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**LTE;
Mission Critical (MC) services over LTE;
Part 5: Abstract test suite (ATS)
(3GPP TS 36.579-5 version 14.2.0 Release 14)**



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Foreword

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

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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: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3".
- [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_rsrelst_urisage-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"

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).

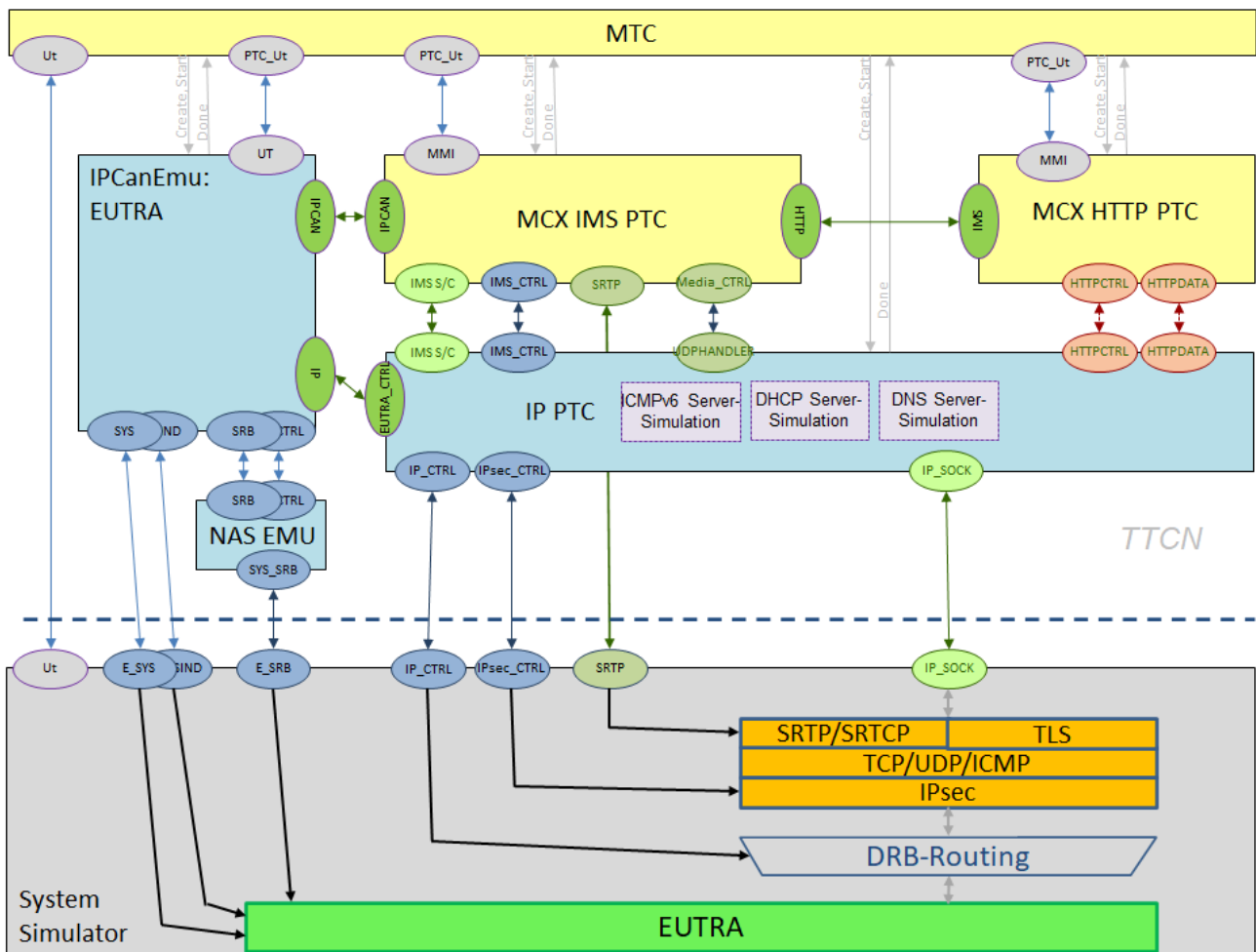


Figure 5.1.1-1: MCX Client on-network test model with TTCN based E-UTRA/EPC implementation

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.

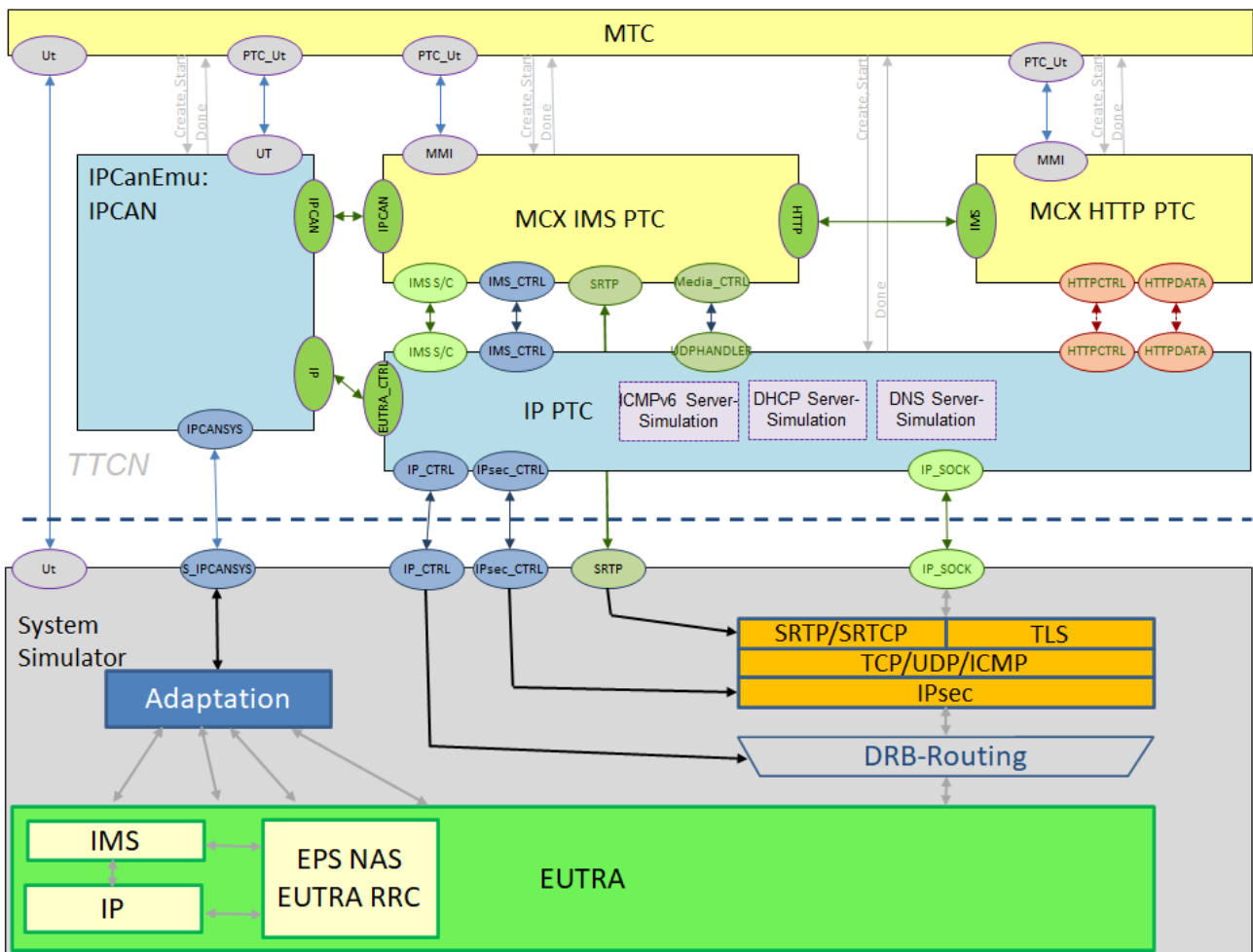


Figure 5.2.1-1: MCX Client on-network test model with SS based E-UTRA/EPC implementation

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 | tsc_MCX_IPCAN_EpsBearerId_MCX |
| | IMS | tsc_MCX_IPCAN_EpsBearerId_IMS |
| | Internet | tsc_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 | tsc_MCX_IPCAN_EpsBearerId_MCX_Audio | | |
| | MCVideo | tsc_MCX_IPCAN_EpsBearerId_MCX_Audio, tsc_MCX_IPCAN_EpsBearerId_MCX_Video | | |
| | MCDData | FFS | | |
| 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 | FFS | | |
| | MCDData | FFS | | |
| 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, with additional IMS-specific AT commands as specified in TS 34.229-3 [28] clause 8.4 and IMS-specific MMI commands as specified in TS 34.229-3 [28] annex B.2.

The following MMI commands are defined.

Table 6.1-1: MMI commands

| Command | Parameters | |
|------------------|--------------|--------------|
| | Name | Value |
| "MCX_USERACTION" | "UserAction" | <charstring> |
| "MCX_USERCHECK" | "UserCheck" | <charstring> |
| "MCX_GROUP_CALL" | *Uri" | <charstring> |

The following AT commands are applied in TTCN.

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

7.1 MCPTT

7.1.1 MCPTT Client

7.1.1.1 Introduction

Test cases for on-network operation are described in terms of IMS, Floor Control and HTTP signalling, see TS 36.579-2 [3]. Thus, on-network test cases are written in TTCN code running on the IMS and HTTP PTCs, see figure 5.1.1-1. Floor Control messages are sent and received within the IMS PTC.

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 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

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.-

7.2 MCX functional architecture

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.

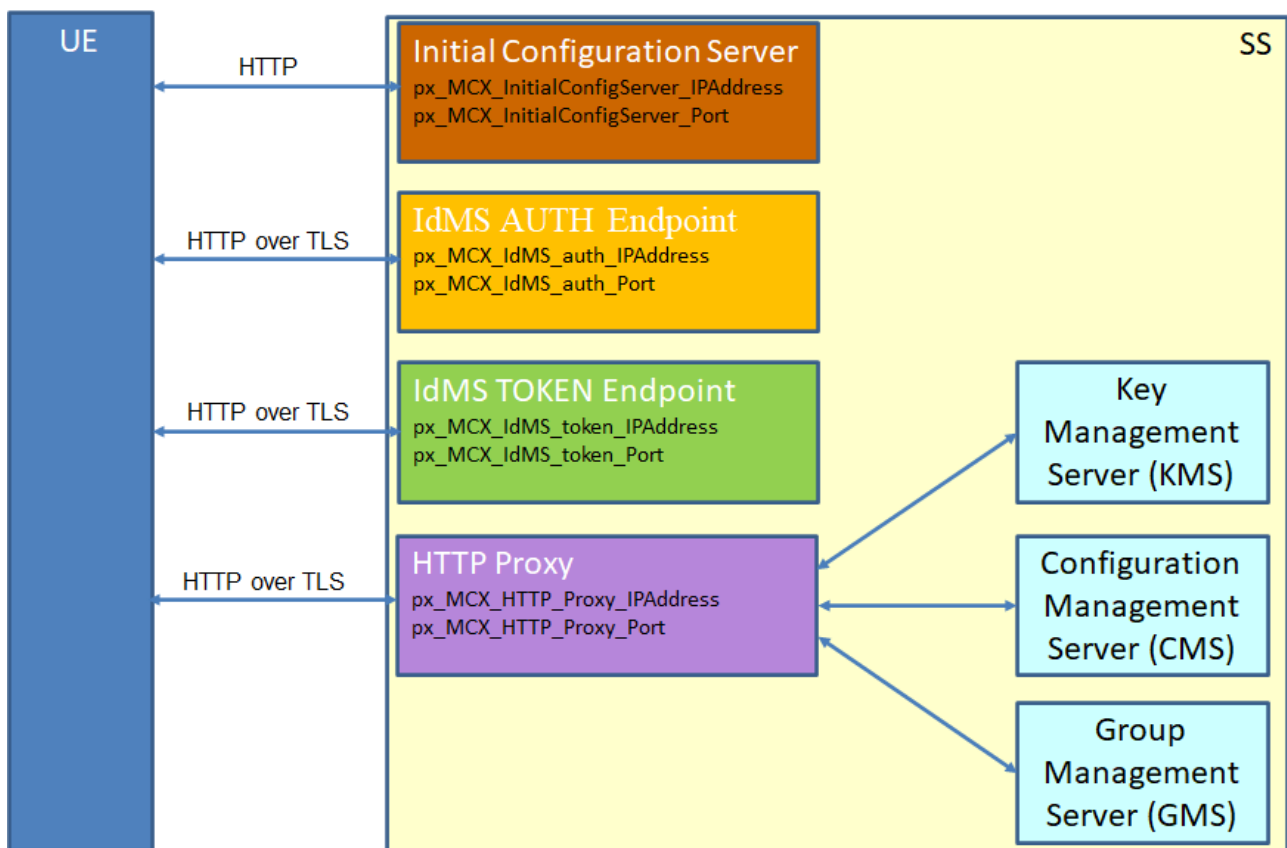


Figure 7.2.1-1: Functional architecture for HTTP-Signalling

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.

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).

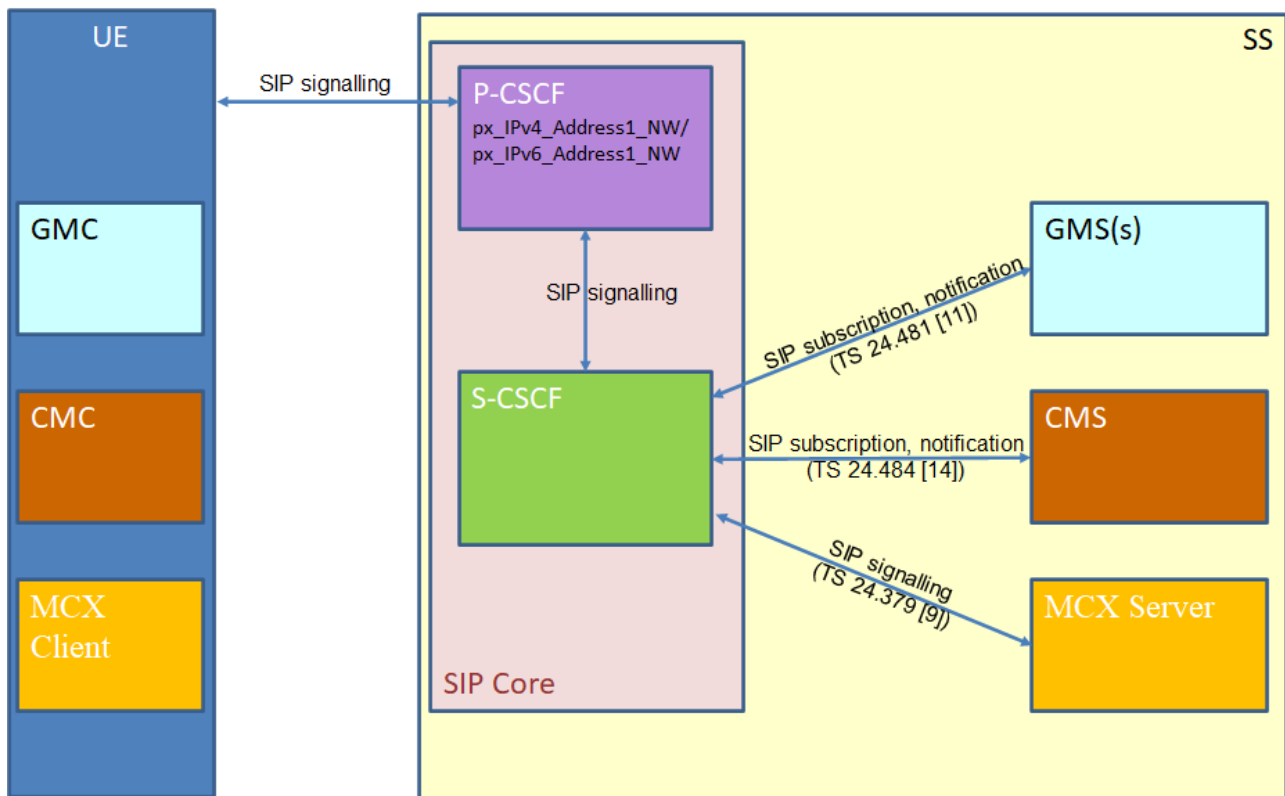


Figure 7.2.2-1: Functional architecture for SIP-Signalling

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.

8 Other SS requirements with TTCN-3 impact

8.1 Codec requirements

The requirements specified in TS 36.523-3 [27] clause 8.1 and TS 34.229-3 [28] clause 7 apply to the present document.

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 date 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 | 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 | Generate KMS Public Authentication Key (KPAK) for ECCSI (RFC 6507 [44] clause 4.2): KPAK := [KSAK]G 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 | 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 | 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 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 | 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 | 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) 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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_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]) | |

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 MCPTT

9.2.1 MCPTT Client PIXIT

Table 9.2.1-1: MCPTT Client Common PIXIT

| Parameter Name | Parameter Type | Default Value | Supported Values | Description |
|----------------------------------|----------------|-------------------------------------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Client relevant IXIT | | | | |
| px_MCPTT_Client_A_ID | charstring | "mcptt-client-A@mcptt-op.gov" | | The URI of the MCPTT client which is installed on the implementation under test. The MCPTT client will assign this ID when the Client communicate for the first time with the MCPTT Server and will retain it unless factory reset is done. Editor's note: To be removed when not used in 36.579-1 anymore |
| px_MCPTT_Client_B_ID | charstring | "urn:uuid:cdcd34fb-c2f1-4488-a03a-6b5a5d360c47" | | MCPTT 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_MCData_ID_User_A | charstring | | NOTE 1 | 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_MCPTT_User_A_Profile_Name | charstring | "mcptt-user-A-Profile-Name" | | Profile name for the MCPTT 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_MCPTT_User_A_Participant Type | charstring | "first responder" | | Participant type of the MCPTT user. Ref. TS 24.483 [13]. |
| px_MCPTT_User_A_Organization | charstring | "mcptt-op.gov" | | Indicates the organization the MCPTT user belongs to. Ref. TS 24.483 [13]. Editor's note: To be removed when not used in 36.579-1 anymore |
| 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_MCPTT_TokenRsaPrivateKey | octetstring | | | Private key being used to create signature for ID and Access Token |
| px_MCPTT_UserDecryptKeyName | charstring | "tk.12.userA_decrypt@mcptt-op.gov" | | Name of the key being used to cipher the SAKKE "Receiver Secret Key". in the KMS Key Set. |

| Parameter Name | Parameter Type | Default Value | Supported Values | Description |
|----------------------------------|----------------|------------------------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| px_MCPTT_UserDecryptKey_value | bitstring | | | Value of the key being used to cipher the SAKKE "Receiver Secret Key" in the KMS Key Set |
| px_MCPTT_UserSigningKeySSK_name | charstring | "tk.12.userA_sign@mcptt-op.gov" | | Name of the key being used to cipher the ECCSI private Key, "SSK". in the KMS Key Set |
| px_MCPTT_UserSigningKeySSK_value | bitstring | | | Value of the key being used to cipher the ECCSI private Key, "SSK", in the KMS Key Set |
| px_MCPTT_UserPubTokenPVT_name | charstring | "tk.12.userA_pub@mcptt-op.gov" | | Name of the key being used to cipher the ECCSI public validation token, "PVT". in the KMS Key Set |
| px_MCPTT_UserPubTokenPVT_value | bitstring | | | Value of the key being used to cipher the ECCSI public validation token, "PVT", in the KMS Key Set |
| px_MCPTT_SigningKey_name | charstring | "tk.12.userA_signing@mcptt-op.gov" | | Name of the key being used to sign the kmsResponse carrying the key set |
| px_MCPTT_SigningKey_value | bitstring | | | Value of the key being used to sign the kmsResponse carrying the key set |
| 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. |
| 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_MCPTT_User_B_Profile_Name | charstring | "mcptt-user-B-Profile-Name" | | Profile name for the MCPTT user. Ref. TS 24.483 [13]. |
| px_MCPTT_User_B_Alias | charstring | "mcptt-user-B-alias" | | Alphanumeric alias of MCPTT user. Ref. TS 24.483 [13]. |
| px_MCPTT_User_B_Participant Type | charstring | "first responder" | | Participant type of the MCPTT user. Ref. TS 24.483 [13]. |
| px_MCPTT_User_B_Organization | charstring | "mcptt-op.gov" | | Indicates the organization the MCPTT user belongs to. Ref. TS 24.483 [13]. Editor's note: To be removed. |
| 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]. |

| Parameter Name | Parameter Type | Default Value | Supported Values | Description |
|-------------------------------------------------|----------------|------------------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| px_MCPTT_User_C_Profile_Name | charstring | "mcptt-user-C-Profile-Name" | | Profile name for the MCPTT user. Ref. TS 24.483 [13]. |
| px_MCPTT_User_C_Alias | charstring | "mcptt-user-C-alias" | | Alphanumeric alias of MCPTT user. Ref. TS 24.483 [13]. |
| px_MCPTT_User_C_Participant Type | charstring | "first responder" | | Participant type of the MCPTT user. Ref. TS 24.483 [13]. |
| px_MCPTT_User_C_Organization | charstring | "mcptt-op.gov" | | Indicates the organization the MCPTT user belongs to. Ref. TS 24.483 [13]. Editor's note: To be removed. |
| px_MCX_SIP_PublicUserId_A_1 | charstring | | | (First) public user id of the SIP subscriber (user A) as stored in the HSS and on the ISIM, if the UE has an ISIM; the parameter shall be a SIP URI |
| px_MCX_SIP_PrivateUserId_A | charstring | | | Private user id of the SIP subscriber (user A) as stored in the HSS and on the ISIM, if the UE has an ISIM |
| px_MCX_SIP_HomeDomain_A | charstring | | | Home domain name of the SIP subscriber (user A) as stored in the HSS and on the ISIM, if the UE has an ISIM |
| px_MCX_SIP_RegistrationWith TemporaryIdentities | 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_MCPTT_Group_A_Name | charstring | "mcptt-group-A-name" | | A human readable Group name for the group |
| px_MCPTT_Group_A_Owner_Organization | charstring | "mcptt-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_MCPTT_Group_B_Name | charstring | "mcptt-group-B-name" | | A human readable Group name for the group |
| px_MCPTT_Group_B_Owner_Organization | charstring | "mcptt-op.gov" | | Indicates the group's owner organization the group belongs to. Ref. TS 24.483 [13]. |
| px_MCPTT_Group_B_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_C_ID | charstring | "mcptt-group-C@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]. |

| Parameter Name | Parameter Type | Default Value | Supported Values | Description |
|---------------------------------------------------|----------------|------------------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| px_MCPTT_Group_C_Name | charstring | "mcptt-group-C-name" | | A human readable Group name for the group |
| px_MCPTT_Group_C_Owner_Organization | charstring | "mcptt-op.gov" | | Indicates the group's owner organization the group belongs to. Ref. TS 24.483 [13]. |
| px_MCPTT_Group_C_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_D_ID | charstring | "mcptt-group-D@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_D_Name | charstring | "mcptt-group-D-name" | | A human readable Group name for the group |
| px_MCPTT_Group_D_Owner_Organization | charstring | "mcptt-op.gov" | | Indicates the group's owner organization the group belongs to. Ref. TS 24.483 [13]. |
| px_MCPTT_Group_D_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_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_MCPTT_Group_T_Name | charstring | "mcptt-group-T-name" | | A human readable Group name for the group |
| px_MCPTT_Group_T_Owner_Organization | charstring | "mcptt-op.gov" | | Indicates the group's owner organization the group belongs to. Ref. TS 24.483 [13]. |
| px_MCPTT_Group_T_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] |
| Miscellaneous IXIT | | | | |
| px_MCPTT_vendor_specific_information_init_config | charstring | "" | | UE initial configuration vendor specific name for the application vendor, device vendor etc. Ref. TS 24.483 [13]. |
| px_MCPTT_vendor_specific_information_config | charstring | "" | | UE configuration vendor specific name for the application vendor, device vendor etc. Ref. TS 24.483 [13]. |
| px_MCPTT_vendor_specific_information_user_profile | charstring | "" | | User Profile vendor specific name for the application vendor, device vendor etc. Ref. TS 24.483 [13]. |
| px_MCPTT_vendor_specific_service_conf | charstring | "" | | MCPTT service configuration vendor specific name for the application vendor, device vendor etc. Ref. TS 24.483 [13]. |
| px_MCPTT_CertUri | charstring | "cert1.mcptt-op.gov" | | The URI of the Certificate (this object). Ref. TS 33.179 [15] |
| px_MCPTT_IP_ConnectionAddressAll | charstring | "0.0.0.0" | | The unicast IP address |

| Parameter Name | Parameter Type | Default Value | Supported Values | Description |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|---------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| px_MCPTT_IP_ConnectionAddressAudio | charstring | "0.0.0.0" | | The media=audio plane control channel IP address. NOTE: Can be the same as the unicast IP address. |
| px_MCPTT_IP_ConnectionAddressApp | charstring | "0.0.0.0" | | The media=application plane control channel IP address. NOTE: Can be the same as the unicast IP address. |
| px_MCPTT_ALL_APN | charstring | "mcptt-apn" | | A single APN which the UE shall use to access each and all MCPTT relevant services including the MCPTT SIP-1 reference point, the MC common core services for the HTTP-1 reference point and the MC identity management service for the CSC-1 reference point. 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 |
| 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 MCPTT Server PIXIT

Table 9.2.2-1: MCPTT Server Common PIXIT

| Parameter Name | Parameter Type | Default Value | Supported Values | Description |
|----------------------------------|----------------|---------------------------------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| px_MCPTT_PCSCF_A_URI | charstring | "mcptt-p-cscf-A@mcptt-op.gov" | | The URI of the P-CSCF simulated by the SS. |
| px_MCPTT_GroupCreationXUI | charstring | "mcptt-gms@mcptt-op.gov" | | Indicates the group creation XUI information for creation of groups. Ref. TS 23.003 [21]. |
| px_MCPTT_GroupConfigDoc_URI | charstring | "xcap.mcptt-op.gov/group_configuration.xml" | | Points to the group configuration document. Ref. TS 24.481 [11]. |
| px_MCPTT_IDMSAuthEndpoint | charstring | "IDMSAuthEndpoint.mcptt-op.gov" | | Identity management server authorisation endpoint identity information. Ref. TS 23.003 [21]. Editor's note: To be removed when not used in 36.579-1 anymore |
| px_MCPTT_IDMSTokenEndpoint | charstring | "IDMSTokenEndpoint.mcptt-op.gov" | | Identity management server token endpoint identity information. Ref. TS 23.003 [21]. Editor's note: To be removed when not used in 36.579-1 anymore |
| px_MCPTT_GMS | charstring | "mcptt-gms.mcptt-op.gov" | | Indicates the group management server identity information. Ref. TS 23.003 [21]. Editor's note: To be removed when not used in 36.579-1 anymore |
| px_MCPTT_CMS | charstring | "mcptt-cms.mcptt-op.gov" | | Indicates the configuration management server identity information. Ref. TS 23.003 [21]. Editor's note: To be removed when not used in 36.579-1 anymore |
| px_MCPTT_KMS | charstring | "kms.mcptt-op.gov" | | Indicates the key management server identity information. Ref. TS 23.003 [21]. Editor's note: To be removed when not used in 36.579-1 anymore |
| px_MCPTT_IdM_Server_URI | charstring | "IdM.server.com:9031" | | Request-URI (AUID) for HTTP GET (IdM server) Editor's note: To be removed when not used in 36.579-1 anymore |
| px_MCPTT_XCAP_UE_Config_URI | charstring | "xcap.org.3gpp.mcptt.ue-config" | | Request-URI (AUID) for HTTP GET (UE configuration) |
| px_MCPTT_XCAP_User_Profile_URI | charstring | "xcap.org.3gpp.mcptt.user-profile" | | Request-URI (AUID) for HTTP GET (User Profile) |
| px_MCPTT_XCAP_Service_Config_URI | charstring | "xcap.org.3gpp.mcptt.service-config" | | Request-URI (AUID) for HTTP GET (Service Configuration) |
| px_MCPTT_XCAP_Group_Config_URI | charstring | "xcap.org.3gpp.mcptt.group-config" | | Request-URI (AUID) for HTTP GET (Group Configuration) |
| px_MCPTT_User_XUI_URI | charstring | | | "XUI-URI" attribute of the user profile document |
| 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 |

| Parameter Name | Parameter Type | Default Value | Supported Values | Description |
|--------------------------------------|-----------------|--------------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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_IPAddress | 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 MCPTT 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: MCPTT Server Common PIXIT

| 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" | 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" | 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 |
| tsc_MCX_KMS_ClientReqUri | charstring | "https://" & tsc_MCX_KMS_Hostname & tsc_MCX_KMS_keyprov_UriPath | used as <ClientReqUri> entry in the KMS Key Set |
| 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 | "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 |
| tsc_MCX_GMSXCAPRootURI | charstring | "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 |

| Constant Name | Constant Type | Value | Description |
|--------------------------------------|---------------|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| tsc_MCPTT_PublicServiceId_A | charstring | "sip:" & "mcptt-server-A@" & px_MCX_DomainName_Organization_A | The URI of the MCPTT Server which is simulated by the SS |
| tsc_MCPTT_PublicServiceId_B | charstring | "sip:" & "mcptt-server-B@" & px_MCX_DomainName_Organization_A | The URI of a second MCPTT Server which is implemented in the DUT used in MCPTT Server testing. |
| tsc_MCX_SessionID_A | charstring | "sip:" & "sessionA@cf." & px_MCX_DomainName_Organization_A" | The URI of the MCPTT session A identity. Ref. TS 24.483 [13]. SIP URI according to TS 24.379 [9] clause 4.5. |
| tsc_MCX_SessionID_B | charstring | "sip:" & "sessionB@cf." & px_MCX_DomainName_Organization_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_Group_A_ProSeLayer2GroupID | octetstring | '00000A'O | Indicates the Prose layer-2 group ID for the group. Ref. TS 23.303 [24]. |
| tsc_MCPTT_Group_D_ProSeLayer2GroupID | octetstring | '00000D'O | Indicates the Prose layer-2 group ID for the group. Ref. TS 23.303 [24]. |

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 [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

A.3.1 MCX Client Test Suites

There is no approved Test Suite in the present version of the present document.

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 |
| xm_extensions-v1_0 | OMA [39] | urn:oma:xml:xm:extensions |
| xm_rsrclst_uriusage-v1_0 | OMA [40] | urn:oma:xml:xm: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# |
| TS24379_mcpttAff | TS 24.379 [9] Annex F.4.2 | urn:3gpp:ns:affiliationCommand:1.0 |
| TS24379_mcpttInfo | TS 24.379 [9] Annex F.1.2 | urn:3gpp:ns:mcpttInfo:1.0 |
| TS24379_mcpttLoc | 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_pidf+xml-ext | TS 24.379 [9] Table 9.3.1.2-1 | urn:3gpp:ns:mcpttPresInfo:1.0 |
| TS24379_poc-settings+xml-ext | TS 24.379 [9] Table 7.4.1.2.2-2 | urn:3gpp:mcsSettings:1.0 |
| TS24481_mcpttGroup | TS 24.481 [11] clause 7.2.4.2 | urn:3gpp:ns:mcpttGroupInfo: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_ue-config | TS 24.484 [14] clause 8.2.2.3 | urn:3gpp:mcptt:mcpttUEConfig:1.0 |
| TS24484_mcptt-user-profile | TS 24.484 [14] clause 8.3.2.3 | urn:3gpp:mcptt:user-profile:1.0 |
| TS24484_Servconf | TS 24.484 [14] clause 8.4.2.3 | urn:3gpp:ns:mcpttServiceConfig: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:schema: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. | | |

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 namespace | Original schemaLocation | Modified schemaLocation |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|------------------------------------------------------------------------|------------------------------------------------------|
| RFC4354-poc-settings | http://www.w3.org/XML/1998/namespace | http://www.w3.org/2001/xml.xsd | ../Common/IMS_XSD/xml.xsd |
| RFC4661-SimpleFilter | http://www.w3.org/XML/1998/namespace | http://www.w3.org/2001/xml.xsd | ../Common/IMS_XSD/xml.xsd |
| IANA-resource-lists | http://www.w3.org/XML/1998/namespace | 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/namespace | 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) |
| 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/namespace | http://www.w3.org/2001/xml.xsd | ../Common/IMS_XSD/xml.xsd |
| TS24484-ue-config | http://www.w3.org/XML/1998/namespace | http://www.w3.org/2001/xml.xsd | ../Common/IMS_XSD/xml.xsd |
| TS24484-mcptt-user-profile | http://www.w3.org/XML/1998/namespace | 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-Servconf | http://www.w3.org/XML/1998/namespace | http://www.w3.org/2001/xml.xsd | ../Common/IMS_XSD/xml.xsd |
| NOTE 1: The namespace urn:ietf:params:xml:ns:common-policy is specified in RFC 4745 and at http://www.iana.org/assignments/xml-registry/schema/common-policy.xsd with difference in the minOccurs for identityType and validityType. 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. | | | |
| NOTE 2: The namespace urn:ietf:params:xml:ns:resource-lists is specified in RFC 4826 and at http://www.iana.org/assignments/xml-registry/schema/resource-lists.xsd with the difference of attribute anchor not being mandatory in the RFC. | | | |

Table D.1-3: schemaLocation of included namespaces

| XML Schema | Included schema | Original schemaLocation | Modified schemaLocation |
|-------------------|--------------------------------------|--------------------------------------|-------------------------|
| RFC5874-xcap-diff | urn:ietf:params:xml:schema:patch-ops | urn:ietf:params:xml:schema:patch-ops | 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_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 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_EUTRA_ActivateDedicatedEpsBearer_Speech, f_EUTRA_ActivateDedicatedEpsBearer_SpeechVideo | | |
| EpsBearerSpeech | MCX_IPCAN_ASP_DedicatedEpsBearerInfo_Type | | |
| EpsBearerVideo | MCX_IPCAN_ASP_DedicatedEpsBearerInfo_Type | opt | present in case of video call |

MCX_IPCAN_DeactivateDedicatedEpsBearerMCX_Type

| TTCN-3 Record Type | | | |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----|---------------------------------------------------------------|
| Name | MCX_IPCAN_DeactivateDedicatedEpsBearerMCX_Type | | |
| Comment | Deactivate dedicated EPS bearer(s) for the MCX PDN CellId : cell id of the cell Reference implementation: f_EUTRA_DeactivateEPS_BearerContext | | |
| EpsBearerIdSpeech | MCX_IPCAN_EpsBearerId_Type | opt | may be not present if only the video bearer shall be released |
| EpsBearerIdVideo | MCX_IPCAN_EpsBearerId_Type | opt | present in case of video call |

MCX_IPCAN_RRCConnectionRelease_Type

| TTCN-3 Record Type | |
|--------------------|------------------------------------------------------------------------------------------------------------------|
| Name | MCX_IPCAN_RRCConnectionRelease_Type |
| Comment | Relase 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 | |
| RRCCoalitionSetupMO | MCX_IPCAN_RRCCoalitionSetupMO_Type | |
| RRCCoalitionSetupMT | MCX_IPCAN_RRCCoalitionSetupMT_Type | |
| ActivateDedicatedEpsBearerMCX | MCX_IPCAN_ActivateDedicatedEpsBearerMCX_Type | |
| DeactivateDedicatedEpsBearerMCX | MCX_IPCAN_DeactivateDedicatedEpsBearerMCX_Type | |
| RRCCoalitionRelease | MCX_IPCAN_RRCCoalitionRelease_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 |

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_R EQ | |
| in | MCX_IPCAN_SYSTEM_CTRL_C NF | |

E.2 MCX_CommonDefs

MCX_CommonDefs: 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 | IpccanModel_IPCAN/MCX_IPCAN_ASP_TypeDefs.ttcn | Rev 29950 |
| MCX_CommonDefs | Common/MCX_CommonDefs.ttcn | Rev 29944 |
| CommonDefs | Common/CommonDefs.ttcn | Rev 29871 |

Annex F (informative): Change history

| Change history | | | | | | | |
|----------------|---------|-----------|------|---------|-----|-----------------------------------------------------------------------------------------------------------------|----------------|
| Date | Meeting | TDoc | CR | R ev | Cat | Subject/Comment | New version |
| 2017-02 | RAN#74 | R5-171302 | - | - | - | Introduction of TS 36.579-5. | 0.0.1 |
| 2018-03 | RAN#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 | RAN#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 MCData | 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 |

History

| Document history | | |
|-------------------------|---------------|-------------|
| V14.0.0 | November 2020 | Publication |
| V14.1.0 | January 2021 | Publication |
| V14.2.0 | April 2021 | Publication |
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