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01-januar-2005

Storitve in protokoli za napredna omrežja (SPAN) – Preskušanje integracije omrežja s splošno radijsko storitvijo s paketiranimi podatki (GPRS) in omrežij z internetnim protokolom (IP) – 1. del: Zgradba preskušalnega niza in namen preskušanja (TSS&TP)

Services and Protocols for Advanced Networks (SPAN); Network Integration Testing between General Packet Radio Service (GPRS) and Internet Protocol (IP) Networks; Part 1: Test Suite Structure and Test Purposes (TSS&TP)

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33.040.01	Telekomunikacijski sistemi na splošno	Telecommunication systems in general
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Technical Specification

**Services and Protocols for Advance Network (SPAN);
Network Integration Testing between
General Packet Radio Service (GPRS)
and Internet Protocol (IP) Networks
Part 1: Test Suite Structure and Test purposes (TSS&TP)**

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ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Services and Protocols for Advanced Networks (SPAN).

The present document was developed by EURESCOM P1106 as Deliverable 2 Volume 4 and made freely and publicly available to ETSI TC SPAN for publication.

The present document is part 1 of a multi-part deliverable covering the Network Integration Testing between GPRS and IP Networks, as identified below:

Part 1: "Test Suite Structure and Test Purposes (TSS&TP)";

Part 2: "Abstract Test Suite (ATS), Implementation Conformance Statement (ICS) and partial Implementation eXtra Information for Testing (PIXIT) proformas";

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Introduction

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The present document contains the Test Suite Structure and Test Purposes (TSS&TP) for Network Integration Testing for the European PLMN, covering Network Integration Testing (NIT) between GPRS and non managed IP Networks.

1 Scope

The present document specifies the Test Suite Structure and Test Purposes for Network Integration Testing to verify the overall compatibility between GPRS (UMTS, GSM Phase 2+) and IP Networks. The objective is to verify the level of international or national end-to-end support of GPRS services.

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 and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

- [1] ETSI TS 124 008: Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Mobile radio interface layer 3 specification, Core Network protocols - Stage 3 (3G TS 24.008)".
- [2] ETSI TS 100 940: Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 specification (GSM 04.08)".
- [3] ISO/IEC 9646-1: "Information Technology-OSI Conformance Testing Methodology and Framework, Part 1: General Concepts".
- [4] ETSI TS 125 323: "Universal Mobile Telecommunications System (UMTS); Packet Data Convergence Protocol (PDCP) specification (3GPP TS 25.323)".
- [5] ETSI TS 129 060: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); General Packet Radio Service (GPRS); GPRS Tunnelling Protocol (GTP) across the Gn and Gp interface (3GPP TS 29.060)".
- [6] ETSI TS 125 322: "Universal Mobile Telecommunications System (UMTS); Radio Link Control (RLC) protocol specification (3GPP TS 25.322)".
- [7] ITU-T Recommendation I.361: "B-ISDN ATM layer specification".
- [8] ETSI TS 125 321: "Universal Mobile Telecommunications System (UMTS); Medium Access Control (MAC) protocol specification (3GPP TS 25.321)".
- [9] ETSI TS 123 040: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Technical realization of Short Message Service (SMS) (3GPP TS 23.040)".
- [10] ETSI TS 125 413: "Universal Mobile Telecommunications System (UMTS); UTRAN Iu interface RANAP signalling (3GPP TS 25.413)".
- [11] ETSI TS 123 121: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Architecture Requirements for release 99 (3GPP TS 23.121)".
- [12] ETSI TS 123 107: "Universal Mobile Telecommunications System (UMTS); Quality of Service (QoS) concept and architecture (3GPP TS 23.107)".
- [13] ITU-T Recommendation H.323: "Packet-based multimedia communications systems".

3 Definitions and abbreviations

3.1 Definitions related to conformance testing

Abstract Test Case (ATC): Refer to ISO/IEC 9646-1 [3].

Abstract Test Suite (ATS): Refer to ISO/IEC 9646-1 [3].

Implementation Under Test(IUP): Refer to ISO/IEC 9646-1 [3].

lower tester: Refer to ISO/IEC 9646-1 [3].

Implementation Conformance Statement (ICS) proforma: Refer to ISO/IEC 9646-1 [3].

Implementation eXtra Information for Testing (IXIT) proforma: Refer to ISO/IEC 9646-1 [3].

Point of Control and Observation (PCO): Refer to ISO/IEC 9646-1 [3].

Protocol Implementation Conformance Statement (PICS): Refer to ISO/IEC 9646-1 [3].

Protocol Implementation eXtra Information for Testing (PIXIT): Refer to ISO/IEC 9646-1 [3].

System Under Test (SUT): Refer to ISO/IEC 9646-1 [3].

Test Purpose (TP): Refer to ISO/IEC 9646-1 [3].

4 Abbreviations (standards.iteh.ai)

For the purpose of the present document the following abbreviations apply:

ATS	Abstract Test Suite
BS	Base Station
BSC	Base Station Controller
BSC	Base Station Controller
BSS	Base Station Sub-system
BSS	Base Station System
GSM	Global System for Mobile Communication
GW	Gateway
HLR	Home Location Register
IMSI	International Mobile Subscriber Identity
IP	Internet Protocol
MS	Mobile Station
MS	Mobile Subscriber
MSC	Mobile Switching Center
MT	Mobile Terminal
MT	Mobile Terminated
NIT	Network Integration Testing
PDP	Packet Data Protocol
PIXIT	Protocol Implementation eXtra Information for Testing
PLMN	Public Land Mobile Network
PPP	Point to Point Protocol
QoS	Quality of Service
RADIUS	Remote Authentication Dial In User Service
SCCP	Signaling Connection and Control Part
SGSN	Serving GPRS Support Node
SMS	Short Message Service
SS	Supplementary Service
TC	Test Case
TCP/IP	Transmission Control Protocol/Internet Protocol
TP	Test Plant

TSS	Test Suite Structure
TSS&TP	Test Suite Structure and Test Purposes
UDP	User Datagram Protocol
UMTS	Universal Mobile Telecommunications System
UTRAN	UMTS Terrestrial Radio Access Network

5 Numbering Scheme

- Pos. 1: Network of the A-Subscriber.
- Pos. 2: Network of the B-Subscriber.
- Pos. 3: Network of the C-Subscriber.
- Pos. 4: Network of the D-Subscriber.
- Pos. 5: Network of the E-Subscriber.

The following Network Codes apply:

_: No such network used (used e.g. for C-Subscriber in successful A to B Calls)

(underscore makes it easier to read the name)

G: GSM (w/HSCSD & GPRS)

U: UTRAN (UMTS)

N: IP Network

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(Extensions will be added when needed)

- Pos. 6 and 7: Bearer- or Teleservice involved.

xx: defined per PIXIT value

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Packet Services

GI: GPRS (IP)

NT: IP Network TCP

NU: IP Network UDP

- Pos. 8 and 9:

__: No Supplementary Services Involved/Successful

_U: No Supplementary Services Involved/Unsuccessful

- Pos. 10 to 25: YYY Name of individual Test Group (if needed).
- Pos. Last two positions XX Number of individual Test Purpose.

Short description	Name of individual Test Group
A_PDP_CR_GEN	ACTIVATE PDP CONTEXT REQUEST General
A_PDP_CR_INTE	ACTIVATE PDP CONTEXT REQUEST Interactive class
A_PDP_CR_BC_C	ACTIVATE PDP CONTEXT REQUEST Background class
A_PDP_STR_C	ACTIVATE PDP CONTEXT REQUEST Streaming class
A_PDP_CON_C	ACTIVATE PDP CONTEXT REQUEST Conversational class
A_PDP_CR_GENxx_R98	ACTIVATE PDP CONTEXT REQUEST General for Rel.98
A_SPDP_CR	Activate Secondary PDP context Request
M_PDP_CR	Modify PDP Context Request
D_PDP_CR	Deactivate PDP Context Request

5.1 Examples

1	2	3	4	5	6	7	8	9	10	11	12	13	14	14	15	17	18	19	20	21	19	20
G	N	-	-	-	G	I	-	-	A	-	P	D	P	-	C	R	-	G	E	N	X	X

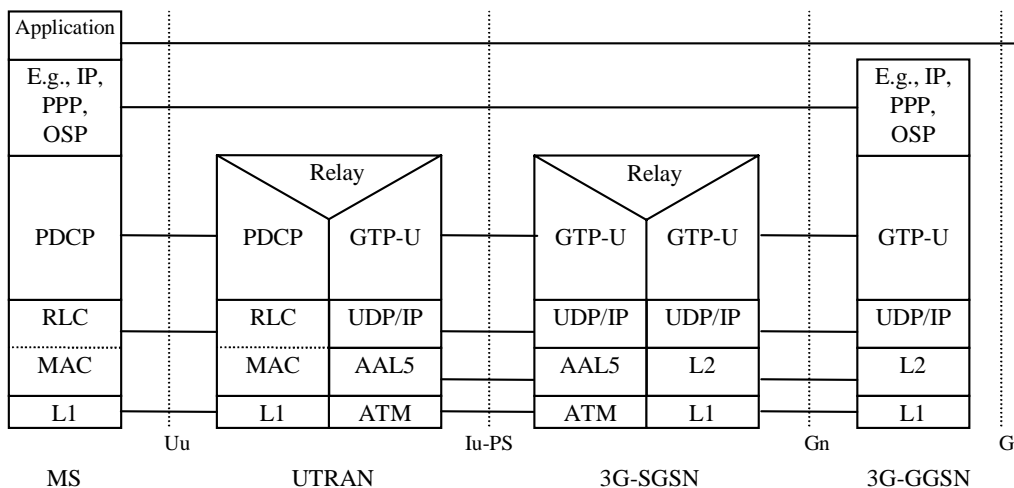
6 Test Suite Structure (TSS)

Packet Services GPRS 99 to ext. Network	Control Plane	PDP context activation	Successful GPRS General	GN_GI_A_PDP_C R_GENxx
	Control Plane + Application		Successful GPRS Interactive class	GN_GI_A_PDP_C R_INTExx
			Successful GPRS Background class	GN_GI_A_PDP_C R_BC_Cxx
			Successful GPRS Streaming class	GN_GI_A_PDP_S TR_Cxx
			Successful GPRS Conversational class	GN_GI_A_PDP_C ON_Cxx
GPRS 98 to external PDP network	Control Plane	PDP context activation	Successful GPRS General	GN_GI_A_PDP_C R_GENxx_R98xx
GPRS 99	General	Basic GPRS scenario - Successful	GPRS Activate PDP context Accept	GN_GI_A_PDP_Ax x
			Activate Secondary PDP context Request	GN_GI_A_SPDP_ CRxx
			Modify PDP Context Request	GN_GI M_PDP_CR xx
			Deactivate PDP Context Request	GN_GI_D_PDP_ CRxx
		Basic GPRS scenario - Unsuccessful	GPRS Activate PDP context Accept	GN_GI_U_A_PDP_ Axx
			Activate Secondary PDP context Request	GN_GI_U_A_SPDP_ _CRxx
			PDP Context modification	GN_GI_UM_PD_PD P Xx
ANNEX A GPRS 99 – Session Management, Interface Interoperability, Performance			Session Management Tests	GN_GI_SM_xx
			Interface Interoperability	GN_GI_II_xx
			Performance Tests	GN_GI_PM_xx

7 Test configurations and test procedures

7.1 User Plane for UMTS

MS-GGSN



Legend:

Packet Data Convergence Protocol (PDCP): This transmission functionality maps higher-level characteristics onto the characteristics of the underlying radio-interface protocols. PDCP provides protocol transparency for higher-layer protocols. PDCP supports e.g., IPv4, PPP, OSP, and IPv6. Introduction of new higher-layer protocols shall be possible without any changes to the radio-interface protocols. PDCP provides protocol control information compression. PDCP is specified in TS 125 323 [4].

NOTE: Unlike in GPRS, user data compression is not supported in UMTS, because the data compression efficiency depends on the type of user data, and because many applications compress data before transmission. It is difficult to check the type of data in the PDCP layer, and compressing all user data requires too much processing.

GPRS Tunnelling Protocol for the user plane (GTP-U): This protocol tunnels user data between UTRAN and the 3G-SGSN, and between the GSNs in the backbone network. All PDP PDUs shall be encapsulated by GTP. GTP is specified in TS 129 060 [5].

UDP/IP: These are the backbone network protocols used for routing user data and control signalling.

Asynchronous Transfer Mode (ATM): The information to be transmitted is divided into fixed-size cells (53 octets), multiplexed, and transmitted. ATM is specified in ITU-T Recommendation I.361 [7]. [FFS: add AAL5 description.]

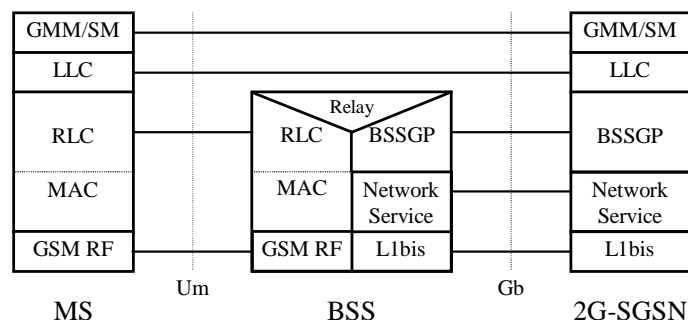
Radio Link Control (RLC): The RLC protocol provides logical link control over the radio interface. There may be several simultaneous RLC links per MS. Each link is identified by a Bearer Id. RLC is defined in TS 125 322 [6].

Medium Access Control (MAC): The MAC protocol controls the access signalling (request and grant) procedures for the radio channel. MAC is specified in TS 125 321 [8].

Figure 1: User Plane for UMTS

7.2 Control Plane

MS-SGSN for GPRS

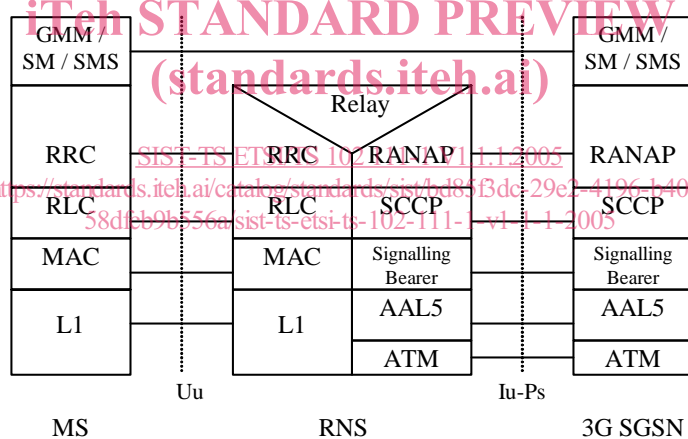


Legend:

GPRS Mobility Management and Session Management (GMM/SM): This protocol supports mobility management functionality such as GPRS attach, GPRS detach, security, routing area update, location update, PDP context activation, and PDP context deactivation, as described in clauses "Mobility Management Functionality" and "PDP Context Activation, Modification, and Deactivation Functions".

Figure 2: Control Plane MS-2G-SGSN

MS-SGSN for UMTS



Legend:

UMTS Mobility Management and Session Management (GMM/SM): GMM supports mobility management functionality such as attach, detach, security, and routing area update, as described in clause "Mobility Management Functionality". SM supports PDP context activation and PDP context deactivation, as described in clause "PDP Context Activation, Modification, and Deactivation Functions". SMS supports the mobile-originated and mobile-terminated short message service described in TS 123 040 [9].

Radio Access Network Application Protocol (RANAP): This protocol encapsulates and carries higher-layer signalling, handles signalling between the 3G-SGSN and UTRAN, and manages the GTP connections on the Iu interface. RANAP is specified in TS 125 413[10]. The layers below RANAP are defined in TS 123 121 [11].

Radio Link Control (RLC): The RLC protocol offers logical link control over the radio interface for the transmission of higher layer-signalling messages and SMS. RLC is defined in 3G TS 25.322.

Figure 2a: Control Plane MS-3G-SGSN

7.3 PDP Context Activation Procedure

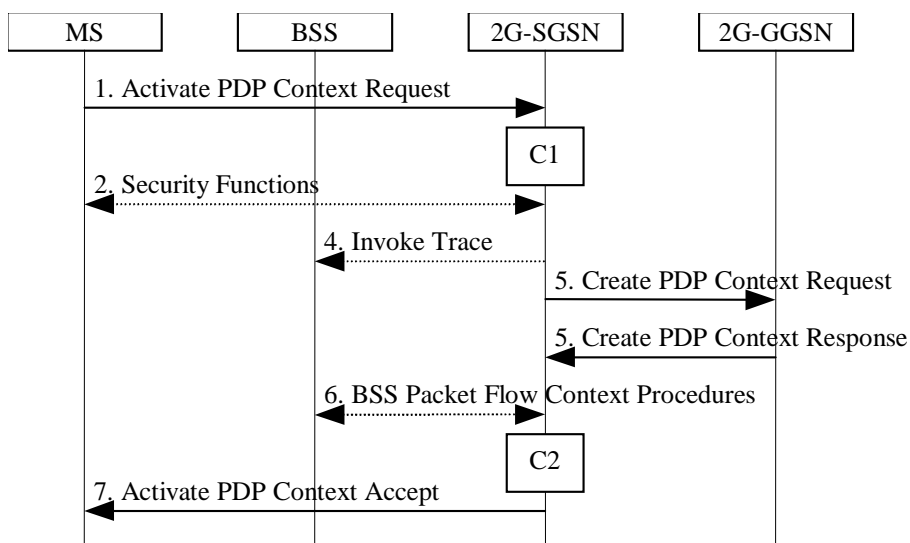


Figure 3: PDP Context Activation Procedure for GPRS

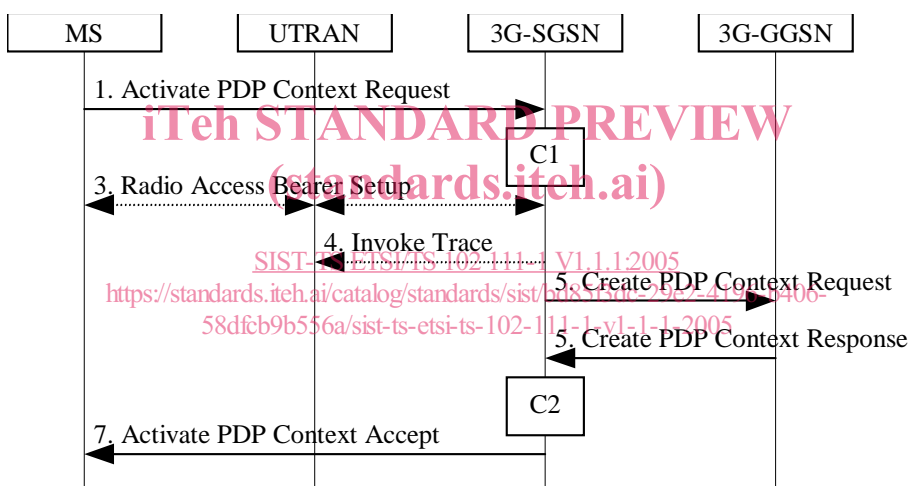


Figure 4: PDP Context Activation Procedure for UMTS

7.3.1 Successful Network-Requested PDP Context Activation Procedure

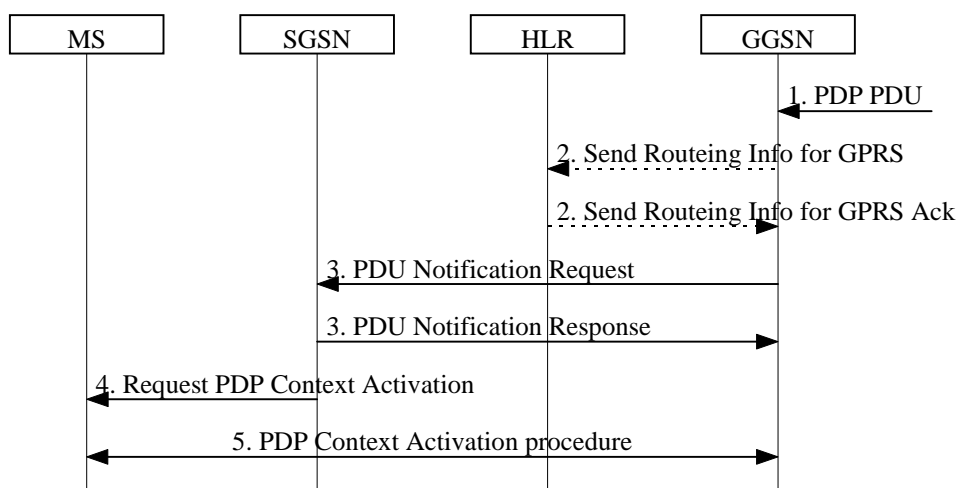


Figure 5: Successful Network-Requested PDP Context Activation Procedure

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8.1 PDP context activation

8.1.1 GPRS R99 to external PDP network

8.1.1.1 Successful

GN_GI A_PDP_CR_GEN 01	GSM ref. to: TS 124 008 [1] clauses 6.1.1 and 6.1.3.1.1	
TSS reference:	GPRS R99 to external PDP network /PDP context activation/successful/ACTIVATE PDP CONTEXT REQUEST	
GSM selection criteria:	BS 70	
IP selection criteria:	None	
Test purpose:	<p>If the UE is attached, then the Detach Request is originated from the UE indicating "GPRS detach without switching off". The network responds with a Detach Accept after completing the security mode procedures. A PDP context activation is then requested by the user. The PS attach (ATTACH REQUEST) is then indirectly caused by a requested PDP context activation. The SS returns the ATTACH ACCEPT message to the UE. Now session management can proceed with PDP context activation.</p> <p>On receipt of the ACTIVATE PDP CONTEXT REQUEST message an ACTIVATE PDP CONTEXT ACCEPT is returned by the SS with the same requested QoS.</p> <p>The GGSN may further restrict QoS Negotiated given its capabilities and the current load. If the QoS offered by the network is acceptable to the mobile, then upon receipt of the ACTIVATE PDP CONTEXT ACCEPT message the MS shall initiate establishment of the logical link with the offered QoS.</p> <p>An external IP application is started defined with PIXIT values.</p> <p>Ensure that the PDP PDU transfer with the offered parameters is performed correctly.</p> <p>Verify if the requested QoS parameters in the ACTIVATE PDP CONTEXT ACCEPT message are kept on the routed PDP PDUs.</p>	
GSM parameter values:	<p>QoS Requested:</p> <p>PDP type organization: PCO_ID</p> <p>PDP type number value: PDP_TNV_ID (PIXIT)</p> <p>Reliability class: RC_IDreq (PIXIT)</p> <p>Delay class: DC_IDreq (PIXIT)</p> <p>Precedence class: PC_IDreq (PIXIT)</p> <p>Peak throughput: PT_IDreq (PIXIT)</p> <p>Mean throughput: MT_IDreq (PIXIT)</p> <p>Delivery of erroneous SDU: DoeSDU_IDreq (PIXIT)</p> <p>Delivery order: DO_IDreq (PIXIT)</p> <p>Traffic class: TC_IDreq (PIXIT)</p> <p>Maximum SDU size: M_SDU_S_IDreq(PIXIT)</p> <p>Maximum bit rate for uplink: MBRFU_IDreq (PIXIT)</p> <p>Maximum bit rate for downlink: MBRFD_IDreq (PIXIT)</p> <p>Residual Bit Error Rate: RBER_IDreq (PIXIT)</p> <p>SDU error ratio: SDU_ER_IDreq (PIXIT)</p> <p>Traffic handling priority: THP_IDreq (PIXIT)</p> <p>Transfer delay: TD_IDreq (PIXIT)</p> <p>Guaranteed bit rate for uplink: GBRU_IDreq (PIXIT)</p> <p>Guaranteed bit rate for downlink: BRD_IDreq (PIXIT)</p>	
IP application parameter values:	<p>Application name: IP_APLIC (PIXIT)</p> <p>Application parameters values : IP_PAR 1 to ...IP_PAR 3 (PIXIT)</p>	