to the KeyName in the Signature's KeyInfo element
p_XmlDocument	XML document to be signed						
p_XmlDsigDocument	XML xmldsig document with signature element containing all information to sign the document (p_XmlDocument)						
p_Key	Key corresponding to the KeyName in the Signature's KeyInfo element						
Return Value	universal charstring XML xmldsig document with DigestValue and SignatureValue added to p_XmlDsigDocument						

TTCN-3 External Function					
Name	fx_XML_GetElementContent				
Description	Return content of the node in an XML tree or XML branch as pointed at by the xpath expression				
Parameters	<table border="1"> <tr> <td>p_XmlBranch</td> <td>XML tree (including the root element) or branch of an XML tree</td> </tr> <tr> <td>p_XpathExpression</td> <td>XCAP expression according to https://www.w3.org/TR/1999/REC-xpath-19991116/</td> </tr> </table>	p_XmlBranch	XML tree (including the root element) or branch of an XML tree	p_XpathExpression	XCAP expression according to https://www.w3.org/TR/1999/REC-xpath-19991116/
p_XmlBranch	XML tree (including the root element) or branch of an XML tree				
p_XpathExpression	XCAP expression according to https://www.w3.org/TR/1999/REC-xpath-19991116/				
Return Value	universal charstring string containing the content of the element or empty string if p_XpathExpression does not address an existing element of the given XML branch NOTE: if the element may be empty, it may be necessary to check existence of the element with fx_XML_GetElement first				

TTCN-3 External Function							
Name	fx_XML_SetElementContent						
Description	Return XML tree or XML branch with replaced content of the node pointed at by the xpath expression						
Parameters	<table border="1"> <tr> <td>p_XmlBranch</td> <td>XML tree (including the root element) or branch of an XML tree</td> </tr> <tr> <td>p_XpathExpression</td> <td>XCAP expression according to https://www.w3.org/TR/1999/REC-xpath-19991116/</td> </tr> <tr> <td>p_NewContent</td> <td>new content for the given node</td> </tr> </table>	p_XmlBranch	XML tree (including the root element) or branch of an XML tree	p_XpathExpression	XCAP expression according to https://www.w3.org/TR/1999/REC-xpath-19991116/	p_NewContent	new content for the given node
p_XmlBranch	XML tree (including the root element) or branch of an XML tree						
p_XpathExpression	XCAP expression according to https://www.w3.org/TR/1999/REC-xpath-19991116/						
p_NewContent	new content for the given node						
Return Value	universal charstring modified XML tree or XML branch						

TTCN-3 External Function	
Name	fx_SHA_1
Description	Generic SHA-1 function
Parameters	p_Data data (octetstring)
Return Value	octetstring (hash value of 160 bits)

TTCN-3 External Function	
Name	fx_SHA_2
Description	Generic SHA-2 function
Parameters	p_Function type enumerated HASH_Function_Type { SHA_256 // may be extended e.g SHA_224 etc. } p_Data data (octetstring)
Return Value	octetstring (representing 256 bits for SHA-256, 224 bits for SHA-224, ...)

TTCN-3 External Function	
Name	fx_JWK_Signature
Description	Generate JWK signature according to RFC 7515 [49]
Parameters	p_String string for which the signature shall be generated (charstring) p_Algorithm algorithm to generate the hash: type enumerated JWK_HashAlgorithm_Type { // RFC 7515 [49] HS256, // HMAC SHA-256 RS256 // RSASSA-PKCS1-v1_5 SHA-256 } p_Key key (octetstring)
Return Value	charstring (base64url encoded signature according to RFC 7515 [49])

TTCN-3 External Function	
Name	fx_XML_Log
Description	Log function for (unencrypted) XML documents
Parameters	p_FileName TTCN module from where the function is called p_LineNo Line number from where the function is called p_UplinkDownlink XML document has been received (UPLINK) or will be sent (DOWNLINK) p_XmlDocument XML document

TTCN-3 External Function	
Name	fx_AEAD_Encrypt
Description	Encrypt data using AEAD algorithms according to RFC 5116
Parameters	p_Data (octetstring) p_AssociatedData (octetstring) p_Method type enumerated AEAD_EncryptionMethod_Type { AEAD_AES_128_GCM, // RFC 5116 clause 5.1 AEAD_AES_256_GCM // RFC 5116 clause 5.2 } p_Key key for encryption (bitstring) p_IV initial vector (octetstring)
Return Value	octetstring Encrypted data appended by authentication tag

TTCN-3 External Function		
Name	fx_AEAD_Decrypt	
Description	Decrypt data using AEAD algorithms according to RFC 5116	
Parameters	p_Data	(octetstring)
	p_AssociatedData	(octetstring)
	p_Method	type enumerated AEAD_EncryptionMethod_Type { AEAD_AES_128_GCM, // RFC 5116 clause 5.1 AEAD_AES_256_GCM // RFC 5116 clause 5.2 }
	p_Key	key for decryption (bitstring)
	p_IV	initial vector (octetstring)
Return Value	octetstring	Decrypted data

9 IXIT Proforma

9.1 General

This partial IXIT proforma contained in the present document is provided for completion, when the related Abstract Test Suite is to be used against the Implementation Under Test (IUT).

Text in italics is a comment for guidance for the production of an IXIT, and is not to be included in the actual IXIT.

The completed partial IXIT will normally be used in conjunction with the completed ICS, as it adds precision to the information provided by the ICS.

9.2 MCX

9.2.1 MCX Client PIXIT

Table 9.2.1-1: MCX Client Common PIXIT

Parameter Name	Parameter Type	Default Value	Supported Values	Description
Client relevant IXIT				
px_MCX_Client_B_ID	charstring	"urn:uuid:cdcd34fb-c2f1-4488-a03a-6b5a5d360c47"		MCX client ID for a remote user: As defined in TS 24.379 [9] clause 4.10 it is a UUID URN according to RFC 4122 [62], i.e. has the format "urn:uuid:XXXXXXXX-YYYY-ZZZZ-yyyy-zzzzzzzzzzzz"
Users relevant IXIT				
px_MCPTT_ID_User_A	charstring	"mcptt-user-A-id@mcptt-op.gov"	NOTE 1	MCPTT user identity (MCPTT ID) which is a globally unique identifier within the MCPTT service that represents the MCPTT user. Ref. TS 24.483 [13].
px_MCVideo_ID_User_A	charstring		NOTE 1	MCVideo user identity (MCVideo ID) which is a globally unique identifier within the MCVideo service that represents the MCVideo user. Ref. TS 24.483 [13].
px_MCDData_ID_User_A	charstring		NOTE 1	MCDData user identity (MCDData ID) which is a globally unique identifier within the MCDData service that represents the MCDData user. Ref. TS 24.483 [13].
px_MCPTT_User_A_Alias	charstring	"mcptt-user-A-alias"		Alphanumeric alias of MCPTT user. Ref. TS 24.483 [13].
px_MCVideo_User_A_Alias	charstring	"mcvideo-user-A-alias"		Alphanumeric alias of MCVideo user. Ref. TS 24.483 [13].
px_MCDData_User_A_Alias	charstring	"mcddata-user-A-alias"		Alphanumeric alias of MCDData user. Ref. TS 24.483 [13].
px_MCPTT_ID_FA_A	charstring	"mcptt-FA-A-id@mcptt-op.gov"		The value is a "uri" attribute. TS 24.483 [13] clause 5.2.48W6
px_MCDData_ID_FA_A	charstring	"mcddata-FA-A-id@mcptt-op.gov"		The value is a "uri" attribute. TS 24.483 [13] clause 10.2.97B3
px_MCX_User_A_ParticipantType	charstring	"first responder"		Participant type of the MCPTT user. Ref. TS 24.483 [13].
px_MCX_DomainName_Organization_A	charstring	"mcptt-op.gov"		Domain name of the organization the user belongs to.
px_MCX_User_A_username	charstring	"MCPTT#U01"		UE's User username used for user authentication
px_MCX_User_A_password	charstring	"psw@MCPTT&7"		UE's User password used for user authentication
px_MCX-TokenRsaPrivateKey	octetstring			Private key being used to create signature for ID and Access Token
px_MCX_TrK	bitstring			Transport key for XML confidentiality and between the KMS and the MC KM client according to TS 33.180 [43] clause 9.3.3.
px_MCX_TrK_ID	B32_Type			Transport key ID for XML confidentiality and between the KMS and the MC KM client according to TS 33.180 [43] clause 9.3.3.
px_MCX_InK	bitstring			Integrity protection key for XML confidentiality and between the KMS and the MC KM client according to TS 33.180 [43] clause 9.3.3.

Parameter Name	Parameter Type	Default Value	Supported Values	Description
px_MCX_InK_ID	B32_Type			Integrity protection key ID for XML confidentiality and between the KMS and the MC KM client according to TS 33.180 [43] clause 9.3.3.
px_MCPTT_ID_User_B	charstring	"mcptt-user-B-id@mcptt-op.gov"		MCPTT user identity (MCPTT ID) which is a globally unique identifier within the MCPTT service that represents the MCPTT user. Ref. TS 24.483 [13].
px_MCVideo_ID_User_B	charstring	"mcvideo-user-B-id@mcptt-op.gov"		MCVideo user identity (MCVideo ID) which is a globally unique identifier within the MCVideo service that represents the MCVideo user. Ref. TS 24.483 [13].
px_MCData_ID_User_B	charstring	"mcdata-user-B-id@mcptt-op.gov"		MCData user identity (MCData ID) which is a globally unique identifier within the MCData service that represents the MCData user. Ref. TS 24.483 [13].
px_MCX_User_B_ParticipantType	charstring	"first responder"		Participant type of the MCX user. Ref. TS 24.483 [13].
px_MCPTT_ID_User_C	charstring	"mcptt-user-C-id@mcptt-op.gov"		MCPTT user identity (MCPTT ID) which is a globally unique identifier within the MCPTT service that represents the MCPTT user. Ref. TS 24.483 [13].
px_MCVideo_ID_User_C	charstring	"mcvideo-user-C-id@mcptt-op.gov"		MCVideo user identity (MCVideo ID) which is a globally unique identifier within the MCVideo service that represents the MCVideo user. Ref. TS 24.483 [13].
px_MCData_ID_User_C	charstring	"mcdata-user-C-id@mcptt-op.gov"		MCData user identity (MCData ID) which is a globally unique identifier within the MCData service that represents the MCData user. Ref. TS 24.483 [13].
px_MCX_User_C_ParticipantType	charstring	"first responder"		Participant type of the MCX user. Ref. TS 24.483 [13].
px_MCPTT_ID_User_D	charstring	"mcptt-user-D-id@mcptt-op.gov"		MCPTT user identity (MCPTT ID) which is a globally unique identifier within the MCPTT service that represents the MCPTT user. Ref. TS 24.483 [13].
px_MCVideo_ID_User_D	charstring	"mcvideo-user-D-id@mcptt-op.gov"		MCVideo user identity (MCVideo ID) which is a globally unique identifier within the MCVideo service that represents the MCVideo user. Ref. TS 24.483 [13].
px_MCData_ID_User_D	charstring	"mcdata-user-D-id@mcptt-op.gov"		MCData user identity (MCData ID) which is a globally unique identifier within the MCData service that represents the MCData user. Ref. TS 24.483 [13].
px_MCX_SIP_PublicUserId_A_1	charstring			(First) public user id of the SIP subscriber (user A) for MCX; the parameter shall be a SIP URI

Parameter Name	Parameter Type	Default Value	Supported Values	Description
px_MCX_SIP_PrivateUserId_A	charstring			Private user id of the SIP subscriber (user A) for MCX
px_MCX_SIP_HomeDomain_A	charstring			Home domain name of the SIP subscriber (user A) for MCX
px_MCX_SIP_PublicUserId_B	charstring			Public user id of user B
px_MCX_SIP_PublicUserId_C	charstring			Public user id of user C
px_MCX_SIP_RegistrationWithTemporaryIdentities	boolean			If true the UE shall derive the public user id, private user id and home domain name from the IMSI for SIP registration
Groups relevant IXIT				
px_MCPTT_Group_A_ID	charstring	"mcptt-group-A@mcptt-op.gov"		Group ID for a group. Value is an "uri" attribute specified in OMA OMA-TS-XDM_Group-V1_1 that indicates the group id. Ref. TS 24.483 [13].
px_MCVideo_Group_A_ID	charstring	"mcvideo-group-A@mcptt-op.gov"		Group ID for a group. Value is an "uri" attribute specified in OMA OMA-TS-XDM_Group-V1_1 that indicates the group id. Ref. TS 24.483 [13].
px_MCData_Group_A_ID	charstring	"mcdata-group-A@mcptt-op.gov"		Group ID for a group. Value is an "uri" attribute specified in OMA OMA-TS-XDM_Group-V1_1 that indicates the group id. Ref. TS 24.483 [13].
px_MCPTT_Group_A_Name	charstring	"mcptt-group-A-name"		A human readable Group name for the group
px_MCVideo_Group_A_Name	charstring	"mcvideo-group-A-name"		A human readable Group name for the group
px_MCData_Group_A_Name	charstring	"mcdata-group-A-name"		A human readable Group name for the group
px_MCX_Group_A_Owner_Organization	charstring	"mcx-op.gov"		Indicates the group's owner organization the group belongs to. Ref. TS 24.483 [13].
px_MCPTT_Group_A_preferred_VCodec	charstring	"AMR-WB"		Preferred voice codec for the group (a RTP payload). MCPTT clients shall support the AMR-WB codec. RFC 4566 [25] TS 26.171 [26]
px_MCPTT_Group_B_ID	charstring	"mcptt-group-B@mcptt-op.gov"		Group ID for a group. Value is an "uri" attribute specified in OMA OMA-TS-XDM_Group-V1_1 that indicates the group id. Ref. TS 24.483 [13].
px_MCVideo_Group_B_ID	charstring	"mcvideo-group-B@mcptt-op.gov"		Group ID for a group. Value is an "uri" attribute specified in OMA OMA-TS-XDM_Group-V1_1 that indicates the group id. Ref. TS 24.483 [13].
px_MCData_Group_B_ID	charstring	"mcdata-group-B@mcptt-op.gov"		Group ID for a group. Value is an "uri" attribute specified in OMA OMA-TS-XDM_Group-V1_1 that indicates the group id. Ref. TS 24.483 [13].
px_MCPTT_Group_T_ID	charstring	"mcptt-group-T@mcptt-op.gov"		Group ID for a temporary group. Value is an "uri" attribute specified in OMA OMA-TS-XDM_Group-V1_1 that indicates the group id. Ref. TS 24.483 [13].
px_MCVideo_Group_T_ID	charstring	"mcvideo-group-T@mcptt-op.gov"		Group ID for a temporary group. Value is an "uri" attribute specified in OMA OMA-TS-XDM_Group-V1_1 that indicates the group id. Ref. TS 24.483 [13].

Parameter Name	Parameter Type	Default Value	Supported Values	Description
px_MCData_Group_T_ID	charstring	"mcdata-group-T@mcptt-op.gov"		Group ID for a temporary group. Value is an "uri" attribute specified in OMA OMA-TS-XDM_Group-V1_1 that indicates the group id. Ref. TS 24.483 [13].
Miscellaneous IXIT				
px_MCX_APN	charstring	"mcx-apn"		A single APN which the UE shall use to access each and all MCX relevant services. The APN is provided in the initial UE configuration as specified in TS 36.579-1 [2] Table 5.5.8.1-1.
px_MCX_InitialRegistration_TypeOfPDN1	MCX_Registration_PDN_Type	mcx	ims, internet, mcx	First PDN registered during initial registration (either 'ims' or 'internet' or 'mcx'; 'none' is not applicable as first PDN)
px_MCX_InitialRegistration_TypeOfPDN2	MCX_Registration_PDN_Type	none	ims, internet, mcx, none	Second PDN registered during initial registration; in addition to 'ims' or 'internet' or 'mcx' it may be 'none' to indicate that there is no second PDN connectivity requested by the UE during initial registration
px_MCX_InitialRegistration_TypeOfPDN3	MCX_Registration_PDN_Type	none	ims, internet, mcx, none	Third PDN registered during initial registration; in addition to 'ims' or 'internet' or 'mcx' it may be 'none' to indicate that there is no third PDN connectivity requested by the UE during initial registration
px_MCX_CoordinateLatitude_Client_B	float	none		Simulated latitude value sent to the UE to inform about Client_B location
px_MCX_CoordinateLongitude_Client_B	float	none		Simulated longitude value sent to the UE to inform about Client_B location
NOTE 1: According to TS 23.280 [54] clause 8.1.2 a MC service ID shall be a URI; nevertheless in context of this specification only URIs consisting of userinfo, host and path elements (see RFC 3986 [53]) are supported. Editor's note: A similar note may need to be added to other PIXITs too				

9.2.2 MCX Server PIXIT

Table 9.2.2-1: MCX Server Common PIXIT

Parameter Name	Parameter Type	Default Value	Supported Values	Description
px_MCX_GroupCreationXUI	charstring	"mcx-gms@mcptt-op.gov"		Indicates the group creation XUI information for creation of groups. Ref. TS 23.003 [21].
px_MCX_IdMS_auth_IPAddress	charstring			IPv4/IPv6 address of the IdMS authorization endpoint
px_MCX_IdMS_auth_Port	integer			Port number of the IdMS authorization endpoint
px_MCX_IdMS_auth_Certificate	charstring			Identifier or file name of the certificate to be used during establishment of the TLS tunnel to the IdMS authorization endpoint
px_MCX_IdMS_token_IPAddresses	charstring			IPv4/IPv6 address of the IdMS token endpoint
px_MCX_IdMS_token_Port	integer			Port number of the IdMS token endpoint
px_MCX_IdMS_token_Certificate	charstring			Identifier or file name of the certificate to be used during establishment of the TLS tunnel to the IdMS token endpoint
px_MCX_HTTP_Proxy_IPAddresses	charstring			IPv4/IPv6 address of the HTTP proxy
px_MCX_HTTP_Proxy_Port	integer			Port number of the HTTP proxy
px_MCX_HTTP_Proxy_Certificate	charstring			Identifier or file name of the certificate to be used during establishment of the TLS tunnel to the HTTP proxy
px_MCX_InitialConfigServer_IPAddress	charstring			IPv4/IPv6 address of the server optionally being used to download the Initial UE Configuration document
px_MCX_InitialConfigServer_Port	integer			Port number of the server optionally being used to download the Initial UE Configuration document
px_MCX_InitialConfigServer_URIPath	charstring	"/cms/initial-ue-config"		URI Path component: Absolute path used for HTTP requests addressing a server to download the UE initial configuration document
px_MCX_TLS_CipherSuite	TLS_CIPHER_Type	TLS_RSA_WITH_NULL_SHA		Cipher suite to be used for TLS connections
px_MCX_OAuth_ClientId_A	charstring			Client ID of the UE's MCX application as used in OAuth signalling with the IdMS
px_MCX_OAuth_RedirectURI_A	charstring			Redirect URI used by the UE implementation (user agent, MCX client and OS) to redirect the OAuth authentication response to the MCX client application

9.2.3 MCX Constant PIXIT Definitions

Several parameters for MCX conformance testing can be defined as constants as they are neither preconfigured at the UE nor at the SS. Table 9.2.3-1 lists these constants.

Table 9.2.3-1: MCX Constant PIXIT Definitions

Constant Name	Constant Type	Value	Description
tsc_MCX_KMS_Hostname	charstring	"kms." & px_MCX_DomainName_Organization_A	FQDN of the KMS; used in initial UE configuration as domain name for the 'kms' URI in the App-Server-Info.
tsc_MCX_CMS_Hostname	charstring	"cms." & px_MCX_DomainName_Organization_A	FQDN of the CMS; used in initial UE configuration as domain name for the 'cms' URI in the App-Server-Info.
tsc_MCX_GMS_Hostname	charstring	"gms." & px_MCX_DomainName_Organization_A	FQDN of the GMS; used in initial UE configuration as domain name for the 'gms' URI in the App-Server-Info.
tsc_MCX_KMS_CertUri	charstring	"certificate1." & tsc_MCX_KMS_Hostname	Name of the KMS certificate sent to the UE during MCX user authentication
tsc_MCX_IdMS_auth_UriPath	charstring	"/idms/auth"	URI path to address the IdMS authorization endpoint
tsc_MCX_IdMS_token_UriPath	charstring	"/idms/token"	URI path to address the IdMS token endpoint
tsc_MCX_IdMS_userauth_UriPath	charstring	"/idms/userauth"	relative URI at IdMS used for user authentication
tsc_MCX_KMS_init_UriPath	charstring	"/keymanagement/identity/v1/init"	Path of the Request-URI for "KMS Initialize" request according to TS 33.180 [43] D.2.3
tsc_MCX_KMS_keyprov_UriPath	charstring	"/keymanagement/identity/v1/keyprov"	Path of the Request-URI for "KMS KeyProvision" request according to TS 33.180 [43] D.2.4
tsc_MCX_KMS_ClientReqUri_init	charstring	"https://" & tsc_MCX_KMS_Hostname & tsc_MCX_KMS_init_UriPath	used as <ClientReqUri> entry in the KMS Key Set and as Request-URI for "KMS Initialize" request according to TS 33.180 [43] D.2.3 (NOTE 1)
tsc_MCX_KMS_ClientReqUri	charstring	"https://" & tsc_MCX_KMS_Hostname & tsc_MCX_KMS_keyprov_UriPath	used as <ClientReqUri> entry in the KMS Key Set and as Request-URI for "KMS KeyProvision" request according to TS 33.180 [43] D.2.4 (NOTE 1)
tsc_MCX_GMSURI	charstring	"subscription-proxy." & tsc_MCX_GMS_Hostname	used for <GMS-URI> element in the MCS UE initial configuration document according to TS 24.484 [14] clause 7.2.2.7 and TS 24.483 [13] clause 8.2.9; sub-domain of the GMS's hostname
tsc_MCX_CMSXCAPRootURI	charstring	"http://xcap." & tsc_MCX_CMS_Hostname	used for <CMS-XCAP-root-URI> element in the MCS UE initial configuration document according to TS 24.484 [14] clause 7.2.2.7 and TS 24.483 [13] clause 8.2.9C

Constant Name	Constant Type	Value	Description
tsc_MCX_GMSXCAPRootURI	charstring	"http://xcap." & tsc_MCX_GMS_Hostname	used for <GMS-XCAP-root-URI> element in the MCS UE initial configuration document according to TS 24.484 [14] clause 7.2.2.7 and TS 24.483 [13] clause 8.2.9B
tsc_MCX_MC_ID_User_A	charstring	px_MCX_User_A_username	According to TS 24.482 [12] clause 6.3.1 the MC ID set to the user name
tsc_MCPTT_PublicServiceId_A	charstring	"sip:" & "mcptt-server-A@" & px_MCX_DomainName_Organizatio n_A	The URI of the MCPTT Server which is simulated by the SS
tsc_MCVideo_PublicServiceId_A	charstring	"sip:" & "mcvideo-server-A@" & px_MCX_DomainName_Organizatio n_A	The URI of the MCVideo Server which is simulated by the SS
tsc_MCData_PublicServiceId_A	charstring	"sip:" & "mcdata-server-A@" & px_MCX_DomainName_Organizatio n_A	The URI of the MCData Server which is simulated by the SS
tsc_MCPTT_PublicServiceId_B	charstring	"sip:" & "mcptt-server-B@" & px_MCX_DomainName_Organizatio n_A	The URI of a second MCPTT Server which is implemented in the DUT used in MCPTT Server testing.
tsc_MCPTT_PublicServiceId_P F_A	charstring	"sip:" & "participating-mcptt-function- A@" & px_MCX_DomainName_Organizatio n_A	The URI of the participating MCPTT function which configures the location reporting at the UE according to TS 24.379 [9] clause 13.2.2.
tsc_MCVideo_PublicServiceId_ PF_A	charstring	"sip:" & "participating-mcvideo- function-A@" & px_MCX_DomainName_Organizatio n_A	The URI of the participating MCVideo function which configures the location reporting at the UE according to TS 24.281 [55] clause 18.2.2.
tsc_MCData_PublicServiceId_P F_A	charstring	"sip:" & "participating-mcdata- function-A@" & px_MCX_DomainName_Organizatio n_A	The URI of the participating MCData function which configures the location reporting at the UE according to TS 24.282 [57] clause 17.2.2.
tsc_MCX_SessionID_B	charstring	"sip:" & "sessionB@cf." & px_MCX_DomainName_Organizatio n_A	The URI of the MCPTT session B identity. Ref. TS 24.483 [13]. SIP URI according to TS 24.379 [9] clause 4.5.
tsc_MCPTT_SessionId	charstring	"sip:" & "mcptt-session-A@cf." & px_MCX_DomainName_Organizatio n_A	Service Id for MCPTT calls as used as Contact URI of the MCPTT server
tsc_MCVideo_SessionId	charstring	"sip:" & "mcvideo-session-A@cf." & px_MCX_DomainName_Organizatio n_A	Service Id for MCVideo calls as used as Contact URI of the MCVideo server
tsc_MCData_SessionId	charstring	"sip:" & "mcdata-session-A@cf." & px_MCX_DomainName_Organizatio n_A	Service Id for MCData calls as used as Contact URI of the MCData server
tsc_MCData_MSF_Hostname	charstring	"msf." & px_MCX_DomainName_Organizatio n_A	Hostname of the message storage function (MSF)
tsc_MCData_MSF_URI	charstring	"http://" & tsc_MCData_MSF_Hostname & "/userA/files"	Absolute URI of the message storage function (MSF)
tsc_MCPTT_Group_A_ProSeLa yer2GroupID	octetstring	'00000A'O	Indicates the Prose layer-2 group ID for the group. Ref. TS 23.303 [24].

Constant Name	Constant Type	Value	Description
tsc_MCPTT_Group_D_ProSeLayer2GroupID	octetstring	'00000D'O	Indicates the Prose layer-2 group ID for the group. Ref. TS 23.303 [24].
NOTE 1: According to the NOTE at step 0 in clause 5.2.3 of TS 33.180 [43] the connection between the KMS and the HTTP Proxy is secured and therefore the URIs of the KMS are assumed to have "https" rather than "http" as scheme.			

9.3 MCX IPCAN test model

Table 9.3-1: MCX IPCAN test model specific PIXIT

Parameter Name	Parameter Type	Default Value	Supported Values	Description
px_MCX_IPCAN_EpsBearerId_IMS	MCX_IPCAN_EpsBearerId_Type	5	5..13	Default EPS bearer for IMS PDN (if any)
px_MCX_IPCAN_EpsBearerId_INTERNET	MCX_IPCAN_EpsBearerId_Type	6	5..13	Default EPS bearer for Internet PDN (if any)
px_MCX_IPCAN_EpsBearerId_MCX	MCX_IPCAN_EpsBearerId_Type	7	5..13	Default EPS bearer for MCX PDN
px_MCX_IPCAN_DedicatedEpsBearerId_MCPTT	MCX_IPCAN_EpsBearerId_Type	8	5..13	Dedicated EPS bearer for MCPTT
px_MCX_IPCAN_DedicatedEpsBearerId_MCVideo	MCX_IPCAN_EpsBearerId_Type	9	5..13	Dedicated EPS bearer for MCVideo
px_MCX_IPCAN_DedicatedEpsBearerId_MCData	MCX_IPCAN_EpsBearerId_Type	10	5..13	Dedicated EPS bearer for MCData

10 Postambles

10.1 Introduction

The purpose of the present clause 10 is to specify the postambles used to bring the UE to a well-defined state regardless of the UE state at the termination of main test body or of the SS conditions and values of the system information inherited from the test.

10.2 MCX

The postambles specified in TS 34.229-3 [28] are also applicable to MCX test cases.

Annex A (normative): Test Suites

A.1 Introduction

This annex references the approved Test Suites, which accompany the present document. The Test Suites have been produced using the Testing and Test Control Notation version 3 (TTCN-3) according to ES 201 873-1 [31].

A.2 Baseline of specifications

Table A.2-1 lists the core specifications and test specifications, which the delivered Test Suites are based upon.

Table A.2-1: References of the test and Core specifications

Type	Specification	Release	Version
Core specifications	TS 24.379 [9]	Note 1	Note 2
	TS 24.380 [10]	Note 1	Note 2
	TS 24.481 [11]	Note 1	Note 2
	TS 24.482 [12]	Note 1	Note 2
	TS 24.483 [13]	Note 1	Note 2
	TS 24.484 [14]	Note 1	Note 2
	TS 33.180 [43]	Note 1	Note 2
	TS 24.229 [16]	Note 1	Note 2
	TS 24.281 [55]	Note 1	Note 2
	TS 24.581 [56]	Note 1	Note 2
	TS 24.282 [57]	Note 1	Note 2
	TS 24.582 [58]	Note 1	Note 2
Test specifications	TS 36.579-1 [2]	Note 1	Note 2
	TS 36.579-2 [3]	Note 1	Note 2
	TS 36.579-4 [5]	Note 1	Note 2
	TS 36.579-6 [59]	Note 1	Note 2
	TS 36.579-7 [60]	Note 1	Note 2
NOTE 1: Latest release available, up to the release number of the present document.			
NOTE 2: Latest available			

A.3 MCX Client Test Suites

A.3.1 MCPTT Client Test Suites

Table A.3.1-1 lists all approved test cases from TS 36.579-2 [3].

Table A.3.1-1: MCPTT Client TTCN test cases from TS 36.579-2 [3]

Test case	Description
5.1.MCPTT	MCPTT / Configuration / Authentication / User Authorisation / UE Configuration / User Profile
5.3.MCPTT	MCPTT / Configuration / Group Affiliation / Remote change / De-affiliation / Home MCPTT system
5.4.MCPTT	MCPTT / Configuration / Pre-established Session Establishment / Pre-established Session Modification / Pre-established Session Release
5.6.MCPTT	Configuration / Download CSK
5.8.MCPTT	Configuration / Functional Alias / Functional alias status determination / Activate functional alias / Deactivate functional alias
6.1.1.1.MCPTT	MCPTT / On-network / On-demand Pre-arranged Group Call / Automatic Commencement Mode / Floor Control / Upgrade to Emergency Group Call / Cancel Emergency State / Upgrade to Imminent Peril Group Call / Cancel Imminent Peril State / Client Originated (CO)
6.1.1.2.MCPTT	MCPTT / On-network / On-demand Pre-arranged Group Call / Automatic Commencement Mode / Floor Control / Upgrade to Emergency Group Call / Cancel Emergency State / Upgrade to Imminent Peril Group Call / Cancel Imminent Peril State / Client Terminated (CT)
6.1.1.3.MCPTT	MCPTT / On-network / On-demand Pre-arranged Group Call / Manual Commencement Mode / Client Originated (CO)
6.1.1.4.MCPTT	MCPTT / On-network / On-demand Pre-arranged Group Call / Manual Commencement Mode / Client Terminated (CT)
6.1.1.5.MCPTT	MCPTT / On-network / Pre-arranged Group Call using pre-established session / Client originated Pre-established Session Release with associated MCPTT session / Client Originated (CO)
6.1.1.6.MCPTT	MCPTT / On-network / Pre-arranged Group Call using pre-established session / Automatic Commencement Mode / Server originated Pre-established Session Release with associated MCPTT session / Client Terminated (CT)
6.1.1.8.MCPTT	MCPTT / On-network / Pre-arranged Broadcast Group Call / Client Originated (CO)
6.1.1.9.MCPTT	MCPTT / On-network / Pre-arranged Broadcast Group Call / Client Terminated (CT)
6.1.1.10.MCPTT	MCPTT / On-network / Broadcast Group Call with Temporary Group / Client Originated (CO)
6.1.1.11.MCPTT	MCPTT / On-network / Pre-arranged Emergency Group Call / Client Originated (CO)
6.1.1.12.MCPTT	MCPTT / On-network / Pre-arranged Emergency Group Call / Client Terminated (CT)
6.1.1.13.MCPTT	MCPTT / On-network / Pre-Arranged Imminent Peril Group Call / Client Originated (CO)
6.1.1.14.MCPTT	MCPTT / On-network / Pre-Arranged Imminent Peril Group Call / Client Terminated (CT)
6.1.1.16.MCPTT	MCPTT / On-network / Emergency Alert / Client Terminated (CT)
6.1.1.17.MCPTT	On-network / Broadcast Group Call using pre-established session / Client originated Pre-established Session Release with associated MCPTT session / Client Originated (CO)
6.1.1.18.MCPTT	MCPTT / On-network / Broadcast Group Call using pre-established session / Client originated Pre-established Session Release with associated MCPTT session / Client Terminated (CT)
6.1.1.19.MCPTT	On-network / On-demand Pre-arranged Group Call / Active functional alias / Client Originated (CO)
6.1.1.20.MCPTT	On-network / On-demand Pre-arranged Group Call / Multi Talker
6.1.1.21.MCPTT	On-network / On-demand Pre-arranged Group Call / No Implicit Floor Control / Client Originated (CO)
6.1.2.7.MCPTT	MCPTT / On-network / Chat Group Call / Emergency Group Call / Client Originated (CO)
6.1.2.8.MCPTT	MCPTT / On-network / Chat Group Call / Emergency Group Call / Client Terminated (CT)
6.1.2.9.MCPTT	MCPTT / On-network / Chat Group Call / Imminent Peril Group Call / Client Originated (CO)
6.1.2.10.MCPTT	MCPTT / On-network / Chat Group Call / Imminent Peril Group Call / Client Terminated (CT)
6.1.2.11.MCPTT	MCPTT / On-network / Chat Group Call / Join Chat Group Session / Upgrade to Emergency / Cancel Emergency / Upgrade to Imminent Peril / Cancel Imminent Peril / Client Originated (CO)
6.1.2.12.MCPTT	MCPTT / On-network / Chat Group Call / Upgrade to Emergency / Cancel Emergency / Upgrade to Imminent Peril / Cancel Imminent Peril / Client Originated (CT)
6.1.2.13.MCPTT	On-network / Chat Group Call / Join Chat Group Session / Active functional alias / Client Originated (CO)

6.2.1.MCPTT	MCPTT / On-network / Private Call / On-demand / Automatic Commencement Mode / With Floor Control confidentiality and integrity protection/ Upgrade to Emergency Call / Cancellation of Emergency on User request / Client Originated (CO)
6.2.2.MCPTT	MCPTT / On-network / Private Call / On-demand / Automatic Commencement Mode / With Floor Control confidentiality and integrity protection/ Upgrade to Emergency Call / Cancellation of Emergency on User request / Client Terminated (CT)
6.2.3.MCPTT	MCPTT / On-network / Private Call / On-demand / Automatic Commencement Mode / Without Floor Control / Client Originated (CO)
6.2.4.MCPTT	MCPTT / On-network / Private Call / On-demand / Automatic Commencement Mode / Without Floor Control / Client Terminated (CT)
6.2.5.MCPTT	MCPTT / On-network / Private Call / Emergency Private Call / On-demand / Automatic Commencement Mode / Force of automatic commencement mode / Without Floor Control / Client Originated (CO)
6.2.6.MCPTT	MCPTT / On-network / Private Call / Emergency Private Call / On-demand / Manual Commencement Mode / Force of automatic commencement mode / Without Floor Control / Client Terminated (CT)
6.2.7.MCPTT	MCPTT / On-network / Private Call / On-demand / Manual Commencement Mode / Without Floor Control / Client Originated (CO)
6.2.8.MCPTT	MCPTT / On-network / Private Call / On-demand / Manual Commencement Mode / Without Floor Control / Client Terminated (CT)
6.2.14.MCPTT	On-network / Private Call / Ambient listening call / Remotely initiated Ambient listening call / Remotely initiated ambient listening call release / Success / Client Originated (CO) / Server initiated ambient call release
6.2.15.MCPTT	MCPTT / On-network / Private Call / Ambient listening call / Remotely initiated Ambient listening call / Remotely initiated ambient listening call release / Success / Client Terminated (CT)
6.2.16.MCPTT	MCPTT / On-network / Private Call / Ambient listening call / Locally initiated Ambient listening call / Locally initiated ambient listening call release / Success / Client Originated (CO) / Server initiated ambient call release
6.2.17.MCPTT	MCPTT / On-network / Private Call / Ambient listening call / Locally initiated Ambient listening call / Locally initiated ambient listening call release / Success / Client Terminated (CT)

A.3.2 MCVideo Client Test Suites

None.

A.3.3 MCDData Client Test Suites

Table A.3.3-1 lists all approved test cases from TS 36.579-7 [60].

Table A.3.3-1: MCDData Client TTCN test cases from TS 36.579-7 [60]

Test case	Description
5.1.MCDData	Configuration / Authentication / User Authorization / UE Configuration / User Profile / Key Generation
6.1.1.MCDData	On-network / Short Data Service (SDS) / Standalone SDS Using Signaling Control Plane / One-to-one Standalone SDS / Client Originated (CO)
6.1.3.MCDData	On-network / Short Data Service (SDS) / Standalone SDS Using Signaling Control Plane / Group Standalone SDS / Client Originated (CO)
6.1.4.MCDData	On-network / Short Data Service (SDS) / Standalone SDS Using Signaling Control Plane / Group Standalone SDS / Client Terminated (CT)

Annex B (informative): Style Guide

B.1 Introduction

The style guide specified in TS 36.523-3 [27] Annex B applies to the present document.

Annex C (normative): Common TTCN-3 Definitions

C.0 Introduction

The present Annex C specifies the TTCN-3 type definitions used at the system interface to configure and control the SS. The type definitions are common, independent from test model.

In case of discrepancy between the content of the present Annex C and the equivalent TTCN-3 definitions / semantic requirements found in the TTCN modules provided as attachments to the present specification, the latter shall take precedence.

NOTE: This annex is automatically generated from the TTCN-3 modules provided as attachment to the present specification and containing the listed TTCN-3 type definitions.

C.1 SRTP_ASP_TypeDefs

C.1.1 Type_Definitions

SRTP_EncryptionAlgorithm_Type

TTCN-3 Enumerated Type	
Name	SRTP_EncryptionAlgorithm_Type
Comment	
Null	RFC 3830 clause 6.10.1
AES_CM	RFC 3830 clause 6.10.1
AES_F8	RFC 3830 clause 6.10.1
AES_GCM	RFC 7714 clause 14.3

SRTP_AuthenticationAlgorithm_Type

TTCN-3 Enumerated Type	
Name	SRTP_AuthenticationAlgorithm_Type
Comment	
Null	RFC 3830 clause 6.10.1
HMAC_SHA_1	RFC 3830 clause 6.10.1
RCCm1	RFC 4771 clause 4
RCCm2	RFC 4771 clause 4
RCCm3	RFC 4771 clause 4

SRTP_PRF_Type

TTCN-3 Enumerated Type	
Name	SRTP_PRF_Type
Comment	
AES_CM	RFC 3830 clause 6.10.1

SRTP_SecurityProfile_Type

TTCN-3 Record Type			
Name	SRTP_SecurityProfile_Type		
Comment	parameters for SRTP security profiles according to 33.180 annex E: - Table E.2.2-1 (RTP group call: GMK) - Table E.3.2-1 (RTP private call: PCK) - Table E.4.2-1 (RTCP: CSK and MuSiK): The parameters may be contained/negotiated in MIKEY Security Policy Payload (RFC 3830)		
EncryptionAlgorithm	SRTP_EncryptionAlgorithm_Type		SRTP type 0; RFC 3830 clause 6.10.1
SessionEncryptionKeyLength	integer		SRTP type 1; RFC 3830 clause 6.10.1
AuthenticationAlgorithm	SRTP_AuthenticationAlgorithm_Type	opt	SRTP type 2; RFC 3830 clause 6.10.1
SessionSaltKeyLength	integer		SRTP type 4; RFC 3830 clause 6.10.1
PRF	SRTP_PRF_Type		SRTP type 5; RFC 3830 clause 6.10.1
KeyDerivationRate	integer		SRTP type 6; RFC 3830 clause 6.10.1
ROC_TransmissionRate	integer	opt	SRTP type 13; RFC 4771 clause 4
SRTP_AuthenticationTagLength	integer	opt	SRTP type 18; RFC 4771 clause 4
SRTCP_AuthenticationTagLength	integer	opt	SRTP type 19; RFC 4771 clause 4
AEAD_AuthenticationTagLength	integer		SRTP type 20; RFC 7714 clause 14.3

SRTP_KeyInfo_Type

TTCN-3 Record Type			
Name	SRTP_KeyInfo_Type		
Comment	SRTP Master Key, SRTP Master Salt and MKI according to 33.180 clauses 7.4.1, 7.4.2 and 9.4.6, RFC 3830 and RFC 3711		
MasterKey	octetstring		SRTP master key according to RFC 3711 (128 bits)
MasterSalt	octetstring		SRTP master salt according to RFC 3711 and RFC 7714 (96 bits): 33.180 clauses 7.5 and 9.4.8 specify the AEAD_AES_128_GCM algorithm as defined in RFC 7714 to be used for confidentiality and data authentication of the media stream and the media control data. RFC 7714 specifies in clause 12 a master salt length of 96 and in clause 11 that the AES_CM PRF KDF according to RFC 3711 shall be used. Nevertheless RFC 3711 clause 8.2 requires a master salt length of 112. This contradiction is resolved by the RFC Errata for RFC 7714: The master salt shall be 96 bit in the first place (as according to RFC 7714) but then multiplied by 2 ¹⁶ to fit to the requirements of RFC 3711 (112 bit). => MasterSalt provides a 96-bit value which needs to be padded by the system adaptor to get the 112-bit master salt as needed according to RFC 3711
MKI	octetstring	opt	SRTP Master Key Identifier: if not present => no MKI to be added to the SRTP/SRTCP packet

SRTP_Config_Type

TTCN-3 Record Type			
Name	SRTP_Config_Type		
Comment	SRTP configuration parameters		
KeyInfo	SRTP_KeyInfo_Type		
SecurityProfile	SRTP_SecurityProfile_Type		

SRTP_Connection_Type

TTCN-3 Record Type			
Name	SRTP_Connection_Type		
Comment	configuration parameters for a single (UDP) connection		
Connection	IP_Connection_Type		RTP/RTCP configuration shall be applied for packets matching the given Connection: in general a connection is given by Protocol := udp Local := { IP address of the SS, port number at the SS } Remote := omit (but other matching criteria may be used if needed) NOTE: TTCN shall ensure that different connection can be identified without ambiguity (in general even the local port number should be sufficient)
LocalSSRC	O4_Type		SSRC of the SS
SRTP_Config	SRTP_Config_Type	opt	configuration of SRTP/SRTCP for the given connection; if not present => no SRTP/SRTCP

SRTP_ConnectionTable_Type

TTCN-3 Record of Type	
Name	SRTP_ConnectionTable_Type
Comment	record of SRTP_Connection_Type

SRTP_CTRL_REQ

TTCN-3 Union Type		
Name	SRTP_CTRL_REQ	
Comment	configuration ASP at the system interface	
Config	SRTP_ConnectionTable_Type	table of all connection to be configured for SRTP/SRTCP (or RTP/RTCP); the configuration overrides any previous configuration; it is not foreseen to add, modify or remove single connections

SRTP_CTRL_IND

TTCN-3 Union Type		
Name	SRTP_CTRL_IND	
Comment	ASP at the system interface for system confirmations and indications	
Confirm	Null_Type	confirmation for configuration
Error	Null_Type	indication of errors

C.1.2 System_Interface

SRTP_PORT

TTCN-3 Port Type	
Name	SRTP_PORT
Comment	
out	SRTP_CTRL_REQ
in	SRTP_CTRL_IND

C.2 IP_ASP_TypeDefs

General Notes:

NOTE 1:

In general the handling of IP data shall be independent from the RAT being used on lower layers.

NOTE 2:

It shall be possible for SS implementation to reuse existing IP stack implementations in the system adaptor; therefore the well-known concept of socket programming shall be supported (regardless of whether those are used in the system adaptor implementation or not)

NOTE 3:

Since in general at the network side there are several different IP addresses the SS needs to simulate more than one IP address;

that can be based on a concept of multiple virtual network adaptors

NOTE 4:

There is no easy way to control the routing of IP data for an IP connection from above the IP stack

i.e. there are no parameters at the socket interface to determine e.g. cell id and DRB id

=> another independent logical entity (DRB-MUX) is needed below the IP stack which is responsible to control the routing of IP packets from/to DRBs in different cells of different RATs

Reference:

An introduction to socket programming can be found in

UNIX Network Programming Volume 1, Third Edition: The Sockets Networking API

by W. Richard Stevens, Bill Fenner, Andrew M. Rudoff

C.2.1 IP_Common

IP_Common: Basic Type Definitions

TTCN-3 Basic Types	
PortNumber_Type	UInt16_Type

IPv4_AddrInfo_Type

TTCN-3 Record Type	
Name	IPv4_AddrInfo_Type
Comment	IPv4 specific info of the socket addr (AF_INET)
Addr	charstring IP Address as string (IP v4 dot notation) to be converted to 32-bit unsigned integer

IPv6_AddrInfo_Type

TTCN-3 Record Type			
Name	IPv6_AddrInfo_Type		
Comment	IPv6 specific info of the socket addr (AF_INET6); NOTE: sin6_flowinfo can be ignored and set to 0		
Addr	charstring		to be converted to sin6_addr
Scopeld	UInt32_Type	opt	sin6_scope_id in general an IPv6 address is like "fe80::1%eth0" with eth0 being the network adaptor mapped to a scope id (Unix) assumption: for UE conformance testing it is not necessary to distinguish different scopes and the scope id in general can be determined by the system adaptor => omit

IP_AddrInfo_Type

TTCN-3 Union Type			
Name	IP_AddrInfo_Type		
Comment			
V4	IPv4_AddrInfo_Type		
V6	IPv6_AddrInfo_Type		

IP_Socket_Type

TTCN-3 Record Type			
Name	IP_Socket_Type		
Comment	Socket		
IpAddr	IP_AddrInfo_Type	opt	IP address
Port	PortNumber_Type	opt	port number

InternetProtocol_Type

TTCN-3 Enumerated Type	
Name	InternetProtocol_Type
Comment	
udp	
tcp	
icmp	
icmpv6	

IP_Connection_Type

TTCN-3 Record Type			
Name	IP_Connection_Type		
Comment	A connection between peer-to-peer entities is unambiguously defined by the protocol (udp/tcp/icmp/icmpv4), the local socket and the remote socket		
Protocol	InternetProtocol_Type		
Local	IP_Socket_Type	opt	
Remote	IP_Socket_Type	opt	

C.3 CommonDefs

CommonDefs: Constant Definitions

TTCN-3 Basic Types			
tsc_UInt16Max	integer	65535	
tsc_UInt32Max	integer	4294967295	

CommonDefs: Basic Type Definitions

TTCN-3 Basic Types		
O4_Type	octetstring length(4)	
Null_Type	boolean (true)	dummy type for 'typeless' fields in unions
UInt16_Type	integer (0 .. tsc_UInt16Max)	
UInt32_Type	integer (0 .. tsc_UInt32Max)	

C.4 References to TTCN-3

References to TTCN-3		
SRTP_ASP_TypeDefs	Common/SRTP_ASP_TypeDefs.ttcn	Rev 29933
IP_ASP_TypeDefs	IP_PTC/IP_ASP_TypeDefs.ttcn	Rev 27511
CommonDefs	Common/CommonDefs.ttcn	Rev 29871

Annex D (Normative): SIP Type Definitions and XSD References

D.1 XML Schema Definitions (XSD)

Common XML schema definitions according to TS 34.229-3 [28] Table G.0.1-1 are used. In addition, there are the MCX specific XML schema definitions as according to table D.1-1.

Table D.1-1: MCX specific definitions

XML Schema (XSD)	Source	Name space
RFC4354-poc-settings	RFC 4354 [52] clause 6.1	urn:oma:params:xml:ns:poc:poc-settings
RFC4661-SimpleFilter	RFC 4661 [34] clause 7	urn:ietf:params:xml:ns:simple-filter
RFC5261-patch-ops (NOTE 2)	RFC 5261 [50] clause 8	(NOTE 1)
RFC5874-xcap-diff	RFC 5874 [51] clause 4	urn:ietf:params:xml:ns:xcap-diff
IANA-resource-lists	RFC 4826 [34] clause 3.2 https://www.iana.org/assignments/xml-registry/schema/resource-lists.xsd	urn:ietf:params:xml:ns:resource-lists
poc_listService-v1_0	OMA [37]	urn:oma:xml:poc:list-service
xdm_extensions-v1_0	OMA [39]	urn:oma:xml:xdm:extensions
xdm_rsrclst_uriusage- v1_0	OMA [40]	urn:oma:xml:xdm:resource-list:oma-uriusage
xenc-schema	W3C [41]	http://www.w3.org/2001/04/xmlenc#
xmldsig-core-schema	W3C [42]	http://www.w3.org/2000/09/xmldsig#
TS24281_mcvideoinfo (NOTE 3)	TS 24.281 [55] Annex F.1.2	urn:3gpp:ns:mcvideoInfo:1.0
TS24281_mcvideolocation info	TS 24.281 [55] Annex F.3.2	urn:3gpp:ns:mcvideoLocationInfo:1.0
TS24281_mcvideoPresInf o	TS 24.281 [55] Table 8.3.1.2-1	urn:3gpp:ns:mcvideoPresInfo:1.0
TS24282_mcdainfo	TS 24.282 [57] Annex D.1.2	"urn:3gpp:ns:mcdainfo:1.0"
TS24282_mcdatalocationi nfo	TS 24.282 [57] Annex D.4.2	urn:3gpp:ns:mcdatalocationInfo:1.0
TS24282_mcdataPresInfo	TS 24.282 [57] Table 8.4.1.2-1	"urn:3gpp:ns:mcdataPresInfo:1.0"
TS24282_mcdataPresInfo FA	TS 24.282 [57] Table 22.3.1.2-1	"urn:3gpp:ns:mcdataPresInfoFA:1.0"
TS24379_mcpttaff (NOTE 4)	TS 24.379 [9] Annex F.4.2 TS 24.281 [55] Annex F.4.2 TS 24.282 [57] Annex D.3.2	urn:3gpp:ns:affiliationCommand:1.0
TS24379_mcpttinfo	TS 24.379 [9] Annex F.1.2	urn:3gpp:ns:mcpttInfo:1.0
TS24379_mcpttlocationinf o	TS 24.379 [9] Annex F.3.2	urn:3gpp:ns:mcpttLocationInfo:1.0
TS24379_mcpttsigneddoc	TS 24.379 [9] Annex F.6.2	urn:3gpp:ns:mcpttSignedDoc:1.0
TS24379_preconfiguredR egroup	TS 24.379 [9] Annex F.7.2	urn:3gpp:ns:preconfiguredRegroup:1.0
TS24379_mcpttPresInfo	TS 24.379 [9] Table 9.3.1.2-1	urn:3gpp:ns:mcpttPresInfo:1.0
TS24379_mcpttPresInfoF A	TS 24.379 [9] Table 9A.3.1.2-1	urn:3gpp:ns:mcpttPresInfoFA:1.0
TS24379_poc-settings (NOTE 5)	TS 24.379 [9] Table 7.4.1.2.2-2 TS 24.281 [55] Table 7.4.1.2.2-2	urn:3gpp:mcsSettings:1.0
TS24481-mcptt-group	TS 24.481 [11] clause 7.2.4.2	urn:3gpp:ns:mcpttGroupInfo:1.0
TS24481-mcpttGMOP	TS 24.481 [11] clause 7.3.3	urn:3gpp:ns:mcpttGMOP:1.0
TS24481-mcpttGKTP	TS 24.481 [11] clause 7.7.4.2	urn:3gpp:ns:mcpttGKTP:1.0
TS24484-ue-init-config	TS 24.484 [14] clause 7.2.2.3	urn:3gpp:mcptt:mcpttUEInitConfig:1.0
TS24484- mcptt-ue-config	TS 24.484 [14] clause 8.2.2.3	urn:3gpp:mcptt:mcpttUEConfig:1.0
TS24484-mcvideo-ue- config	TS 24.484 [14] clause 9.2.2.3	urn:3gpp:mcvideo:mcvideoUEConfig:1.0
TS24484-mcdata-ue- config	TS 24.484 [14] clause 10.2.2.3	urn:3gpp:mcdata:mcdataUEConfig:1.0
TS24484-mcptt-user- profile	TS 24.484 [14] clause 8.3.2.3	urn:3gpp:mcptt:user-profile:1.0
TS24484-mcvideo-user- profile	TS 24.484 [14] clause 9.3.2.3	urn:3gpp:ns:mcvideo:user-profile:1.0
TS24484-mcdata-user- profile	TS 24.484 [14] clause 10.3.2.3	urn:3gpp:ns:mcdata:user-profile:1.0
TS24484-mcptt-service- config	TS 24.484 [14] clause 8.4.2.3	urn:3gpp:ns:mcpttServiceConfig:1.0
TS24484-mcvideo-service- config	TS 24.484 [14] clause 9.4.2.3	urn:3gpp:ns:mcvideoServiceConfig:1.0
TS24484-mcdata-service- config	TS 24.484 [14] clause 10.4.2.3	urn:3gpp:ns:mcdataServiceConfig:1.0
TS33180- mcsecKMSInterface	TS 33.180 [43] Annex D.3.5.1	urn:3gpp:ns:mcsecKMSInterface:1.0
TS33180-mcsecKMSKRR	TS 33.180 [43] Annex D.4.4	urn:3gpp:ns:mcsecKMSKRR:1.0

- NOTE 1: The schema does not define any target namespace but is referred to as "urn:ietf:params:xml:ns:patch-ops" e.g. in the original include statement in urn:ietf:params:xml:ns:xcap-diff.
- NOTE 2: The XML schema in RFC 5261 [50] clause 8 is specified as DTD with ENTITY declarations being referred by the pattern of the schema. These references are resolved in RFC5261-patch-ops in order to get schema definitions which can be processed by TTCN-3 compilers.
- NOTE 3: The schema specifies import of non-existing namespace urn:3gpp:ns:mcvideoGKTP:1.0.
Assumption: urn:3gpp:ns:mcpttGKTP:1.0 to be imported instead
- NOTE 4: The schemata in TS 24.379 [9] F.4.2, TS 24.281 [55] F.4.2 and TS 24.282 [57] Annex D.1.2 are effectively the same apart from the namespace prefix ("mcptt" vs. "mcvideo" vs. "mcdata").
Assumption: The namespace prefix does not matter in XML documents, in general any prefix can be used.
⇒ TS24379_mcptt is used for MCPTT, MCVideo and MCData.
- NOTE 5: The schemata in TS 24.379 [9] Table 7.4.1.2.2-2 and TS 24.281 [55] Table 7.4.1.2.2-2 are the same.
⇒ TS24379_poc-settings is used for MCPTT and MCVideo.

In order to avoid ambiguities and unexpected side effects due to tool specific behaviour the schemaLocation in xs:import statements of XSD files are modified to use local references rather than references to internet locations.

The schemaLocations of imported namespaces are shown in table D.1-2. The schemaLocations of included namespaces are shown in table D.1-3.

Table D.1-2: schemaLocation of imported namespaces

XML Schema	Imported name space	Original schemaLocation	Modified schemaLocation
RFC4354-poc-settings	http://www.w3.org/XML/1998/namesp	http://www.w3.org/2001/xml.xsd	../Common/IMS_XSD/xml.xsd
RFC4661-SimpleFilter	http://www.w3.org/XML/1998/namesp	http://www.w3.org/2001/xml.xsd	../Common/IMS_XSD/xml.xsd
IANA-resource-lists	http://www.w3.org/XML/1998/namesp	http://www.w3.org/2001/xml.xsd	../Common/IMS_XSD/xml.xsd
poc_listService-v1_0	urn:ietf:params:xml:ns:common-policy	http://www.iana.org/assignments/xml-registry/schema/common-policy.xsd	../Common/IMS_XSD/RFC4745-common-policy.xsd (NOTE 1)
poc_listService-v1_0	urn:ietf:params:xml:ns:resource-lists	http://www.iana.org/assignments/xml-registry/schema/resource-lists.xsd	IANA-resource-lists.xsd (NOTE 2)
xdm_extensions-v1_0	http://www.w3.org/XML/1998/namesp	http://www.w3.org/2001/03/xml.xsd	../Common/IMS_XSD/xml.xsd
xenc-schema	http://www.w3.org/2000/09/xmldsig#	xmldsig-core-schema.xsd	(no change needed)
TS24282_mcdainfo.xsd	http://www.w3.org/2001/04/xmlenc#	http://www.w3.org/TR/xmlenc-core/xenc-schema.xsd	xenc-schema.xsd
TS24379_mcpttsigneddoc	http://www.w3.org/2000/09/xmldsig#	http://www.w3.org/TR/xmldsig-core/xmldsig-core-schema.xsd	xmldsig-core-schema.xsd
TS24484-ue-init-config	http://www.w3.org/XML/1998/namesp	http://www.w3.org/2001/xml.xsd	../Common/IMS_XSD/xml.xsd
TS24484- mcptt-ue-config	http://www.w3.org/XML/1998/namesp	http://www.w3.org/2001/xml.xsd	../Common/IMS_XSD/xml.xsd
TS24484-mcvideo-ue-config	http://www.w3.org/XML/1998/namesp	http://www.w3.org/2001/xml.xsd	../Common/IMS_XSD/xml.xsd
TS24484-mcdata-ue-config	http://www.w3.org/XML/1998/namesp	http://www.w3.org/2001/xml.xsd	../Common/IMS_XSD/xml.xsd
TS24484-mcptt-user-profile	http://www.w3.org/XML/1998/namesp	http://www.w3.org/2001/xml.xsd	../Common/IMS_XSD/xml.xsd
TS24484-mcptt-user-profile	urn:ietf:params:xml:ns:common-policy	http://www.iana.org/assignments/xml-registry/schema/common-policy.xsd	../Common/IMS_XSD/RFC4745-common-policy.xsd (NOTE 1)
TS24484-mcvideo-user-profile	http://www.w3.org/XML/1998/namesp	http://www.w3.org/2001/xml.xsd	../Common/IMS_XSD/xml.xsd
TS24484-mcvideo-user-profile	urn:ietf:params:xml:ns:common-policy	http://www.iana.org/assignments/xml-registry/schema/common-policy.xsd	../Common/IMS_XSD/RFC4745-common-policy.xsd (NOTE 1)
TS24484-mcdata-user-profile	http://www.w3.org/XML/1998/namesp	http://www.w3.org/2001/xml.xsd	../Common/IMS_XSD/xml.xsd
TS24484-mcdata-user-profile	urn:ietf:params:xml:ns:common-policy	http://www.iana.org/assignments/xml-registry/schema/common-policy.xsd	../Common/IMS_XSD/RFC4745-common-policy.xsd (NOTE 1)
TS24484-mcptt-service-config	http://www.w3.org/XML/1998/namesp	http://www.w3.org/2001/xml.xsd	../Common/IMS_XSD/xml.xsd

XML Schema	Imported name space	Original schemaLocation	Modified schemaLocation
TS24484-mcdata-service-config	http://www.w3.org/XML/1998/namespace	http://www.w3.org/2001/xml.xsd	../Common/IMS_XSD/xml.xsd
<p>NOTE 1: The namespace <code>urn:ietf:params:xml:ns:common-policy</code> is specified in RFC 4745 and at http://www.iana.org/assignments/xml-registry/schema/common-policy.xsd with difference in the <code>minOccurs</code> for <code>identityType</code> and <code>validityType</code>. Nevertheless for use in TTCN there shall be only one schema as part 9 of the TTCN-3 language [31] does not support different variants of one and the same namespace. In addition according to DIFF1 for RFC 4745 it seems that the RFC's variant is newer than the IANA's variant.</p> <p>NOTE 2: The namespace <code>urn:ietf:params:xml:ns:resource-lists</code> is specified in RFC 4826 and at http://www.iana.org/assignments/xml-registry/schema/resource-lists.xsd with the difference of attribute <code>anchor</code> not being mandatory in the RFC.</p>			

Table D.1-3: schemaLocation of included namespaces

XML Schema	Included schema	Original schemaLocation	Modified schemaLocation
RFC5874-xcap-diff	<code>urn:ietf:params:xml:schema:patch-ops</code>	<code>urn:ietf:params:xml:schema:patch-ops</code>	RFC5261-patch-ops.xsd

D.2 Common TTCN-3 Libraries

The same LibSip modules are used as according to TS 34.229-3 [28] annex G.0.2 and the same additional LibSip_MessageBodyTypes as according to TS 34.229-3 [28] annex G.1 and G.2

Annex E (normative): TTCN-3 Definitions for the MCX IPCAN test model

E.0 Introduction

The present Annex E specifies the TTCN-3 type definitions used at the system interface to configure and control the SS. The type definitions are specific for the MCX IPCAN test model.

In case of discrepancy between the content of the present Annex E and the equivalent TTCN-3 definitions / semantic requirements found in the TTCN modules provided as attachments to the present specification, the latter shall take precedence.

NOTE: This annex is automatically generated from the TTCN-3 modules provided as attachment to the present specification and containing the listed TTCN-3 type definitions.

E.1 MCX_IPCAN_ASP_TypeDefs

MCX_IPCAN_ASP_TypeDefs: Basic Type Definitions

TTCN-3 Basic Types		
MCX_IPCAN_AbsoluteCellPower_Type	integer (-150..0)	absolute cell power (dBm); same as AbsoluteCellPower_Type
MCX_IPCAN_DeactivatedDedicatedEpsBearerMCX_Type	MCX_IPCAN_EpsBearerIdList_Type	Deactivate dedicated EPS bearer(s) for the MCX PDN CellId : cell id of the cell Reference implementation: f_EUTRA_DeactivateEPS_BearerContext

MCX_IPCAN_EpsBearerIdList_Type

TTCN-3 Record of Type	
Name	MCX_IPCAN_EpsBearerIdList_Type
Comment	record of MCX_IPCAN_EpsBearerId_Type

MCX_IPCAN_PacketFilterDirection_Type

TTCN-3 Enumerated Type	
Name	MCX_IPCAN_PacketFilterDirection_Type
Comment	packet filter direction according to TS 24.008 Table 10.5.162
downlinkOnly	
uplinkOnly	
bidirectional	

MCX_IPCAN_PacketFilterComponentPortRange_Type

TTCN-3 Record Type	
Name	MCX_IPCAN_PacketFilterComponentPortRange_Type
Comment	
Low	integer
High	integer

MCX_IPCAN_PacketFilterComponent_Type

TTCN-3 Union Type		
Name	MCX_IPCAN_PacketFilterComponent_Type	
Comment	TS 24.008 Table 10.5.162	
Protocol	integer	Protocol identifier/Next header type: 17 for UDP
SingleRemotePort	integer	
RemotePortRange	MCX_IPCAN_PacketFilterComponentPortRange_Type	

MCX_IPCAN_PacketFilterComponentList_Type

TTCN-3 Record of Type	
Name	MCX_IPCAN_PacketFilterComponentList_Type
Comment	
record of MCX_IPCAN_PacketFilterComponent_Type	

MCX_IPCAN_PacketFilter_Type

TTCN-3 Record Type			
Name	MCX_IPCAN_PacketFilter_Type		
Comment			
Direction	MCX_IPCAN_PacketFilterDirection_Type		
ComponentList	MCX_IPCAN_PacketFilterComponentList_Type		

MCX_IPCAN_PacketFilterList_Type

TTCN-3 Record of Type	
Name	MCX_IPCAN_PacketFilterList_Type
Comment	
record of MCX_IPCAN_PacketFilter_Type	

MCX_IPCAN_ASP_DedicatedEpsBearerInfo_Type

TTCN-3 Record Type			
Name	MCX_IPCAN_ASP_DedicatedEpsBearerInfo_Type		
Comment			
EpsBearerId	MCX_IPCAN_EpsBearerId_Type		EPS bearer id of the dedicated EPS bearer
PacketFilterList	MCX_IPCAN_PacketFilterList_Type		

MCX_IPCAN_IPv4IPv6Address_Type

TTCN-3 Record Type			
Name	MCX_IPCAN_IPv4IPv6Address_Type		
Comment			
IPv4	charstring		
IPv6	charstring		

MCX_IPCAN_PDN_Info_Type

TTCN-3 Record Type			
Name	MCX_IPCAN_PDN_Info_Type		
Comment			
PdnType	MCX_Registration_PDN_Type		MCX, IMS or INTERNET
EpsBearerId	MCX_IPCAN_EpsBearerId_Type		EPS bearer id of the PDN's default EPS bearer
IPAddressNW	MCX_IPCAN_IPv4IPv6Address_Type	opt	not present for MCX PDN as the IP signalling is handled by TTCN
IPAddressUE	MCX_IPCAN_IPv4IPv6Address_Type	opt	not present for MCX PDN as the IP signalling is handled by TTCN

MCX_IPCAN_PDN_InfoList_Type

TTCN-3 Record of Type	
Name	MCX_IPCAN_PDN_InfoList_Type
Comment	list of PDNs to be connected to during Idle Update procedure
record length (1..3) of	MCX_IPCAN_PDN_Info_Type

MCX_IPCAN_ASP_CommonReqPart_Type

TTCN-3 Record Type			
Name	MCX_IPCAN_ASP_CommonReqPart_Type		
Comment			
CellId	EUTRA_CellId_Type		
CnfFlag	boolean		

MCX_IPCAN_Init_Type

TTCN-3 Record Type	
Name	MCX_IPCAN_Init_Type
Comment	Initialisation of the system simulator. CellId : eutra_Cell_NonSpecific Reference implementation: f_EUTRA_Init with p_SysinfoCombination:=c1, p_HandleULDataUM:=HANDLE_UM_DATA, p_UseBigGrants:=USE_BIG_GRANTS

MCX_IPCAN_CellConfig_Type

TTCN-3 Record Type	
Name	MCX_IPCAN_CellConfig_Type
Comment	Create a cell and send out system information. CellId : cell id of the cell to be created Reference implementation: f_EUTRA_CellConfig_Def

MCX_IPCAN_CellPower_Type

TTCN-3 Record Type			
Name	MCX_IPCAN_CellPower_Type		
Comment	Set the cell power of a cell. CellId : cell id of the cell Reference implementation: f_EUTRA_SetCellPower		
AbsoluteCellPower	MCX_IPCAN_AbsoluteCellPower_Type		

MCX_IPCAN_InitialRegistration_Type

TTCN-3 Record Type		
Name	MCX_IPCAN_InitialRegistration_Type	
Comment	Perform initial registration procedure according to TS 36.579-1 clause 5.4.1A and Table 5.4.2.3-1 steps 2 - 16A to bring the UE into state 3 according to Figure 4.5.1-1 in TS 36.508. As described in clause 5.4.1A of TS 36.579-1 after switch on the UE may register to an internet PDN, an IMS PDN and the MCX PDN. NOTE: The UE does not need to register to MCX during initial registration after switch-on. CellId : cell id of the cell	
PdnList	MCX_IPCAN_PDN_InfoList_Type	list of PDNs the UE is expected to connect to during Idle Update procedure; the list may or may not contain MCX
DefaultAPN	octetstring	APN to be used for the PDN (if any) for which the UE does not provide an APN; APN encoded according to 23.003 clause 9.1 and RFC 1035 clause 4.1.2

MCX_IPCAN_AdditionalRegistrationMCX_Type

TTCN-3 Record Type		
Name	MCX_IPCAN_AdditionalRegistrationMCX_Type	
Comment	Procedure used, if the UE is configured not to connect automatically to the MCX PDN after switch-on: In this case after initial registration the UE gets triggered from TTCN by an MMI command to start MCX registration and this procedure is started to perform steps 19 - 26 of TS 36.579-1 Table 5.4.2.3-1. CellId : cell id of the cell	
EpsBearerId	MCX_IPCAN_EpsBearerId_Type	

MCX_IPCAN_RRCConnectionSetupMO_Type

TTCN-3 Record Type		
Name	MCX_IPCAN_RRCConnectionSetupMO_Type	
Comment	MO RRC connection establishment (TS 36.508 cl. 4.5.3.3 steps 3-9) for DedicatedEpsBearers == {}; for DedicatedEpsBearers != {} steps 2 - 8 of the Generic Test Procedure for MCPTT radio bearer establishment for use of pre-established session according to 36.579-1 clause 5.4.13 apply. CellId : cell id of the cell Reference implementation: f_EUTRA_ServiceRequestAndActivate_SRB2_DRB (for DedicatedEpsBearers == {})	
DedicatedEpsBearers	MCX_IPCAN_EpsBearerId_List_Type	list of dedicated EPS bearers for which the DRBs need to be established for a pre-established session

MCX_IPCAN_RRCConnectionSetupMT_Type

TTCN-3 Record Type		
Name	MCX_IPCAN_RRCConnectionSetupMT_Type	
Comment	MT RRC connection establishment (TS 36.508 cl. 4.5.3.3 steps 1-9) for DedicatedEpsBearers == {}; for DedicatedEpsBearers != {} the Generic Test Procedure for MCPTT radio bearer establishment for use of pre-established session according to 36.579-1 clause 5.4.13 applies. CellId : cell id of the cell Reference implementation: f_EUTRA_RbEst_Def (for DedicatedEpsBearers == {})	
DedicatedEpsBearers	MCX_IPCAN_EpsBearerId_List_Type	list of dedicated EPS bearers for which the DRBs need to be established for a pre-established session

MCX_IPCAN_ActivateDedicatedEpsBearerMCX_Type

TTCN-3 Record of Type		
Name	MCX_IPCAN_ActivateDedicatedEpsBearerMCX_Type	
Comment	Establish dedicated EPS bearer(s) for the MCX PDN CellId : cell id of the cell Reference implementation: f_MCX_EUTRA_IPCAN_ActivateDedicatedEpsBearer	
record of MCX_IPCAN_ASP_DedicatedEpsBearerInfo_Type		

MCX_IPCAN_RRConnectionRelease_Type

TTCN-3 Record Type	
Name	MCX_IPCAN_RRConnectionRelease_Type
Comment	Release RRC connection CellId : cell id of the cell Reference implementation: f_EUTRA_RRC_ConnectionRelease

MCX_IPCAN_Release_Type

TTCN-3 Record Type	
Name	MCX_IPCAN_Release_Type
Comment	Release all configuration at the system simulator; CellId : eutra_Cell_NonSpecific

MCX_IPCAN_SystemRequest_Type

TTCN-3 Union Type	
Name	MCX_IPCAN_SystemRequest_Type
Comment	
Init	MCX_IPCAN_Init_Type
CellConfig	MCX_IPCAN_CellConfig_Type
CellPower	MCX_IPCAN_CellPower_Type
InitialRegistration	MCX_IPCAN_InitialRegistration_Type
AdditionalRegistrationMCX	MCX_IPCAN_AdditionalRegistrationMCX_Type
RRConnectionSetupMO	MCX_IPCAN_RRConnectionSetupMO_Type
RRConnectionSetupMT	MCX_IPCAN_RRConnectionSetupMT_Type
ActivateDedicatedEpsBearerMCX	MCX_IPCAN_ActivateDedicatedEpsBearerMCX_Type
DeactivateDedicatedEpsBearerMCX	MCX_IPCAN_DeactivateDedicatedEpsBearerMCX_Type
RRConnectionRelease	MCX_IPCAN_RRConnectionRelease_Type
Release	MCX_IPCAN_Release_Type

MCX_IPCAN_SYSTEM_CTRL_REQ

TTCN-3 Record Type	
Name	MCX_IPCAN_SYSTEM_CTRL_REQ
Comment	
Common	MCX_IPCAN_ASP_CommonReqPart_Type
Request	MCX_IPCAN_SystemRequest_Type

MCX_IPCAN_InitConfirmation_Type

TTCN-3 Record Type	
Name	MCX_IPCAN_InitConfirmation_Type
Comment	
RanType	IPCAN_RAN_Type

MCX_IPCAN_SystemConfirmation_Type

TTCN-3 Union Type		
Name	MCX_IPCAN_SystemConfirmation_Type	
Comment		
Init	MCX_IPCAN_InitConfirmation_Type	Confirmation for Init request: carries the RAN Type
Other	Null_Type	Confirmation for any other request
Error	charstring	Error indication when the corresponding request causes error; the charstring may be used to provide information about the error

MCX_IPCAN_SYSTEM_CTRL_CNF

TTCN-3 Record Type		
Name	MCX_IPCAN_SYSTEM_CTRL_CNF	
Comment		
Confirmation	MCX_IPCAN_SystemConfirmation_Type	

MCX_IPCAN_SYSTEM_PORT

TTCN-3 Port Type		
Name	MCX_IPCAN_SYSTEM_PORT	
Comment		
out	MCX_IPCAN_SYSTEM_CTRL_REQ	
in	MCX_IPCAN_SYSTEM_CTRL_CNF	

E.2 MCX_CommonIPCAN

MCX_CommonIPCAN: Basic Type Definitions

TTCN-3 Basic Types		
MCX_IPCAN_EpsBearerId_Type	integer (5..13)	EPS bearer id: the associated DRB Id shall always be EpsBearerId - 4

MCX_Registration_PDN_Type

TTCN-3 Enumerated Type	
Name	MCX_Registration_PDN_Type
Comment	Type definition for PIXITs px_MCX_InitialRegistration_TypeOfPDN1, px_MCX_InitialRegistration_TypeOfPDN2, px_MCX_InitialRegistration_TypeOfPDN3; (see TS 36.579-1 clause 5.4.1A) NOTE: 'ims', 'internet', 'mcx' and 'none' cannot be used as 'none' is a keyword; 'IMS', 'INTERNET', 'MCX' and 'NONE' cannot be used as 'IMS' is a port name of various PTCs
imsPDN	
internetPDN	
mcxPDN	
noPDN	

E.3 CommonDefs

CommonDefs: Basic Type Definitions

TTCN-3 Basic Types		
Null_Type	boolean (true)	dummy type for 'typeless' fields in unions

EUTRA_CellId_Type

TTCN-3 Enumerated Type	
Name	EUTRA_CellId_Type
Comment	
eutra_Cell_NonSpecific	
eutra_Cell1	
eutra_Cell2	
eutra_Cell3	
eutra_Cell4	
eutra_Cell6	
eutra_Cell10	
eutra_Cell11	
eutra_Cell12	
eutra_Cell13	
eutra_Cell14	
eutra_Cell23	
eutra_Cell28	
eutra_Cell29	
eutra_Cell30	
eutra_Cell31	
eutra_CellA	
eutra_CellB	
eutra_CellC	
eutra_CellD	
eutra_CellE	
eutra_CellG	
eutra_CellH	
eutra_CellI	
eutra_CellJ	
eutra_CellK	
eutra_CellL	
eutra_CellM	

IPCAN_RAN_Type

TTCN-3 Enumerated Type	
Name	IPCAN_RAN_Type
Comment	radio access network technology used by the IPCAN PTC
GERAN	
UTRAN_FDD	
UTRAN_TDD	
EUTRA_FDD	
EUTRA_TDD	
WLAN	
NR	

E.4 References to TTCN-3

References to TTCN-3		
MCX_IPCAN_ASP_TypeDefs	IPCAN_IpcanModel/MCX_IPCAN_ASP_TypeDefs.ttcn	Rev 32546
MCX_CommonIPCAN	IPCAN_Common/MCX_CommonIPCAN.ttcn	Rev 32341
CommonDefs	Common/CommonDefs.ttcn	Rev 32710

Annex F (informative): Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2017-02	RAN5#74	R5-171302	-	-	-	Introduction of TS 36.579-5.	0.0.1
2018-03	RAN5#78	R5-180687	-	-	-	Implements changes agreed in R5-180618 "MCPTT: Initial Test Model" R5-180657 "Various updates to 36579-5"	0.1.0
2018-03	RAN#79	RP-180130	-	-	-	Draft version for information purposes to the RAN Plenary	1.0.0
2018-05	RAN5#79	R5-182437	-	-	-	Implements changes agreed in R5-183163 R5-183164	2.0.0
2018-06	RAN#80	RP-180655	-	-	-	put under revision control as v13.0.0 with small editorial changes	13.0.0
2018-09	RAN#81	R5-184081	0001	-	F	MCPTT: Test Model updates	13.1.0
2018-12	RAN#82	R5-192380	0002	1	F	Routine maintenance for TS 36.579-5	13.2.0
2019-06	RAN#84	R5-195221	0003	1	F	Routine maintenance for TS 36.579-5	13.3.0
2019-06	RAN#84	R5-195222	0004	1	F	Introduction of MCPTT test model over IP	13.3.0
2019-12	RAN#86	R5-199050	0005	1	F	Routine maintenance for TS 36.579-5	13.4.0
2020-03	RAN#87	R5-201152	0006	1	F	Routine maintenance for TS 36.579-5	13.5.0
2020-06	RAN#88	R5-203077	0007	1	F	Routine maintenance for TS 36.579-5	13.6.0
2020-09	RAN#89	R5-203554	0008	-	F	Routine maintenance for TS 36.579-5	13.7.0
2020-09	RAN#89	R5-204377	0010	-	F	Updates to introduce support for MCVideo and MCDData	14.0.0
2020-12	RAN#90	R5-206465	0011	1	F	Routine maintenance for TS 36.579-5	14.1.0
2021-03	RAN#91	R5-210255	0012	-	F	Routine maintenance for TS 36.579-5	14.2.0
2021-06	RAN#92	R5-213670	0017	1	F	Routine maintenance for TS 36.579-5	14.3.0
2021-09	RAN#93	R5-216343	0019	1	F	Routine maintenance for TS 36.579-5	14.4.0
2021-09	RAN#93	R5s210779	0018	-	B	Addition of MCPTT test case 6.1.1.2 to the MCX ATS	14.4.0
2021-09	RAN#93	R5s210897	0013	1	B	Addition of MCPTT test case 5.1 to the MCX ATS	14.4.0
2021-09	RAN#93	R5s210899	0014	1	B	Addition of MCPTT test case 6.1.1.1 to the MCX ATS	14.4.0
2021-09	RAN#93	R5s211178	0020	-	F	Add new verified and e-mail agreed TTCN test cases in the TC lists in 36.579-5 (prose), Annex A	14.4.0
2021-12	RAN#94	R5-216753	0060	-	F	Routine maintenance for TS 36.579-5	14.5.0
2021-12	RAN#94	R5s211359	0046	-	B	Addition of MCPTT test case 6.2.1 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211361	0047	-	B	Addition of MCPTT test case 6.2.2 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211363	0048	-	B	Addition of MCPTT test case 6.2.3 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211365	0049	-	B	Addition of MCPTT test case 6.2.4 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211367	0050	-	B	Addition of MCPTT test case 6.2.5 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211369	0051	-	B	Addition of MCPTT test case 6.2.6 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211371	0052	-	B	Addition of MCPTT test case 6.2.7 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211373	0053	-	B	Addition of MCPTT test case 6.2.8 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211377	0055	-	B	Addition of MCPTT test case 6.2.15 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211381	0057	-	B	Addition of MCPTT test case 6.2.17 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211463	0021	1	B	Addition of MCPTT test case 5.3 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211469	0059	-	F	Configuration of SRTP	14.5.0
2021-12	RAN#94	R5s211617	0023	1	B	Addition of MCPTT test case 6.1.1.4 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211618	0024	1	B	Addition of MCPTT test case 6.1.1.8 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211619	0025	1	B	Addition of MCPTT test case 6.1.1.9 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211620	0026	1	B	Addition of MCPTT test case 6.1.1.11 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211621	0027	1	B	Addition of MCPTT test case 6.1.1.12 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211628	0028	1	B	Addition of MCPTT test case 6.1.1.13 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211629	0029	1	B	Addition of MCPTT test case 6.1.1.14 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211630	0030	1	B	Addition of MCPTT test case 6.1.2.7 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211631	0031	1	B	Addition of MCPTT test case 6.1.2.8 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211632	0032	1	B	Addition of MCPTT test case 6.1.2.9 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211633	0033	1	B	Addition of MCPTT test case 6.1.2.10 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211634	0034	1	B	Addition of MCPTT test case 6.1.2.11 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211635	0035	1	B	Addition of MCPTT test case 6.1.2.12 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211688	0022	1	B	Addition of MCPTT test case 6.1.1.3 to the MCX ATS	14.5.0
2021-12	RAN#94	R5s211695	0061	-	F	Add new verified and e-mail agreed TTCN test cases in the TC lists in 36.579-5 (prose), Annex A	14.5.0
2022-03	RAN#95	R5-220488	0070	-	F	Routine maintenance for TS 36.579-5	14.6.0
2022-03	RAN#95	R5s220129	0062	-	B	Addition of MCPTT test case 5.4 to the MCX ATS	14.6.0
2022-03	RAN#95	R5s220131	0063	-	B	Addition of MCPTT test case 6.1.1.5 to the MCX ATS	14.6.0
2022-03	RAN#95	R5s220133	0064	-	B	Addition of MCPTT test case 6.1.1.6 to the MCX ATS	14.6.0
2022-03	RAN#95	R5s220135	0065	-	B	Addition of MCPTT test case 6.1.1.10 to the MCX ATS	14.6.0
2022-03	RAN#95	R5s220137	0066	-	B	Addition of MCPTT test case 6.1.1.16 to the MCX ATS	14.6.0
2022-03	RAN#95	R5s220139	0067	-	B	Addition of MCPTT test case 6.1.1.18 to the MCX ATS	14.6.0
2022-03	RAN#95	R5s220141	0068	-	B	Addition of MCPTT test case 6.1.1.21 to the MCX ATS	14.6.0
2022-03	RAN#95	R5s220143	0069	-	B	Addition of MCPTT test case 6.2.16 to the MCX ATS	14.6.0
2022-03	RAN#95	R5s220344	0071	-	F	Correction of MCPTT ambient listening test cases	14.6.0
2022-03	RAN#95	R5s220346	0072	-	F	Update of function f_URL_Decoding	14.6.0

2022-03	RAN#95	R5s220437	0073	-	F	Add new verified and e-mail agreed TTCN test cases in the TC lists in 36.579-5 (prose), Annex A	14.6.0
2022-06	RAN#96	R5s220559	0074	-	F	Correction of f_MCX_InviteMT_SendINVITE	14.7.0
2022-09	RAN#97	R5-223960	0076	-	F	Routine maintenance for TS 36.579-5	14.8.0
2022-09	RAN#97	R5s220869	0075	-	F	MCX Implementation Issues	14.8.0
2022-09	RAN#97	R5s220992	0077	-	B	Addition of MCPTT test case 5.6 to the MCX ATS	14.8.0
2022-09	RAN#97	R5s220994	0078	-	B	Addition of MCPTT test case 6.1.1.17 to the MCX ATS	14.8.0
2022-09	RAN#97	R5s220996	0079	-	B	Addition of MCPTT test case 6.1.1.20 to the MCX ATS	14.8.0
2022-09	RAN#97	R5s221072	0086	-	F	Add new verified and e-mail agreed TTCN test cases in the TC lists in 36.579-5 (prose), Annex A	15.0.0
2022-12	RAN#98	R5s221283	0082	1	B	Addition of MCDData test case 5.1 to the MCX ATS	15.1.0
2022-12	RAN#98	R5s221284	0083	1	B	Addition of MCDData test case 6.1.1 to the MCX ATS	15.1.0
2022-12	RAN#98	R5s221285	0084	1	B	Addition of MCDData test case 6.1.3 to the MCX ATS	15.1.0
2022-12	RAN#98	R5s221286	0085	1	B	Addition of MCDData test case 6.1.4 to the MCX ATS	15.1.0
2022-12	RAN#98	R5s221361	0091	-	F	Add new verified and e-mail agreed TTCN test cases in the TC lists in 36.579-5 (prose), Annex A	15.1.0
2022-12	RAN#98	-	-	-	-	upgrade to Rel16 with no change	16.0.0
2022-12	RAN#98	R5s221241	0088	-	F	Rel-17 Sep'22 baseline upgrade for MCX Test Suites	17.0.0
2023-03	RAN#99	R5-230148	0092	-	F	Routine maintenance for TS 36.579-5	17.1.0
2023-03	RAN#99	R5s230192	0090	1	F	Correction of function fl_MCPTT_Info_AmbientListening_RX	17.1.0
2023-06	RAN#100	R5-232221	0093	-	F	Routine maintenance for TS 36.579-5	17.2.0
2023-06	RAN#100	R5-232604	0094	-	F	Update to MCX PIXITs for MCDData Functional Alias	17.2.0
2023-09	RAN#101	R5-233868	0099	-	F	Routine maintenance for TS 36.579-5	17.3.0
2023-09	RAN#101	R5s230578	0095	1	B	Addition of MCPTT test case 5.8 to the MCX ATS	17.3.0
2023-09	RAN#101	R5s230579	0096	1	B	Addition of MCPTT test case 6.1.1.19 to the MCX ATS	17.3.0
2023-09	RAN#101	R5s230580	0097	1	B	Addition of MCPTT test case 6.1.2.13 to the MCX ATS	17.3.0
2023-09	RAN#101	R5s230581	0098	1	B	Addition of MCPTT test case 6.2.14 to the MCX ATS	17.3.0
2023-09	RAN#101	R5s230672	0100	-	F	Add new verified and e-mail agreed TTCN test cases in the TC lists in 36.579-5 (prose), Annex A	17.3.0
2023-12	RAN#102	R5-237446	0102	1	F	Routine maintenance for TS 36.579-5	17.4.0

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