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Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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Contents

Foreword

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

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

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where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

The present document is part 5 of a multi-part conformance test specification for Mission Critical services consisting of:

3GPP TS 37.579-1 [2]: "Mission Critical (MC) services; Part 1: Common test environment"

3GPP TS 37.579-2 [3]: "Mission Critical (MC) services; Part 2: Mission Critical Push To Talk (MCPTT) User Equipment (UE) Protocol conformance specification"

3GPP TS 37.579-4 [5]: "Mission Critical (MC) services; Part 4: Test Applicability and Implementation Conformance Statement (ICS) proforma specification"

3GPP TS 37.579-5: "Mission Critical (MC) services; Part 5: Abstract test suite (ATS)" (the present specification)

3GPP TS 37.579-6 [59]: "Mission Critical (MC) services; Part 6: Mission Critical Video (MCVideo) User Equipment (UE) Protocol conformance specification"

3GPP TS 37.579-7 [60]: "Mission Critical (MC) services; Part 7: Mission Critical Data (MCData) User Equipment (UE) Protocol conformance specification"

In the present document, modal verbs have the following meanings:

shall indicates a mandatory requirement to do something

shall not indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

should indicates a recommendation to do something

should not indicates a recommendation not to do something

may indicates permission to do something

need not indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

can indicates that something is possible

cannot indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

will indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

will not indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

might indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

might not indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

is (or any other verb in the indicative mood) indicates a statement of fact

is not (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

1 Scope

The present document specifies the protocol and signalling conformance testing in TTCN-3 for the Mission Critical services 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 37.579-2 [3], TS 37.579-6 [59] and TS 37.579-7 [60].

The applicability of the individual test cases is specified in the test ICS proforma specification in 3GPP TS 37.579-4 [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] and TS 38.523-3 [72] for test requirements related to the 3GPP 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 37.579-1: "Mission Critical (MC) services; Part 1: Common test environment".

[3] 3GPP TS 37.579-2: "Mission Critical (MC) services; Part 2: Mission Critical Push To Talk (MCPTT) User Equipment (UE) Protocol conformance specification".

[4] Void.

[5] 3GPP TS 37.579-4: "Mission Critical (MC) services; Part 4: Test Applicability and Implementation Conformance Statement (ICS) proforma specification".

[6] 3GPP TS 36.523-1: "User Equipment (UE) conformance specification; Part 1: Protocol conformance specification"

[7] 3GPP TS 22.179: "Mission Critical Push To Talk (MCPTT) over LTE; Stage 1".

[8] Void.

[9] 3GPP TS 24.379: "Mission Critical Push To Talk (MCPTT) call control; Protocol specification".

[10] 3GPP TS 24.380: "Mission Critical Push To Talk (MCPTT) floor control; Protocol specification".

[11] 3GPP TS 24.481: "Mission Critical Services (MCS) group management; Protocol specification".

[12] 3GPP TS 24.482: "Mission Critical Services (MCS) identity management; Protocol specification".

[13] 3GPP TS 24.483: "Mission Critical Services (MCS) Management Object (MO)".

[14] 3GPP TS 24.484: "Mission Critical Services (MCS) configuration management; Protocol specification".

[15] 3GPP TS 33.179: "Security of Mission Critical Push-To-Talk (MCPTT)".

[16] 3GPP TS 24.229: "IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3".

[17] 3GPP TS 24.237: "IP Multimedia Subsystem (IMS) Service Continuity; Stage 3".

[18] 3GPP TS 29.468: "Group Communication System Enablers for LTE (GCSE_LTE); MB2 Reference Point; Stage 3".

[19] 3GPP TS 24.301: "Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3".

[20] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols; Stage 3".

[21] 3GPP TS 23.003: "Numbering, addressing and identification".

[22] ISO/IEC 9646-1: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concepts".

[23] ISO/IEC 9646-7: "Information technology - Open systems interconnection - Conformance testing methodology and framework - Part 7: Implementation Conformance Statements".

[24] 3GPP TS 23.303: "Proximity-based services (ProSe); Stage 2".

[25] IETF RFC 4566 (July 2006): "SDP: Session Description Protocol".

[26] 3GPP TS 26.171: "Speech codec speech processing functions; Adaptive Multi-Rate - Wideband (AMR-WB) speech codec; General description".

[27] 3GPP TS 36.523-3: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); User Equipment (UE) conformance specification; Part 3: Test suites".

[28] 3GPP TS 34.229-3: "Internet Protocol (IP) multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); User Equipment (UE) conformance specification; Part 3: Abstract Test Suites (ATS)".

[29] ISO/IEC 9646-1: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concepts".

[30] ISO/IEC 9646-7: "Information technology - Open systems interconnection - Conformance testing methodology and framework - Part 7: Implementation Conformance Statements".

[31] ETSI ES 201 873-1: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 1: TTCN-3 Core Language".

[32] IETF RFC 3711: "The Secure Real-time Transport Protocol (SRTP)".

[33] 3GPP TS 27.007: "AT command set for User Equipment (UE)".

[34] IETF RFC 4661: "An Extensible Markup Language (XML)-Based Format for Event Notification Filtering".

[34] IETF RFC 4826: "Extensible Markup Language (XML) Formats for Representing Resource Lists".

[35] W3C: "XML Encryption Syntax and Processing Version 1.1", https://www.w3.org/TR/xmlenc-core1/.

[36] W3C: "XML Signature Syntax and Processing (Second Edition)", http://www.w3.org/TR/xmldsig-core/.

[37] Void.

[38] Void.

[39] Void.

[40] Void.

[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 37.579-6: "Mission Critical (MC) services; Part 6: Mission Critical Video (MCVideo) User Equipment (UE) Protocol conformance specification"

[60] 3GPP TS 37.579-7: "Mission Critical (MC) services; Part 7: Mission Critical Data (MCData) User Equipment (UE) Protocol conformance specification"

[61] 3GPP TS 36.508: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); Common Test Environments for User Equipment (UE) Conformance Testing".

[62] IETF RFC 4122: "A Universally Unique IDentifier (UUID) URN Namespace"

[63] IETF RFC 5245: "Interactive Connectivity Establishment (ICE): A Protocol for Network Address Translator (NAT) Traversal for Offer/Answer Protocols"

[64] IETF RFC 3830: "MIKEY: Multimedia Internet KEYing".

[65] IETF RFC 6509 (February 2012): "MIKEY-SAKKE: Sakai-Kasahara Key Encryption in Multimedia Internet KEYing (MIKEY)".

[66] IETF RFC 6043: "MIKEY-TICKET: Ticket-Based Modes of Key Distribution in Multimedia Internet KEYing (MIKEY)".

[67] IETF RFC 3550: "RTP: A Transport Protocol for Real-Time Applications".

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

[69] IETF RFC 2616: "Hypertext Transfer Protocol -- HTTP/1.1".

[70] ETSI ES 201 873-11: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 11: Using JSON with TTCN-3".

[71] OMA-TS-REST_NetAPI_NMS-V1_0-20190528-C: "RESTful Network API for Network Message Storage".

[72] 3GPP TS 38.523-3: "5GS; User Equipment (UE) conformance specification; Part 3: Protocol Test Suites".

[73] 3GPP TS 38.508-1: "5GS; User Equipment (UE) conformance specification; Part 1: Common test environment".

[74] 3GPP TS 38.508-2: "5GS; User Equipment (UE) conformance specification; Part 2: Common Implementation Conformance Statement (ICS) proforma".

[75] ETSI ES 201 873-9: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 9: Using XML schema with TTCN-3".

[76] OMA-TS-REST_NetAPI_NotificationChannel-V1_0-20200319-C: “RESTful Network API for Notification Channel”.

3 Definitions of terms, symbols and abbreviations

3.1 Terms

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] clause 4.1.1 applies to the present document.

4.2 Component architecture

The architecture specified in TS 36.523-3 [27] clause 4.1.2 and TS 38.523-3 [72] clause 4.2 applies to the present document, with the clarification that only single RAT scenarios (E-UTRAN or NR/5GC) are considered by the test model 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 (EUTRA)

The MCX EUTRA 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 and the NAS EMU are 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).

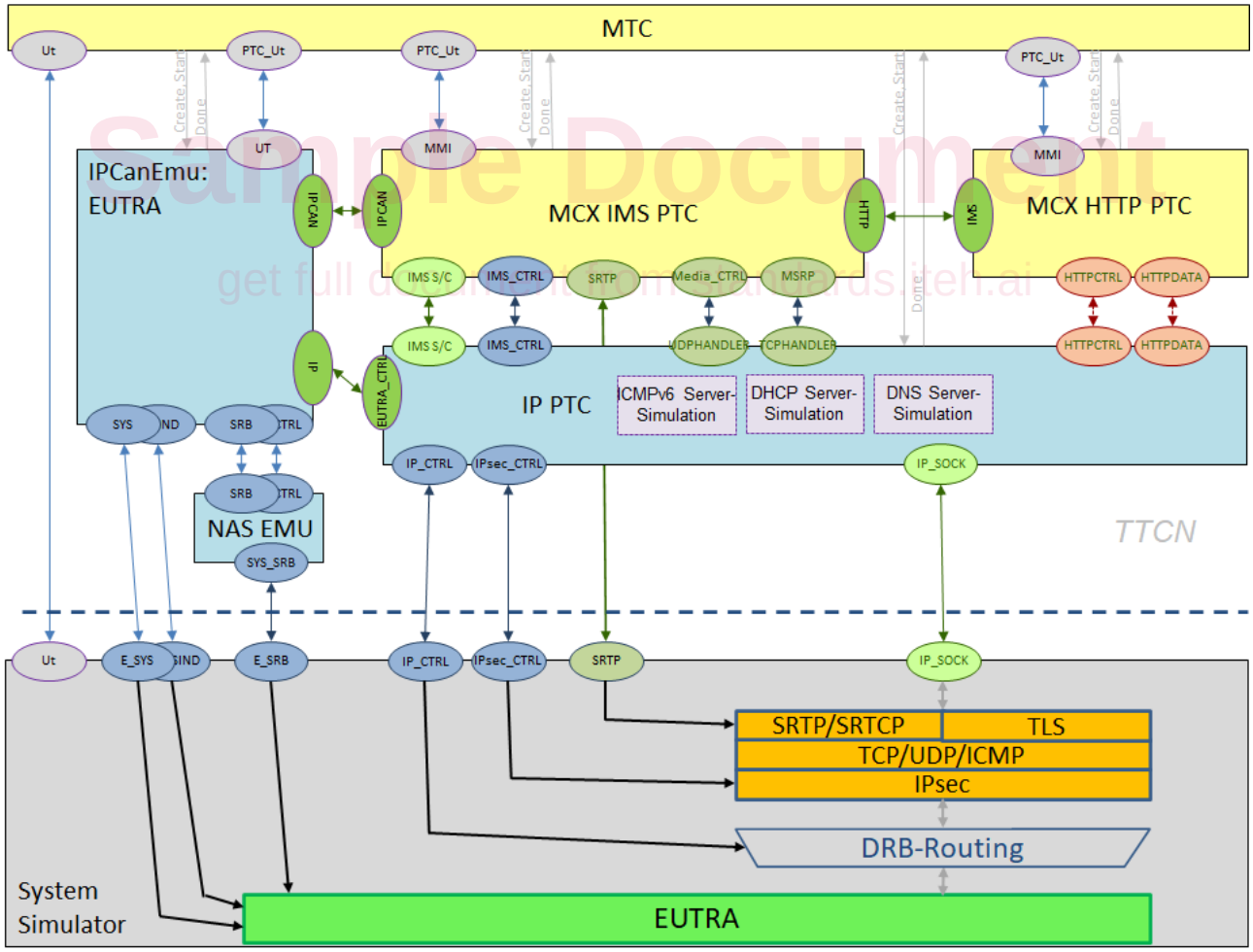

Figure 5.1.1-1: MCX Client on-network test model with TTCN based E-UTRA/EPC implementation

As described in TS 37.579-1 [2] clause 5.4.1A after switch on the UE may register to an internet PDN, an IMS PDN and the MCX PDN. Table 5.1.1-1 shows which IP addresses are assigned to a particular PDN.

Table 5.1.1-1: Mapping of IP addresses to PDNs

PDN	IP address	Value	Comment
MCX	NW IP address	px_IPv4_Address1_NW, px_IPv6_Address1_NW	PDN_1 in TTCN
	UE IP address	px_IPv4_Address1_UE, px_IPv6_Address1_UE	
IMS	NW IP address	px_IPv4_Address2_NW, px_IPv6_Address2_NW	PDN_2 in TTCN
	UE IP address	px_IPv4_Address2_UE, px_IPv6_Address2_UE	
Internet	NW IP address	px_IPv4_Address3_NW, px_IPv6_Address3_NW	PDN_3 in TTCN
	UE IP address	px_IPv4_Address3_UE, px_IPv6_Address3_UE	

5.1.2 MCX Client off-network test model (EUTRA)

An MCX Client off-network test model for EUTRA is not supported by the present version of the specification.

5.2 MCX test model with SS based E-UTRA/EPC or NR/5GC implementation (MCX IPCAN test model)

5.2.1 MCX Client on-network test model

In contrast to the MCX EUTRA test model (specified in clause 5.1.1) or NR5GC test model (specified in clause 5.3.1) the MCX IPCAN test model shown in figure 5.2.1-1 uses an external IPCAN (black-box) implementation which is integrated in the system simulator. In general, this IPCAN implementation shall be conformant in terms of TS 36.508 [61] and TS 38.508-1 [73] but this is out of the scope for the MCX IPCAN test model as long as the IPCAN implementation obeys the commands at the system interface as specified in annex E.

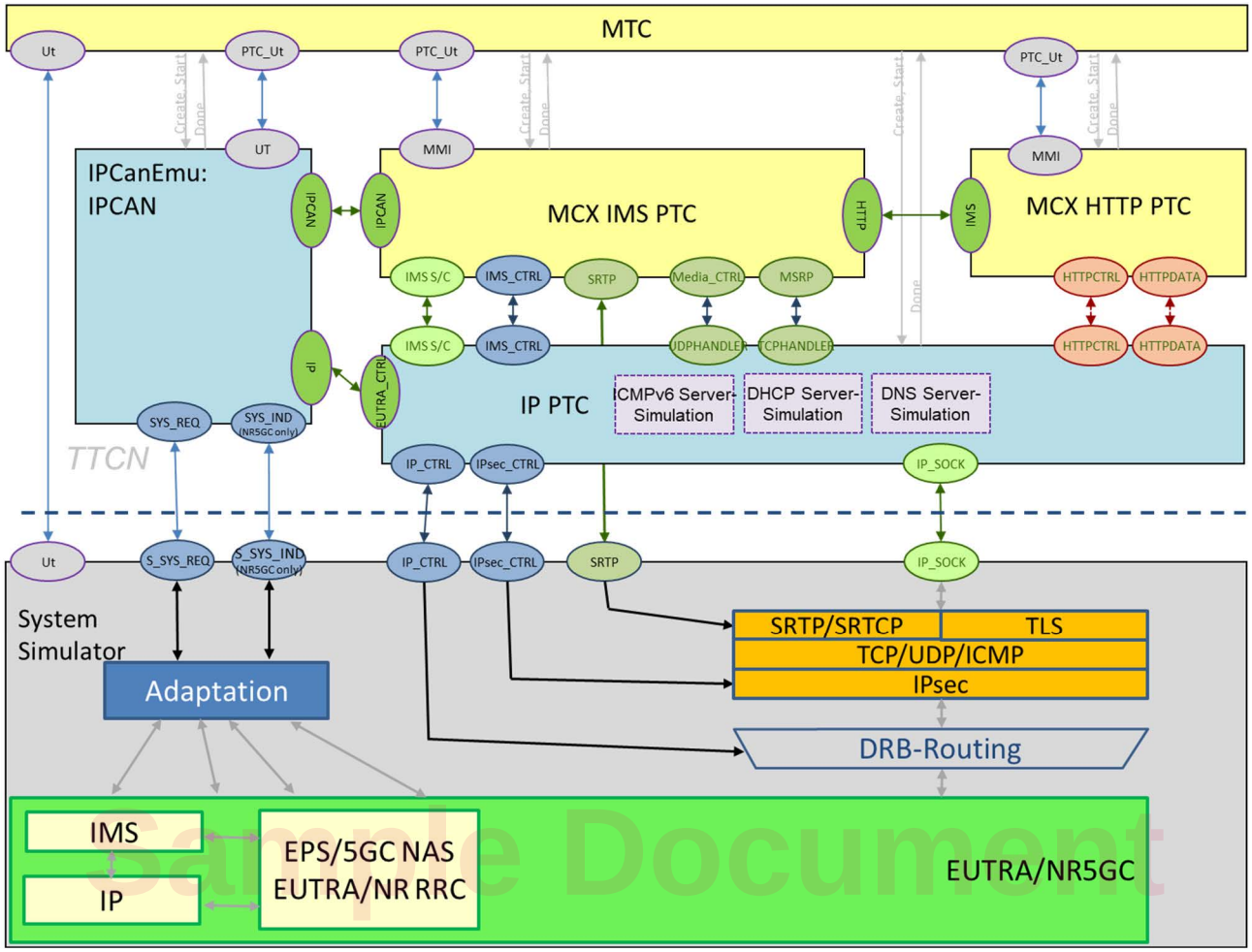

Figure 5.2.1-1: MCX Client on-network test model with SS based E-UTRA/EPC or NR/5GC implementation

NOTE 1: Whether or how the MCX IPCAN test model may use other IP-connectivity access networks is out of scope of this specification.

NOTE 2: The SYS_IND port shown in figure 5.2.1-1 is used only in case of NR5GC to indicate the PDU session id in a system indication and to assign the QFI in the corresponding acknowledgement.

NOTE 3: In the rest of this clause the term "PDN" is used for a PDN connectivity in EUTRA or a PDU session in NR5GC.

NOTE 4: The major procedures for configuration and control of the system simulator are illustrated in annex F.

As described in clauses 5.4.1A and 5.4.1B of TS 37.579-1 [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.

Tables 5.2.1-1 and 5.2.1-2 show the information provided to the SS for configuration of the PDNs for EUTRA and NR5GC.