3GPP TSG_CN#7 **NP-000048**

ETSI SMG3 Plenary Meeting #7,

Madrid, Spain

13th – 15th March 2000

Agenda item: **5.3.3**

Source: **TSG_N WG3**

Title: **CRs to 3G Work Item Service Clean-up**

Introduction:

This document contains **"4"** CRs on **Work Item Service Clean-up,** that have been agreed by **TSG_N WG3,** and are forwarded to **TSG_N Plenary** meeting #7 for approval.

WG Tdoc	Spec	CR	Rev	Cat	Phase	Current V.	New V.	Subject
N3-000099	27.060	012		F	R99	3.3.0	3.4.0	Removal of X.25 from R'99 Packet Domain
N3-000031	27.060	011		F	R99	3.3.0	3.4.0	N1 VOCABULARY ALIGNMENT
N3-000032	29.061	013		F	R99	3.2.0	3.3.0	N1 VOCABULARY ALIGNMENT
N3-000100	29.061	012		C	R99	3.2.0	3.3.0	Removal of X.25 from R'99 Packet Domain

3GPP TSG-CN WG3/SMG 3 WPD Meeting #8
Sophia-Antipolis, France, 28 Feb-03 Mar 2000

***Document* N3-000031**
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

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27.060	CR	011	Current Version:	3.3.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	CN#7	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from:* ftp://ftp.3gpp.org/Information/CR-Form-v2.doc

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [ ] Core Network [ ]

Source: TSG_CN WG3 **Date:** 2000-02-04

Subject: N1 vocabulary alignment

Work item: R99 Service Clean up

Category: *(only one category shall be marked with an X)*

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change:

In 3G TS 24.008, section 2.2.2 (Vocabulary), it is stated that:
(…)
- The label (GSM only) indicates this section or paragraph applies only to GSM system. For multi system case this is determined by the current serving radio access network.
- The label (UMTS only) indicates this section or paragraph applies only to UMTS system. For multi system case this is determined by the current serving radio access network.
- In GSM,... Indicates this paragraph applies only to GSM System. For multi system case this is determined by the current serving radio access network.
- In UMTS,... Indicates this paragraph applies only to UMTS System. For multi system case this is determined by the current serving radio access network."

This CR aligns the text in the specification with these rules. In particular it removes the use of the term 'GPRS' for indicating that text is applicable only to systems using the 2G (i.e. GSM) radio access network.

Clauses affected: 3.1, 3.3, 6.1, 6.2, 7.1, 7.3.8.1, 7.3.8.2, 9.1, 9.2, 10, 10.1

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

3.1 Definitions

Refer to 3G TS 22.060 and 3G TS 23.060.

2G- / 3G- The prefixes 2G- and 3G- refers to functionality that supports only GSM ~~GPRS~~ or UMTS, respectively, e.g., 2G-SGSN refers only to the GSM ~~GPRS~~ functionality of an SGSN. When the prefix is omitted, reference is made independently from the GSM ~~GPRS~~ or UMTS functionality.

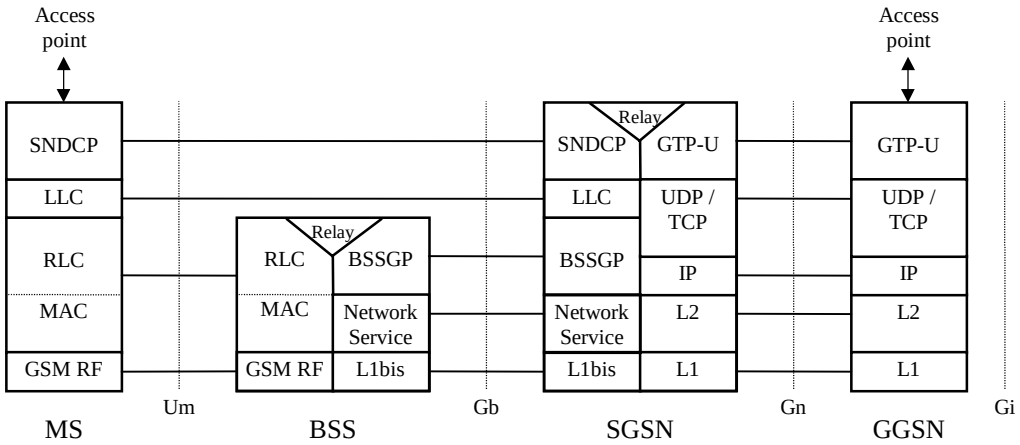
3.3 Symbols

For the purposes of the present document, the following Symbols apply:

Gb Interface between a SGSN and a BSC.
Gi Reference point between the Packet Domain and an external packet data network.
Gn Interface between two GSNs within the same PLMN.
Gp Interface between two GSNs in different PLMNs. The Gp interface allows support of Packet Domain network services across areas served by the co-operating PLMNs.
Gs Interface between an SGSN and MSC.
Iu Interface between the RNS and the core network. It is also considered as a reference point.
R The reference point between a non-ISDN compatible TE and MT. Typically this reference point supports a standard serial interface.
Um The interface between the MS and the ~~GPRS~~ GSM fixed network part. The Um interface is the ~~GPRS~~ GSM network interface for providing packet data services over the radio to the MS. The MT part of the MS is used to access the ~~GPRS~~ GSM services through this interface.
Uu Interface between the mobile station (MS) and the UMTS fixed network part. The Uu interface is the UMTS network interface for providing packet data services over the radio to the MS. The MT part of the MS is used to access the UMTS services through this interface.

6.1 GSM~~GPRS~~

The following figure 2 shows the relationship of the ~~GPRS~~ GSM Packet Domain Bearer, terminating at the SNDCP layer, to the rest of the ~~GPRS~~GSM Packet Domain environment. It is shown for reference purposes only and detailed information can be found in 3G TS 23.060.



NOTE: In the SGSN and GGSN UDP is mandatory. TCP is optional but recommended for X.25 services.

Figure 2: ~~GPRS~~ User Plane for Packet Domain services in GSM

6.2 UMTS

The following figure 2a shows the relationship of the UMTS Packet Domain Bearer, terminating at the PDCP layer, to the rest of the UMTS Packet Domain environment. It is shown for reference purposes only and detailed information can be found in 3G TS 23.060.

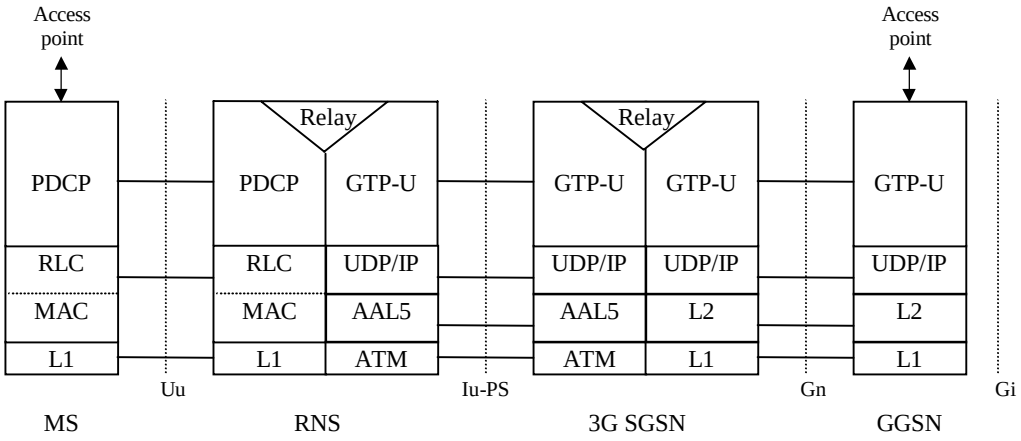


Figure 2a: ~~UMTS~~ User Plane for Packet Domain services in UMTS

7.1 Mobile Station Modes of Operation

Three ~~GPRS~~ GSM MS modes of operation are identified: Class A, B, and C. These modes of operation are described in 3G TS 23.060.

Three UMTS MS modes of operation are supported in UMTS: A PS/CS mode of operation corresponds to class-A mode of operation in ~~GPRS~~GSM. A PS mode of operation corresponds to class-C mode of operation in ~~GPRS~~GSM. A CS mode of operation is out of scope in this specification.

7.3.8.1 ~~GPRS~~2G-MS

It shall be possible to enquire and/or set the following parameters:

- Requested Quality of Service.
  ~~(this includes the peak bit rate, the mean bit rate, the delay requirements, the service precedence, and the reliability level)~~
- Traffic Flow Template
- Compression on or off.
- TCP/IP Header Compression on or off.
- PDP address
- PDP type
- Access Point Name (APN)
- Protocol configuration options (if required by the PDP type)

7.3.8.2 ~~UMTS~~3G-MS

It shall be possible to enquire and/or set the following parameters:

- Requested Quality of Service.
  ~~(this includes Traffic class, Maximum bitrate, Guaranteed bitrate, Delivery order, Maximum SDU size, SDU format information, SDU loss ratio, Residual bit error ratio, Delivery of erroneous SDUs, Transfer delay, Traffic handling priority, Allocation/Retention Priority)~~
- Traffic Flow Template
- Protocol Control Information Compression, on or off.
- PDP address
- PDP type
- Access Point Name (APN)
- Protocol configuration options (if required by the PDP type)

9.1 Example mapping of functions between the R reference point and the Packet Domain bearer for IP over PPP

The following example illustrates the case when the IP over PPP functionality is used in the MT. The example does not include all the details of PPP, but only describes the logical operation of PPP connection establishment, host authentication and IP configuration.

Each interface at the R reference point can support only one PPP connection and each PPP connection can support only one IP session. Therefore, in PPP mode only one IP PDP context can be activated per interface at the R reference point. However, it is possible for a PCMCIA card (or other multiplexed interfaces) to support multiple virtual interfaces (communications ports) at the R reference point. Multiple PPP connections and IP contexts are possible in this case.

9.2 Example mapping of functions between the R reference point and the Packet Domain bearer for IP over MCML PPP

When MCML is used instead of standard PPP [34] at the R-reference point, it is possible to support multiple IP sessions on one MCML connection. This is achieved by using an additional MP header after the standard PPP header. MCML provides two different MP headers, a 2-byte header to have four IP sessions and a 4-byte header to have sixteen IP sessions multiplexed over the MCML connection.

Since both MP and MCML closely follow the PPP connection establishment and negotiation model described in section 9.1, it is not replicated in this section. The major difference is the additional negotiation capabilities used during the LCP configuration negotiation [44][45].

10 PPP Based Services

By means of the PDP type 'PPP' ~~GPRS~~ Packet Domain may support interworking with networks based on the point-to-point protocol (PPP), as well as with networks based on any protocol supported by PPP through one of its Network Control Protocols (NCPs). It may also support interworking by means of tunnelled PPP, by e.g. the Layer Two Tunnelling Protocol (L2TP). The protocol configurations are depicted in figures 8a and 8b.

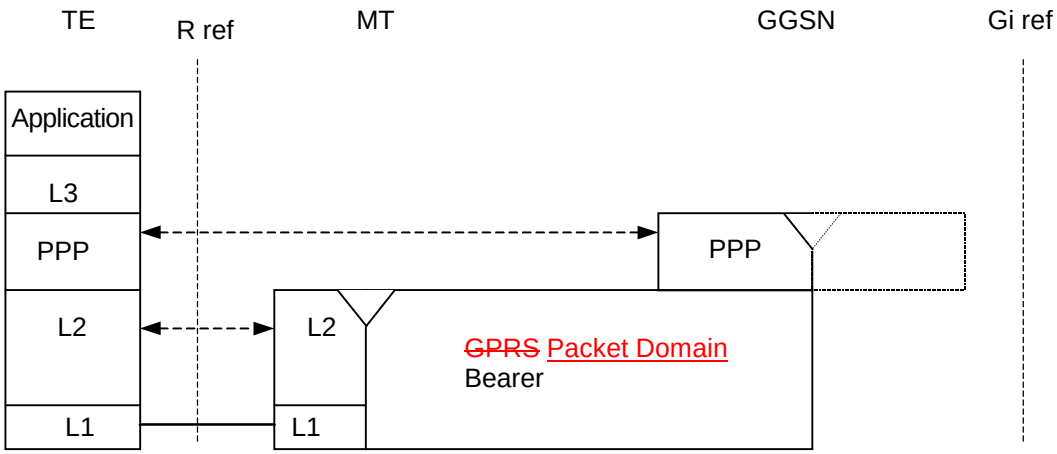
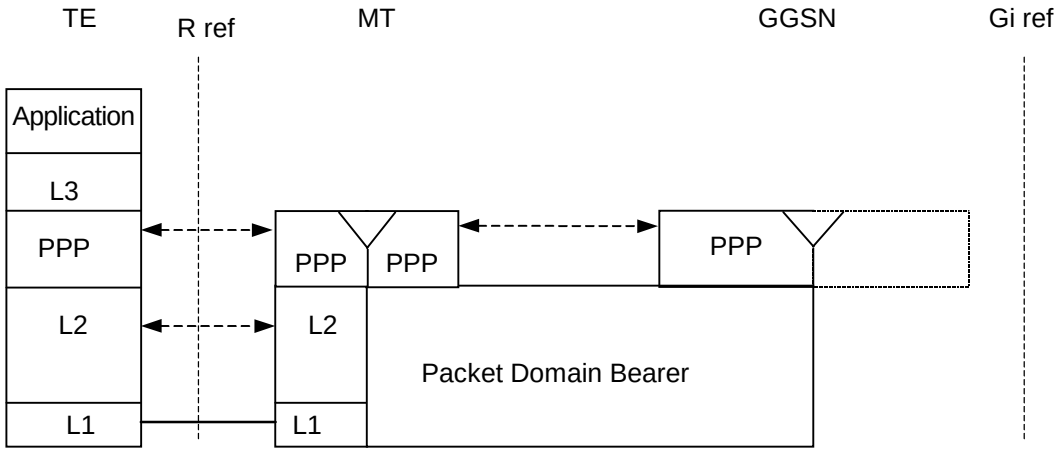


Figure 8a: PPP Based Services (transparent PPP negotiation)



NOTE. In the above case the 'L2' protocol is compliant with [35].

Figure 8b: PPP Based Services (relayed PPP negotiation)

The 'L3' protocol is a network layer protocol supported by one of the PPP NCP's. All protocols currently supported by NCP's are listed in [36].

The PPP is a widely supported protocol in numerous operating systems and this alleviates the need for any Packet Domain~~GPRS~~ specific protocol at the TE. PPP at the GGSN shall comply with [34]. The Domain Name Server information shall be delivered as defined in [40]. The delivery of any vendor-specific packets and options shall conform to [41].

The 'L2' protocol may be the link layer protocol defined for the PPP suite [35]. As an alternative an 'L2' protocol can be used which is defined as a manufacturer's operating system dependent protocol capable of carrying PPP frames over the R reference point. In case the link layer protocol defined for the PPP suite [35] is used as 'L2' protocol, the MT may

negotiate LCP options related to the 'L2' framing (e.g. 'ACCM' [35], 'ACFC' [34] and 'FCS-Alternatives' [37]), with the TE. The MT shall remove the 'L1' and 'L2' specific framing from PPP frames in the uplink direction and add it in the downlink direction (see figure 8b).

10.1 Example mapping of functions between the R reference point and the ~~GPRS~~Packet Domain bearer (transparent PPP negotiation)

The following example illustrates the case when the PPP negotiation is carried out transparently between the TE and the GGSN. The example does not include all the details of PPP, but only describes the logical operation of PPP LCP, host authentication and PPP NCP negotiations.

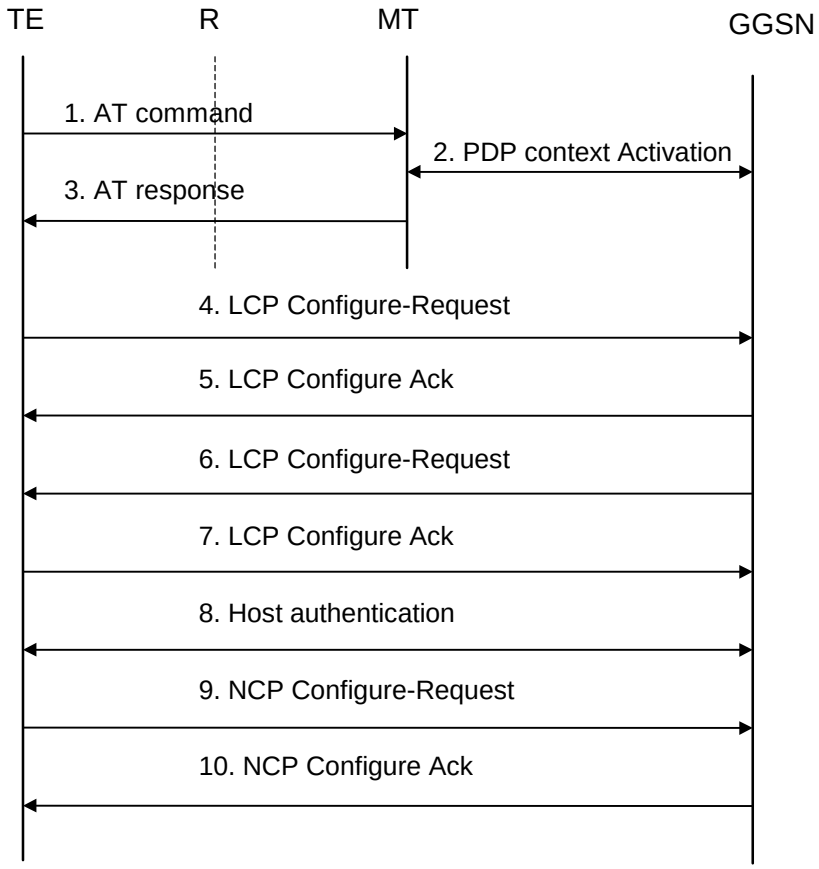


Figure 9a: PPP Based Service (transparent PPP negotiation)

1) The TE issues AT commands to set up parameters and activate a PDP Context (refer to sub-clause on AT commands for further details).

2) The MT performs a PDP Context Activation as described in 3G TS 23.060.

3) The MT sends AT responses to the TE.

4) The PPP protocol in the TE sends an LCP Configure-Request. This command establishes a PPP link between the TE and the GGSN.

5) The GGSN returns an LCP Configure-Ack to the TE to confirm that the PPP link has been established. The GGSN might previously have sent an LCP Configure-Nak in order to reject some options proposed by the TE. This in turn might have triggered a retransmission of the LCP Configure-Request with different options.

6) The PPP protocol in the GGSN sends an LCP Configure-Request in order to negotiate for the authentication protocol used for authentication of the host TE towards the GGSN.

7) The TE returns an LCP Configure-Ack to the GGSN to confirm the use of the specified authentication protocol. The GGSN might previously have sent an LCP Configure-Nak in order to reject the protocol proposed by the TE. This in turn might have triggered a retransmission of the LCP Configure-Request with different options.

8) The TE authenticates itself towards the GGSN by means of the negotiated protocol. If no authentication protocol can be negotiated the GGSN may reject the PPP connection. Refer to GSM 09.61 for further details on the authentication.

9) The PPP protocol in the TE sends to the GGSN an NCP Configure-Request. This command activates the network layer protocol.

10) The GGSN acknowledges to the PPP protocol in the TE that the network layer protocol is now activated by sending an NCP Configure-Ack command. Before sending an NCP Configure-Ack, the GGSN might previously have sent an NCP Configure-Nak in order to reject some parameters proposed by the TE. This in turn might have triggered a retransmission of the NCP Configure-Request with different parameter values.

3GPP TSG-CN WG3/SMG 3 WPD Meeting #8
Sophia-Antipolis, France, 28 Feb-03 Mar 2000

Document N3-000099
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

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27.060	CR	012	Current Version:	3.3.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to: CN#7	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑	for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from:* ftp://ftp.3gpp.org/Information/CR-Form-v2.doc

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [ ] Core Network [ ]

Source: TSG_CN WG3 **Date:** 05-03-2000

Subject: Removal of X.25 from R'99 Packet Domain

Work item: R99 Service Clean up

Category: *(only one category shall be marked with an X)*

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: Support of X.25 is no longer required for R'99 packet Domain.

Clauses affected: 2, 3.2, 6.1, 8, 12.2.2, A, B.1

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

2 References

[All references need to be checked once release 99 stabilizes.]

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.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] GSM 01.04: “Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms”..

[2] GSM 02.02: "Digital cellular telecommunication system (Phase 2+); Bearer Services (BS) supported by a GSM Public Land Mobile Network (PLMN)".

[3] 3G TS 22.060: "Digital cellular telecommunication system (Phase 2+); General Packet Radio Service (GPRS); Service Description Stage 1".

[4] GSM 03.02: "Digital cellular telecommunication system (Phase 2+); Network architecture".

[5] 3G TS 23.003: "Digital cellular telecommunications system (Phase 2+); Numbering, addressing and identification".

[6] GSM 03.10: "Digital cellular telecommunication system (Phase 2+); GSM Public Land Mobile Network (PLMN) connection types".

[7] 3G TS 23.022: "Digital cellular telecommunications system (Phase 2+); Functions related to Mobile Station (MS) in idle mode and group receive mode".

[8] 3G TS 23.040: "Digital cellular telecommunications system (Phase 2+); Technical realization of the Short Message Service (SMS); Point-to-Point (PP)".

[9] 3G TS 23.060: "Digital cellular telecommunication system (Phase 2+); General Packet Radio Service (GPRS) Service Description Stage 2".

[10] GSM 04.02: "Digital cellular telecommunication system (Phase 2+); GSM Public Land Mobile Network (PLMN) access reference configuration".

[11] 3G TS 24.007: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface signalling layer 3; General aspects".

[12] 3G TS 24.008: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 specification".

[13] GSM 04.60: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Mobile Station (MS) - Base Station System (BSS) interface; Radio Link Control / Medium Access Control (RLC/MAC) protocol".

[14] GSM 04.64: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Logical Link Control (LLC)".

[15] GSM 04.65: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Subnetwork Dependent Convergence Protocol (SNDCP)".

[16] 3G TS 27.007: "Digital cellular telecommunication system (Phase 2+); AT command set for GSM Mobile Equipment (ME)".

[17] 3G TS 29.061: "3RD Generation Partnership Project; Technical Specification Group Core Network; Packet Domain; Interworking between the Public Land Mobile Network (PLMN) supporting Packet Based Services and Packet Data Networks (PDN)".

[18] CCITT Recommendation E.164: "Numbering plan for the ISDN era".

[19] CCITT Recommendation V.42 bis: "Data communication over the telephone network – Data compression procedures for data circuit-terminating equipment (DCE) using error correction procedures".

[20] <deprecated>~~CCITT Recommendation X.3: "Packet assembly disassembly facility (PAD) in a public data network".~~

[21] <deprecated>~~CCITT Recommendation X.25: "Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit".~~

[22] <deprecated>~~CCITT Recommendation X.28: "DTE / DCE interface for a start-stop mode data terminal equipment accessing the packet assembly / disassembly facility (PAD) in a public data network situated in the same country".~~

[23] <deprecated>~~CCITT Recommendation X.29: "Procedures for the exchange of control information and user data between a packet assembly / disassembly (PAD) facility and a packet mode DTE or another PAD".~~

[24] <deprecated>~~CCITT Recommendation X.75: "Packet-switched signalling system between public networks providing data transmission services".~~

[25] <deprecated>~~CCITT Recommendation X.121: "International Numbering Plan for Public Data Networks".~~

[26] IETF RFC 768 (1980): "User Datagram Protocol" (STD 6).

[27] IETF RFC 791 (1981): "Internet Protocol" (STD 5).

[28] IETF RFC 792 (1981): "Internet Control Message Protocol" (STD 5).

[29] IETF RFC 793 (1981): "Transmission Control Protocol" (STD 7).

[30] ITU-T Recommendation V.250 (ex V.25ter): "Serial asynchronous automatic dialling and control".

[31] ITU-T Recommendation V.24: "List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)".

[32] ITU-T Recommendation V.28: "Electrical Chracteristics for unbalanced double-current interchange circuits"

[33] ITU-T Recommendation V.80: "In-band DCE control and synchronous data modes for asynchronous DTE"

[34] IETF RFC 1661 (1994): “The Point-to-Point Protocol (PPP)” (STD 51).

[35] IETF RFC 1662 (1994): “PPP in HDLC-like framing” (STD 51).

[36] IETF RFC 1700 (1994): “Assigned Numbers” (STD 2).

[3]7 IETF RFC 1570 (1994):”PPP LCP Extensions“.

[38] IETF RFC 1989 (1996):”PPP Link Quality Monitoring“.

[39] IETF RFC 1332 (1992):”The PPP Internet Protocol Control Protocol (IPCP)“.

[40] IETF RFC 1877 (1995):”PPP IPCP Extensions for Name Server Addresses “.

[41] IETF RFC 2153 (1997):”PPP Vendor Extensions“.

[42] IETF RFC 1334 (1992):”PPP Authentication Protocols“.

[43] IETF RFC 1994 (1996):”PPP Challenge Handshake Authentication Protocol“.

[44] IETF RFC 2686 (1999):”The Multi-Class Extension to Multi-Link PPP”

[45] IETF RFC 1990 (1996):”The PPP Multilink Protocol (MP)“.

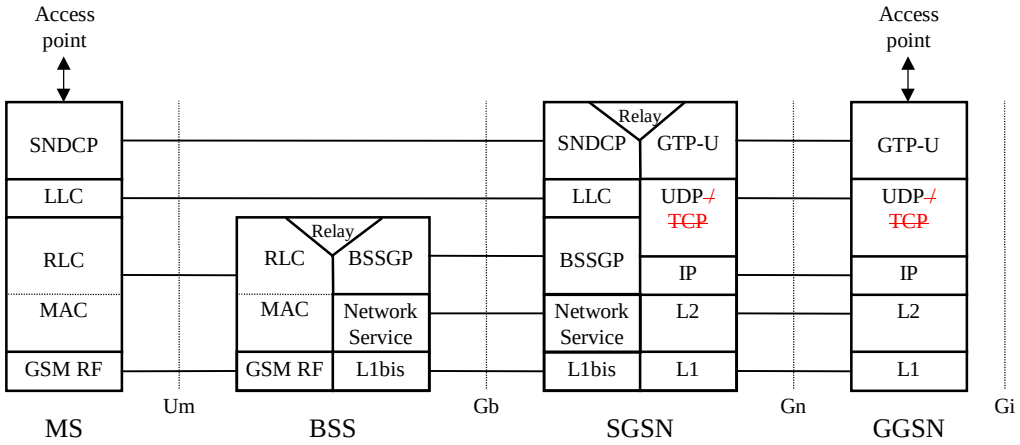
3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

APN	Access Point Name
GGSN	Gateway GPRS Support Node
GPRS	General Packet Radio Service
GSN	GPRS Support Node
GTP-U	GPRS Tunnelling Protocol for user plane
HDLC	High Level Data Link Control
ICMP	Internet Control Message Protocol
IHOSS	Internet Hosted Octet Stream Service
IETF	Internet Engineering Task Force
IP	Internet Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
LA	Location Area
~~LAPB~~	~~Link Access Protocol Balanced~~
LCP	Link Control Protocol
LLC	Logical Link Control
MAC	Medium Access Control
MCML	Multi-Class Multi-Link PPP
ME	Mobile Equipment
MP	Multilink PPP
MS	Mobile Station
MT	Mobile Termination
NCP	Network Control Protocol
OSP	Octet Stream Protocol
OSP:IHOSS	Octet Stream Protocol for Internet Hosted Octet Stream Service
PAD	Packet Assembler/Disassembler
PDCP	Packet Data Convergence Protocol
PDN	Packet Data Network
PDP	Packet Data Protocol , e.g., IP~~, X.25~~ or PPP
PDU	Protocol Data Unit
PPP	Point-to-Point Protocol
PS	Packet Switched
~~PSPDN~~	~~Packet Switched Public Data Network~~
PTM	Point To Multipoint
PTP	Point To Point
PVC	Permanent Virtual Circuit
RA	Routing Area
SGSN	Serving GPRS Support Node
SNDCP	SubNetwork Dependent Convergence Protocol
TE	Terminal Equipment
TFT	Traffic Flow Template
TCP	Transmission Control Protocol
UDP	User Datagram Protocol

6.1 GPRS

The following figure 2 shows the relationship of the GPRS Bearer, terminating at the SNDCP layer, to the rest of the GPRS environment. It is shown for reference purposes only and detailed information can be found in 3G TS 23.060.



~~NOTE: In the SGSN and GGSN UDP is mandatory. TCP is optional but recommended for X.25 services~~.

Figure 2: GPRS User Plane

8 <deprecated>~~X.25 Based Services for GPRS~~

~~This clause describes the use of X.25 based services over the Packet Domain bearer. Two services are specified at the R reference point –~~

~~1) Character mode (specified in ITU-T X.3, X.28, X.29) with the triple X PAD in the MT.~~

~~2) Packet mode (specified in ITU-T X.25).~~

~~NOTE: In order to maintain consistency within UMTS/GSM specifications, the term TE is used when referring to what CCITT/ITU-T X.25 calls a DTE. Exceptionally, in text quoted from an ITU-T Recommendation, the term DTE is retained.~~

~~8.1 X.25 Character mode (triple X PAD) service~~

~~This mode is an asynchronous character based service allowing the application to set up a single connection using the CCITT/ITU-T X.28 / X.29 procedures. This supports both mobile originate and mobile terminate calls. The MT terminates the X.25 packet layer and provides a triple X PAD function.~~

~~Figure 3: Character (Triple X PAD) mode~~

8.1.1 PAD Parameters

The following table lists the minimum set of X.3 parameters that shall be implemented. A full range is specified in the CCITT/ITU-T X series documents and those parameters not implemented shall be fixed to their defined defaults.

Table 1: Table of Minimum X.3 Parameters

Parameter Number	Description	Default Value	Valid Values	Value/Function
1	PAD Recall Character	1	0 1 32-36	(None) DLE Binary representation of decimal value
2	Echo	0	0 1	Off On
3	Data Forwarding Character	2	0 1 2 4 8 16 32 64	(on 128th data byte) A-Z, a-z, 0-9 CR ESC, BEL, ENQ, ACK DEL, CAN, DC2 ETX, EOT HT, LF, VT, FF All characters between NUL & US not listed above
4	Delay Timer	0	0 1-255	Disabled Period of TXD cct inactivity before data forwarded (1/20 of a second). The minimum time-out is 0.5s. Any value of parameter 4 between 1 & 10 will default to 0.5s.
5	Flow Control from Pad (to DTE)	0	0 1	None XON/XOFF
6	Service Signals	5	0 1 5	Disabled Enabled, excluding prompt Enabled, including prompt
7	Action on Break	8	8	PAD escapes from data transfer state
11	Data Rate	13	2 3 4 6 12 13 14	300 bps 1200 bps 600 bps 150 bps 2400 bps 4800 bps 9600 bps Other values may be implemented as long as they conform to the CCITT/ITU-T specifications.
12	Flow Control to Pad (from DTE)	0	0 1	None XON/OFF
13	Line Feed insertion	0	0 1	None LF inserted after CR to DTE
15	Character Deletion	0	0 1	Disabled Enabled

Although not CCITT/ITU-T defined, to be able to specify either X.28 or X.29 modes a Parameter 0 can be used as follows.

For X.28 mode parameter 0 shall be set to 0.

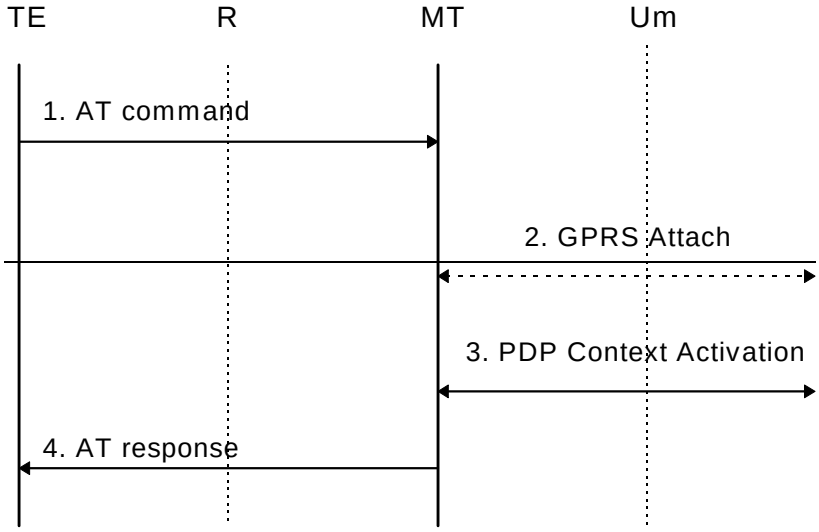
For the four X.29 variants available, each with a corresponding protocol identifier, the parameter value is set as listed below. The identifier octet is supplied with the call request packet when setting up a call.

Value	Description	Protocol Identifier Octet
2	CCITT use	00000001
3	National use	01xxxxxx
4	International User Bodies	10xxxxxx
5	DTE - DTE use	11xxxxxx

x - this digit may be represented by either a 1 or 0 (to be specified in ITU-T Recommendation X.244).

8.1.2 Example mapping of functions between the R reference point and the Packet Domain bearer

The following example illustrates the case when the PAD functionality is used in the MT. In PAD mode only one PDP context can be activated per R reference point.



NOTE: The 2 ended arrows indicate an exchange of 0 or more messages.

Figure 4: PAD Service

1) The TE issues an AT command to activate PAD mode.

2) If the MS is not yet PS attached, the MT performs the PS Attach procedure as described in 3G TS 23.060.

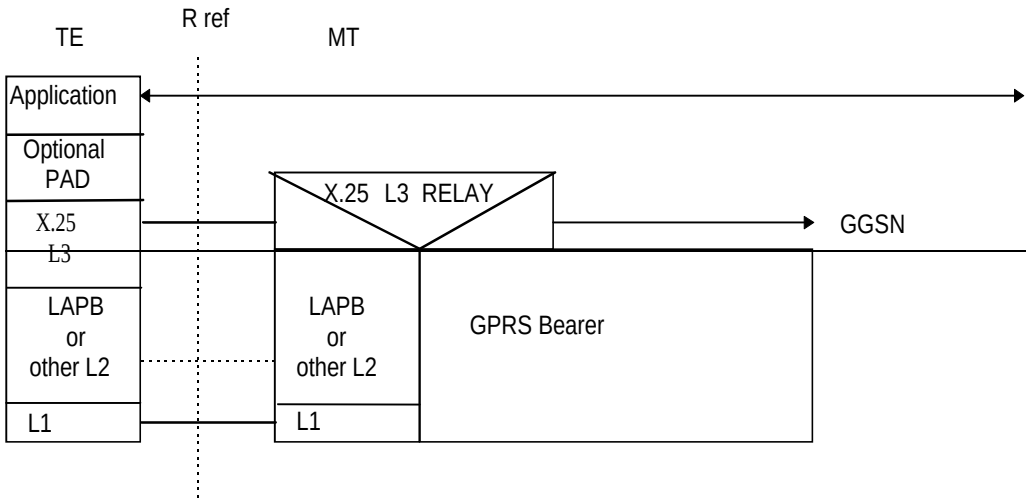
3) The MT performs the PDP Context Activation as described in 3G TS 23.060.

4) The MT sends an AT response to the TE. Following a positive AT response the PAD prompt is issued.

8.2 X.25 Packet mode service

This mode offers a packet based service allowing the application to set up one or more virtual calls using the CCITT/ITU-T X.25 procedures. The maximum permitted number of concurrent virtual calls is implementation dependent. Both mobile originate and mobile terminate calls are supported. The MT performs a relay function for X.25 layer 3 which is terminated in the TE. The layer 2 protocol at the R reference point is terminated in the TE and the MT.

Depending on the application, the TE may or may not incorporate a triple X PAD function.



NOTE: The "other L2" could be 3G TS 27.010 or a manufacturer's defined layer 2

Figure 5: Packet mode

8.2.1 Layer 1 and Layer 2 options

This subclause describes standardized layers 1 and 2 which may be used for the TE-MT interface. As an alternative, the multiplexing protocol specified in 3G TS 27.010 or a manufacturer's defined layers 1 and 2 may be used providing they meet the requirements for carrying X.25 layer 3 frames over the R reference point.

8.2.1.1 Synchronous serial interface

For TEs with a synchronous serial port -

Layer 1 is synchronous X.21 or X.21bis (V.24/V.28).

Layer 2 is LAP B (X.25 L2) based on bit oriented HDLC.

NOTE: Configuration of the MT in this case is outside the scope of this specification.

8.2.1.2 Asynchronous serial interface

For TEs with an asynchronous serial port -

Layer 1 is asynchronous V.24/V.28.

Layer 2 is LAP B (X.25 L2) based on character oriented HDLC.

NOTE: The methods described in ITU T Rec. V.80 may be applicable here.

8.2.1.3 Synchronous and asynchronous (dual mode) interface

For TEs with a serial port that can operate in both synchronous and asynchronous modes the following mechanism may be used where the interface supports AT commands. The interface starts in asynchronous mode and AT commands may be used to configure the MT. When configuration is complete, the interface switches to synchronous mode and X.25 starts up in the usual way. Setting Data Terminal Ready (circuit 108/2) to off is a protocol independent way of returning to asynchronous mode. Alternatively, the closing down of LAP B could be used as the signal.

8.2.2 Example mappings of functions between the R reference point and the Packet Domain bearer

The minimum requirement is that the MT shall be PS attached and the X.25 context activated whilst an X.25 virtual call is in progress. Any extension to this requirement depends on whether the MT implements any other Packet Domain-

supported services (e.g. SMS) which might require that the MT remains PS-attached even when there is no X.25 virtual call in progress.

The following subclauses describe only the X.25 requirements. These actions may be filtered by the requirements of any other Packet Domain supported service. For example, if a PS-only MT also supports SMS, a request for 'disconnection' of the X.25 service would result in a deactivation of the X.25 context but not a PS-detach.

8.2.2.1 Standardized X.25 TE

This case applies to TEs which implement only the X.25 procedures, i.e. they have no support for AT commands. The layer 1 and 2 options described in subclause 8.2.1.1 and 8.2.1.2 apply.

Because of the different implementations of X.25 procedures in existing DTEs, attach/detach and activate/deactivate may need to be controlled at layer 1, 2 or 3 of the X.25 interface. Whilst it is always possible to use layer 3 control, this requires the most complete implementation of the X.25 protocol stack in the MT. Control at a lower layer may result in a simpler implementation. The procedures for connection and disconnection at all three layers are described in CCITT/ITU-T X.25.

In all cases it may be desirable to incorporate a timer to delay the deactivate/detach procedures in order to avoid excessive changes of the activation and attachment states in the course of a number of consecutive calls.

NOTE: The activation and deactivation of an X.25 context to carry packets overthe Packet Domain is analogous to setting up and clearing a switched ISDN B-channel connection to carry them over an ISDN. The call control mapping procedures used in the ISDN case are described in detail in ITU-T X.31 clause 7.3 (layer 1) and appendix I (layers 2 and 3).

8.2.2.1.1 Layer 1 control

This applies to X.25 DTEs which disconnect at the physical layer when no virtual calls are in progress. The TE and MT signal to one another by using V.24 or X.21 control signals.

From TE -

Physical layer connect received by MT -> attach, activate

Physical layer disconnect received by MT -> deactivate, detach

From network -

- If the X.25 context is not currently active, an attempt by the network to offer a mobile terminated X.25 virtual call will be signalled by the receipt at the MT of a Request PDP Context Activation message. The MT signals this to the TE by using V.24 or X.21 control signalling and, if successful, -> attach, activate.
- A network request that the X.25 context should be deactivated or a failure of the radio link will result in the MT performing a physical layer disconnect.

8.2.2.1.2 Layer 2 control

This applies to X.25 DTEs which keep layer 1 active but disconnect at the data link layer when no virtual calls are in progress. The TE and MT signal to one another by starting and stopping the data link layer protocol.

From TE -

Data link layer set-up received by MT -> attach, activate

Data link layer disconnect received by MT -> deactivate, detach

From network -

- If the X.25 context is not currently active, an attempt by the network to offer a mobile terminated X.25 virtual call will be signalled by the receipt at the MT of a Request PDP Context Activation message. The MT signals this to the TE by attempting to start the data link layer and, if successful, -> attach, activate.

- A network request that the X.25 context should be deactivated or a failure of the radio link will result in the MT performing a data link layer disconnect.

8.2.2.1.3 Layer 3 control

This applies to X.25 DTEs which keep layers 1 and 2 active when no virtual calls are in progress.

From TE -

- Call Request packet received by the MT -> attach, activate
  (Action is taken only if there are no X.25 virtual calls already in progress)
- Clear Confirmation packet received by the MT from the TE -> deactivate, detach
  (Action is taken only if there are no more X.25 virtual calls in progress.)

From network -

- If the X.25 context is not currently active, an attempt by the network to offer a mobile terminated X.25 virtual call will be signalled by the receipt at the MT of a Request PDP Context Activation message. Following activation by the MT, an X.25 Call Request packet will be received from the network.
- Clear Confirmation packet received by the MT from the network -> deactivate, detach
  (Action is taken only if there are no more X.25 virtual calls in progress.)
- A network request that the X.25 context should be deactivated or a failure of the radio link will result in the MT clearing any outstanding X.25 virtual calls.

The above refer only to normal clearing situations. An actual implementation shall take into account exceptional conditions such as the receipt of a Clear Request packet from the TE but no acknowledging Clear Confirmation from the network.

8.2.2.2 X.25 TE with support for AT commands

This case applies to TEs which implement AT commands in addition to supporting X.25 procedures. The layer 1 and 2 options described in subclauses 8.2.1.2 and 8.2.1.3 apply.

The TE sends Packet Domain AT commands to configure the MT, followed by a command to switch the interface into packet mode and start X.25. A mode of operation may be supported which provides compatibility with existing modem dial procedures.

12.2.2 MO X.25 virtual call using a triple-X PAD in dial compatibility mode

This example shows how the <called_address> string may be used in the D command to make an X.25 call to a specified X.121 address.

The MT begins in V.250 command state.

TE -> MT: AT<Packet Domain specific configuration commands, if required>

MT -> TE: OK

The TE sends a dial command requesting the Packet Switched service to X.121 address 1234567890.

TE -> MT: ATD*99*1234567890#

MT -> TE CONNECT

The MT enters V.250 online data state, performs a PS attach if necessary and activates the X.25 context. It then automatically makes an X.25 call to the specified address, bypassing the PAD prompt. If the call is successful the MT responds with the PAD connect message -

1234567890 COM

Annex A (informative):
Summary of AT commands for the Packet Domain

This informative annex lists the AT commands for the Packet Domain that are fully described in 3G TS 27.007.

Table A.1: Summary of AT commands for the packet domain

Command	Description
+CGACT	PDP context activate or deactivate
+CGANS	Manual response to a network request for PDP context activation
+CGATT	PS attach or detach
+CGAUTO	Automatic response to a network request for PDP context activation
+CGCLASS	PS mobile station class
+CGCLOSP	Configure local Octet Stream PAD parameters
+CGCLPAD	<deprecated>~~Configure local triple-X PAD parameters~~
+CGDATA	Enter data state
+CGDCONT	Define PDP context
+CGEREP	Control unsolicited PS event reporting
+CGPADDR	Show PDP address
+CGREG	Packet Domain network registration status
+CGQMIN	Quality of service profile (minimum acceptable)
+CGQREQ	Quality of service profile (requested)
+CGSMS	Select service for MO SMS messages

Table A.2: Summary of Packet Domain Extensions to existing GSM AT commands

Command	Description
+CEER	Extended error report (refer to 27.007)
+CMEE	Report mobile equipment error (refer to 27.007)
+CR	Service reporting control (refer to 27.007)
+CRC	Cellular result codes (refer to 27.007)

Table A.3: Summary of AT commands for Packet Domain modem compatibility mode

Command	Description
A	Answer – manual acceptance of a network request for PDP context activation
D	Dial – request Packet Domain service
H	On-hook - manual rejection of a network request for PDP context activation
S0	Automatic answering control - automatic acceptance of a network request for PDP context activation

Annex B (informative): Octet Stream Protocol (OSP) PDP type

B.1 Scope

The Octet Stream Protocol (OSP) is used to carry an unstructured octet (character) stream between the MS and GGSN. It is used to provide a 'character pipe' to allow a MS to communicate (via the GGSN) with an arbitrary Internet host, or other character-based service. Unlike PDP types such as IP and PPP ~~X.25~~, OSP has no existence outside the PLMN. In the MS there is a character stream at the R reference point together with some optional control signals. In the GGSN there is a relay function, carrying the same character stream and control signals between the OSP entity and a fixed network protocol stack.

3GPP TSG-CN WG3/SMG 3 WPD Meeting #8
Sophia-Antipolis, France, 28 Feb-03 Mar 2000

Document N3P000100
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

29.061	CR	012	Current Version:	3.2.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to: TSG_CN#7 *list expected approval meeting # here ↑*	for approval	X	strategic		*(for SMG use only)*
	for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from:* ftp://ftp.3gpp.org/Information/CR-Form-v2.doc

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [ ] UTRAN / Radio [ ] Core Network [X]

Source: TSG_CN WG3 **Date:** 2000-02-09

Subject: Removal of X.25 from R'99 Packet Domain

Work item: R99 Service Clean up

Category: *(only one category shall be marked with an X)*

F	Correction	
A	Corresponds to a correction in an earlier release	
B	Addition of feature	
C	Functional modification of feature	X
D	Editorial modification	

Release:

Phase 2	
Release 96	
Release 97	
Release 98	
Release 99	X
Release 00	

Reason for change: Support of X.25 is no longer required for R'99 packet Domain.

Clauses affected: 1, 2, 3.2, 4.2, 5.2, 5.3, 7.1, 10, A

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

1 Scope

This document defines the requirements for Packet Domain interworking between a:

~~a) PLMN and PSDN~~

b) PLMN and PDN~~IP Networks~~

c) PLMN and PLMN

~~In addition, annex X describes the special requirements for interworking between a PCS1900 PLMN and a PSDN within a BOC's LATA.~~

2 References

(References to be cleaned up when release 99 is stable).

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.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] GSM 01.04: "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".

[2] 3G TS 22.060: "Digital cellular telecommunication system (Phase 2+); General Packet Radio Service (GPRS): Stage 1 Service Description".

[3] 3G TS 23.060: "Digital cellular telecommunication system (Phase 2+); General Packet Radio Service (GPRS); Stage 2 Service Description ".

[4] GSM 03.61: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Point to Multipoint Multicast Service Description; Stage 2".

[5] GSM 03.62: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Point to Multipoint Group Call Service Description; Stage 2".

[6] GSM 03.64: "Digital cellular telecommunications system (Phase 2+);General Packet Radio Service (GPRS); Overall description of the Radio interface; Stage 2".

[7] GSM 04.60: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Mobile Station (MS) - Base Station System (BSS) interface; Radio Link Control / Medium Access Control (RLC/MAC) protocol".

[8] GSM 04.64: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Logical Link Control (LLC)".

[9] GSM 04.65: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Subnetwork Dependent Convergence Protocol (SNDCP)".

[10] 3G TS 27.060: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Mobile Station (MS) supporting GPRS".

[11] CCITT Recommendation E.164: "Numbering plan for the ISDN era".

[12] <deprecated>~~CCITT Recommendation X.25: "Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit".~~

[13] <deprecated>~~CCITT Recommendation X.75: "Packet-switched signalling system between public networks providing data transmission services".~~

[14] <deprecated>~~CCITT Recommendation X.121: "International Numbering Plan for Public Data Networks".~~

[15] IETF RFC 768 (1980): "User Datagram Protocol" (STD 6).

[16] IETF RFC 791 (1981): "Internet Protocol" (STD 5).

[17] IETF RFC 792 (1981): "Internet Control Message Protocol" (STD 5).

[18] IETF RFC 793 (1981): "Transmission Control Protocol" (STD 7).

[19] IETF RFC 1034 (1987): "Domain Names – Concepts and Facilities" (STD 7).

[20] <deprecated>~~Bellcore GR-000301-Issue 2-December 1997; "Public Packet Switched Network Generic Requirements (PPSNGR)".~~

[21] IETF RFC 1661 and 1662 (1994): "The Point-to-Point Protocol (PPP)" (STD 51).

[22] IETF RFC 1700 (1994): "Assigned Numbers" (STD 2).3

[23] UMTS 24.008: "Mobile radio interface layer 3 specification; Core Network Protocols – Stage 3".

[24] UMTS 29.060: "General Packet Radio Service (GPRS); GPRS Tunnelling Protocol (GTP) across the Gn and Gp Interface".

[25] Pat R. Calhoun and Charles E. Perkins, "Mobile IP Network Address Identifier Extension", October 1999. Work in progress (http://www.ietf.org/internet-drafts/draft-ietf-mobileip-mn-nai-05.txt).

[26] IETF RFC 2131 (1997): "Dynamic Host Configuration Protocol".

[27] IETF RFC 1542 (1993): "Clarification and Extensions for the Bootstrap Protocol".

[RFC2002] ~~—~~IETF RFC 2002 (1996), C. Perkins: "IP Mobility Support"

[RFC2486] IETF RFC 2486 (1999), B. Aboba and M. Beadles: "The Network Access Identifier",

January 1999

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

APN	Access Point Name
ATM	Asynchronous Transfer Mode
BG	Border Gateway
~~BOC~~	~~Bell Operating Company~~
CHAP	Challenge Handshake Authentication Protocol
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
~~DNIC~~	~~Data Network Identification Code~~
~~DSE~~	~~Data Switch Exchange~~
GGSN	Gateway GPRS Support Node
GTP-U	GPRS Tunnelling Protocol for user plane
~~IC~~	~~Interexchange Carrier~~
ICMP	Internet Control Message Protocol
IETF	Internet Engineering Task Force
IHOSS	Internet Hosted Octet Stream Service
IP	Internet Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
~~LATA~~	~~Local Access and Transport Area~~
LAPB	Link Access Protocol Balanced
LAC	L2TP Access Concentrator
LAN	Local Area Network
LNS	L2TP Network Server
MIP	Mobile IP
MS	Mobile Station
MT	Mobile Terminal
MTU	Maximum Transfer Unit
NAI	Network Access Identifier
OSP	Octet Stream Protocol
OSP:IHOSS	Octet Stream Protocol for Internet Hosted Octet Stream Service
PAP	Password Authentication Protocol
PDCP	Packet Data Convergence Protocol
PDN	—Packet Data Network
PDU	Protocol Data Unit
~~PHF~~	~~Packet Handler Function~~
~~PNIC~~	~~Pseudo Network Identification Code~~
PPP	Point-to-Point Protocol
PS	Packet Switched
~~PPSN~~	~~Public Packet Switched Network~~
~~PSDN~~	~~Packet Switched Data Network~~
~~PSPDN~~	~~Packet Switched Public Data Network~~
RADIUS	Remote Authentication Dial In User Service
SGSN	Serving GPRS Support Node
SMDS	Switched Multimegabit Data Service
TE	Terminal Equipment
TEID	Tunnel End-point Identifier
TCP	Transmission Control Protocol
UDP	User Datagram Protocol

~~4.2 Key characteristics of PSDN~~

~~Packet Switched Data Networks (PSDNs) are defined in the relevant CCITT/ITU-T X series.~~

5.2 Network Interworking

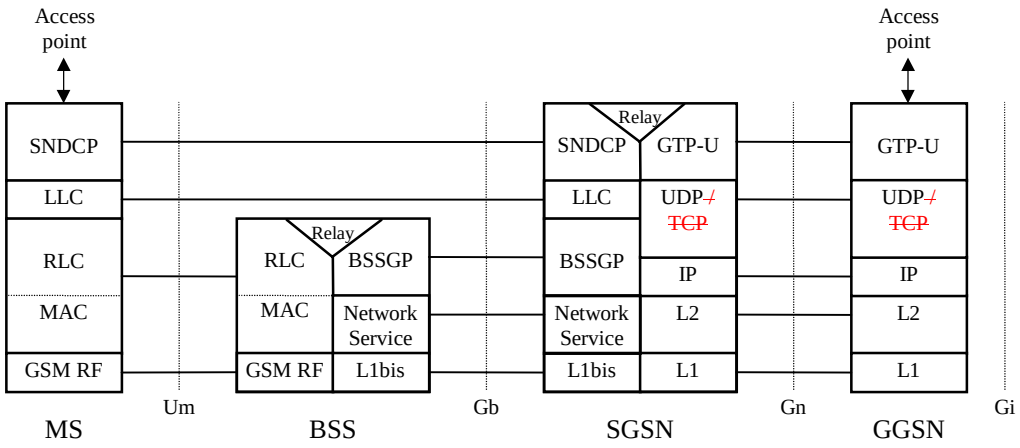
Network interworking is required whenever a PLMN is involved in communications with another network to provide end-to-end communications. The PLMN shall interconnect in a manner consistent with that of a normal Packet Data Network (type defined by the requirements e.g. IP~~, PSDN X.75~~). Interworking appears exactly like that of Packet Data Networks.

5.3 Numbering and Addressing

See 3G TS 23.003 and the relevant sections for ~~X.25 and~~ IP addressing below.

7.1 GPRS

The following Figure 2a shows the relationship of the GPRS Bearer terminating at the SNDCP layer to the rest of the GPRS environment. It is shown for reference purposes only and detailed information can be found in 3G TS 23.060.



~~NOTE: In the SGSN and GGSN UDP is mandatory. TCP is optional but recommended for X.25 services~~.

Figure 2a: GPRS Transmission Plane

10 <deprecated>

~~10 Interworking with PSDN (X.75/X.25)~~

~~10.1 General~~

~~The Packet Domain shall support interworking with PSDN networks. The interworking may be either direct or through a transit network.~~

~~Packet Domain shall support both CCITT/ITU-T X.121 and CCITT/ITU-T E.164 addressing.~~

~~Packet Domain shall provide support for CCITT/ITU-T X.25 and CCITT/ITU-T X.75.~~

~~The Packet Domain TE's shall have addresses provided , and controlled, by their PLMN operator. The PSDN TE sends data to the Packet Domain TE by use of that TE's Packet Domain DNIC (Data Network Identification Code) or equivalent which uniquely identifies that Packet Domain network worldwide.~~

~~The GGSN for interworking with PSDNs is the access point of the Packet Domain network.~~

~~There are two models for PSDN interworking.~~

- ~~X.75 over the Gi reference point.~~
- ~~X.25 over the Gi reference point with the DCE located within the PSDN and the DTE located within the TE of the PLMN.~~

~~Both X.75 and X.25 access methods are supported when mobile users are resident on HPLMN or VPLMN. A roaming user may be allocated a dynamic address from the VPLMN.~~

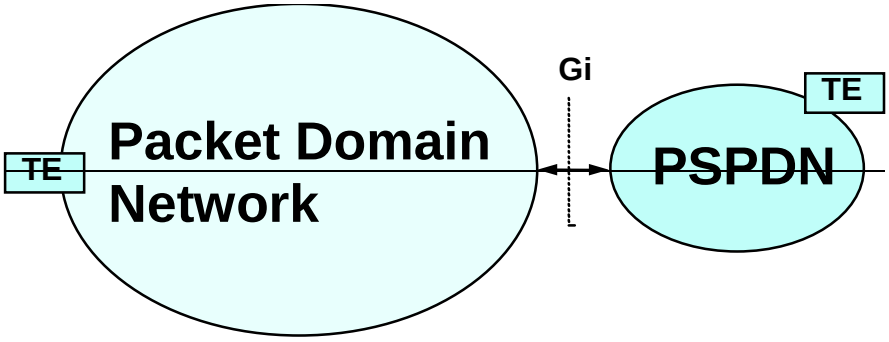
~~10.2 PSDN Interworking Models~~

~~The two models of X.75 and X.25 represent the different scenarios for PSDN interworking with the Packet Domain network.~~

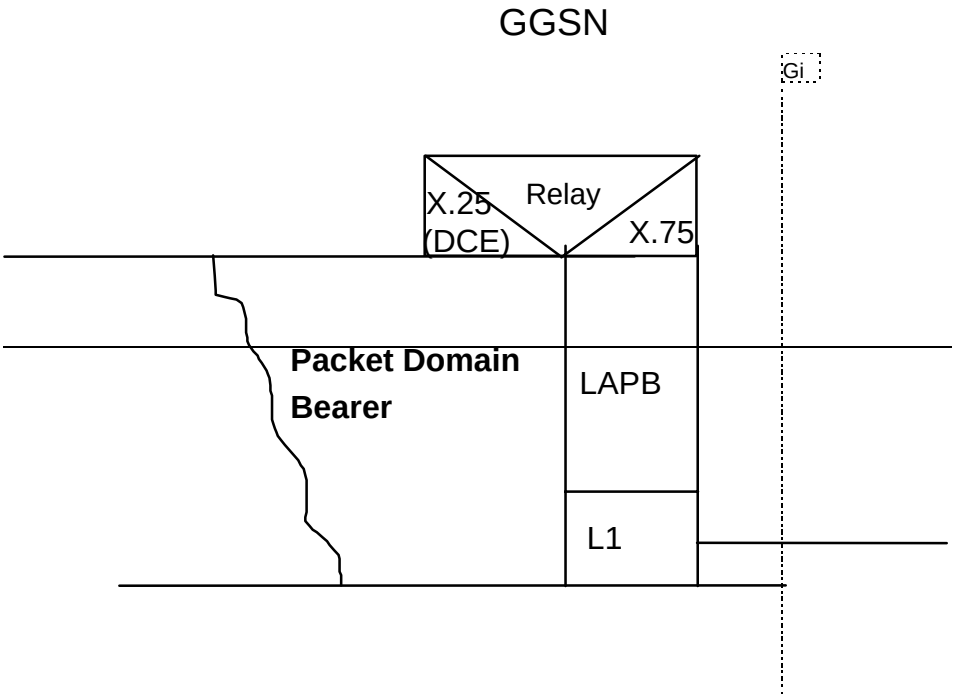
~~The model differences lie in the interconnection protocol over the Gi reference point.~~

~~10.2.1 X.75 Interworking at the Gi Reference Point~~

~~Figure 3 represents the case where X.75 is used as the interworking protocol, as used between interconnect X.25 PSDNs currently. The Packet Domain network will look like any other PSDN in all respects and uses X.75 addressing. Figure 4 shows the interconnecting protocol stacks to the Packet Domain bearer. The Packet Domain bearer is described in 3G TS 27.060, which uses the protocols described in 3G TS 23.060.~~



~~Figure 3: PSPDN Interworking with X.75 at Gi Reference Point~~



~~Figure 4: The Protocol Stack for the X.75 Gi Reference Point~~

~~10.2.1.1 Numbering and Addressing~~

~~A PLMN interworking with PSPDN requires a DNIC or PNIC.~~

~~X.121 addresses allocated to subscribers belong to the PLMN operator.~~

~~10.2.1.2 Charging~~

~~Charging of X.25 packets is done at the GGSN.~~

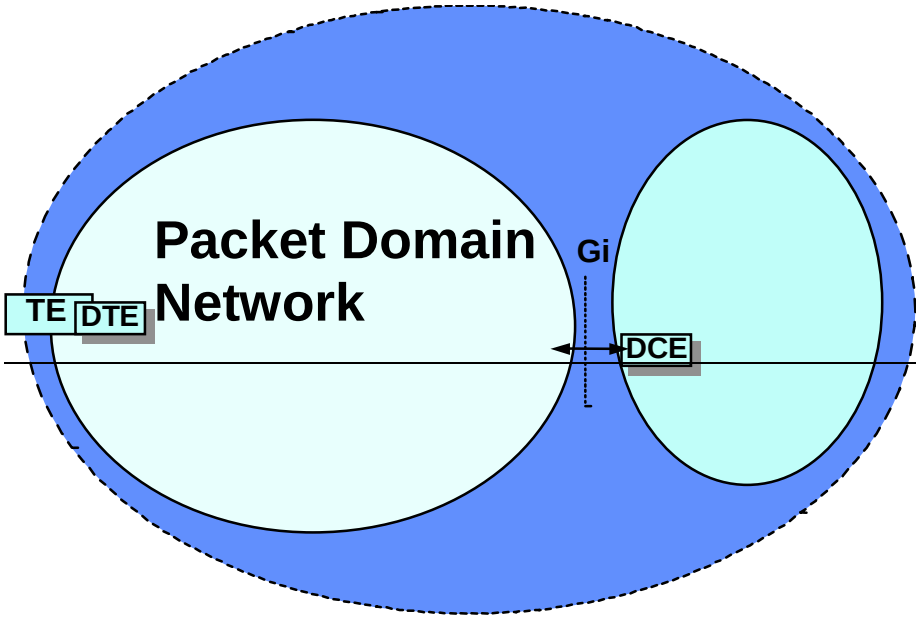
~~10.2.2 X.25 Interworking at the Gi Reference Point~~

~~Figure 5 represents the case where X.25 is used as the interconnect protocol between a DCE and a DTE.~~

~~The DTE resides within the Packet Domain network. The DCE resides within the PSDN.~~

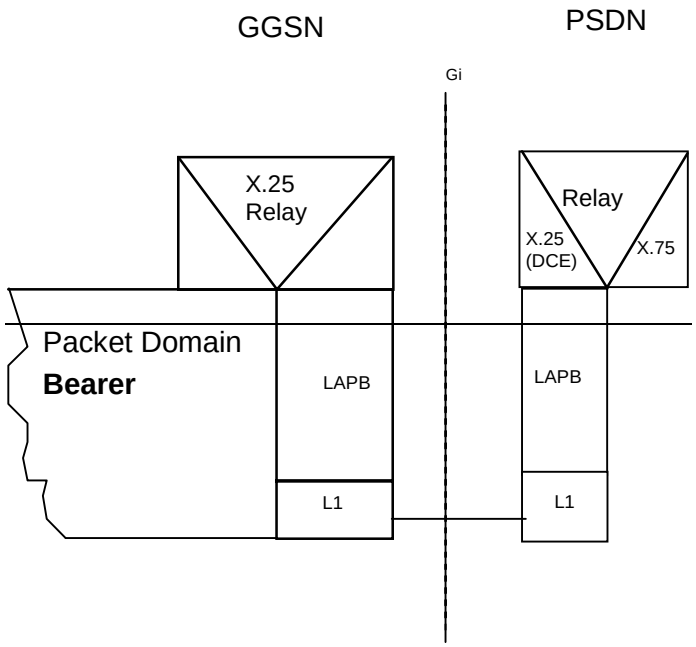
~~The Packet Domain Network is seen as part of the PSDN, as the Gi reference point is the interconnect point between the DCE and the DTE.~~

~~The protocol stack for this model is shown in Figure 6.~~



~~NOTE: The PSDN can interwork at X.75 to other PSDN's~~

~~Figure 5: PSDN Interworking with X.25 over Gi Interface~~



~~Figure 6: The Protocol Stack for the X.25 / Gi Reference point~~

~~Figure 6 shows the transmission plane only. In this case the GGSN shall resolve the association between thePacket Domain bearer and the X.25 DCE. L1 is left to operators to determine connection to other networks.~~

~~The X.25 Relay performs the following:~~

- ~~mapping of logical channel numbers.~~

~~10.2.2.1 Numbering and Addressing~~

~~A fixed X.121 address for the MS maybe allocated by the PSDN operator, and is integral to the PSDN numbering plan. A dynamic X.121 address can also be used which is assigned by the Packet Domain network at PDP context activation.~~

~~10.2.2.2 Charging~~

~~The charging information may be collected in the X.25 network, depending upon the agreement between the PLMN operator and the PSDN operator. The charging may also be collected in the Packet Domain network. If the VPLMN assigns the dynamic address, the charging of the Packet Domain and the external network shall be gathered and sent to the HPLMN.~~

~~10.3 User Facilities~~

~~The set of user facilities as defined in CCITT/ITU-T X.25 may be supported.~~

~~As a minimum the following shall be supported:~~

- ~~reverse charging;~~
- ~~reverse charging acceptance;~~

- fast select restricted;
- fast select unrestricted;
- fast select acceptance.

10.4 The Packet Domain Interworking to PSDN Characteristics

The following table describes the differences in addressing, and user profile for each interconnect type. The static X.121 address in the following table indicates an address which is permanently allocated to the subscriber by the network operator. The dynamic X.121 address is assigned automatically on the PDP Context Activation procedure. The dynamic address is allocated from a free pool held in the GGSN. This is described in 3G TS 23.060.

Table 1: PSPDN Packet Domain Interconnection Characteristics

Metric	X.75 – Stand Alone PSPDN X.25 – PSPDN Sub-Network	
	Static X.121 address	Dynamic X.121 address
X.25 profile	User determined in X.25 DCE	Only Default Profiles allowed in X.25 DCE. Selected upon PDP context activation
X.28/X.29 PAD	Address in GGSN	Address in GGSN after PDP Context Activation

Annex A <deprecated>(normative): Interworking PCS1900 with PSDNs

A.1 Key characteristics of interworking PCS1900 with PSDNs

Bell Operating Company's (BOC's) Public Packet Switching Networks provide data transport services within it's LATA and support data transport as follows:

- between Terminal Equipment (TE) and host computers,
- between TE to TE, between host computer to host computer,
- and interface to Private Networks within LATA.

The interface to other Packet Switched Public Data Networks (PSPDNs) outside the LATA is via Interexchange Carriers (ICs).

For PCS1900, two types of PSDN may exist - those outside a BOC's LATA and those inside.

A.1.1 PSPDNs which are outside the BOC's LATA

PSPDNs which are outside the BOCs LATA are connected via X.75 interface. Interworking is the same as described in section 10.2.1, X.75 Interworking at the Gi Reference Point.

A.1.2 PSPDNs which are inside the BOC's LATA

BOCs PPSN consists of Data Switching Exchanges (DSE) and ISDN Packet Handler Functions (PHFs).

The Bellcore defined X.75' protocol is used on intranetwork DSE to DSE, DSE to ISDN Packet Handler Function (PHF), and ISDN PHF to ISDN PHF within BOC administered networks, and is used for intra-LATA packet data calls.

X.75 interface is used on ICs connected to other PSPDNs outside the LATA.

Therefore, in order to support packet data services within BOC's LATA for PCS 1900 subscribers, support of Bellcore defined X.75' interface is required at the Gi interface.

Bellcore defined X.75' protocol is an extension of X.75 protocol. The extension consists primarily of additional utilities some of which are analogous to X.25 facilities The extension is necessary to maintain service transparency when interconnection equipment supplied by different manufacturers within a single network.

The rest of this annex describes X.75' interworking.

A.2 Subscription checking

Subscriptions checking for Bellcore defined X.75' interface is outside the scope of this specification.

A.3 Interworking PCS1900 with PSDN using X.75'

A.3.1 General

The Packet Domain shall support interworking with PSDN networks. The interworking may be either direct or through a transit network (e.g. ISDN).

The Packet Domain shall support both ITU-T X.121 and ITU-T E.164 addressing.

The Packet Domain shall provide support for interworking using Bellcore specified X.75' protocol for data transport within BOC's LATA.

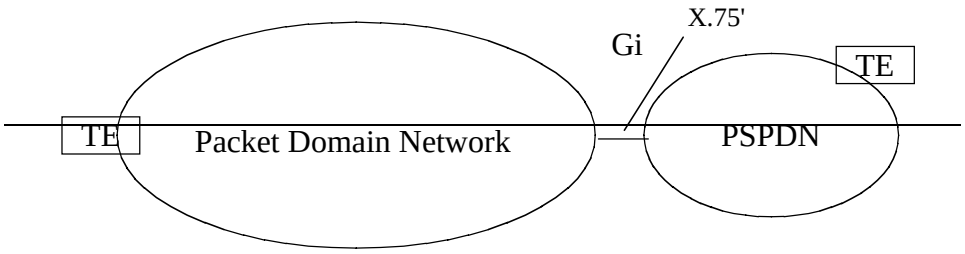
The Packet Domain TE's shall have addresses provided, and controlled, by their Packet Domain operator. The PSDN TE sends data to the Packet Domain TE by use of that TE's Packet Domain DNIC (Data Network Identification Code) or equivalent which uniquely identifies that GPRS network worldwide.

~~The GGSN for interworking with PSDNs is the access point of the Packet Domain data network.~~

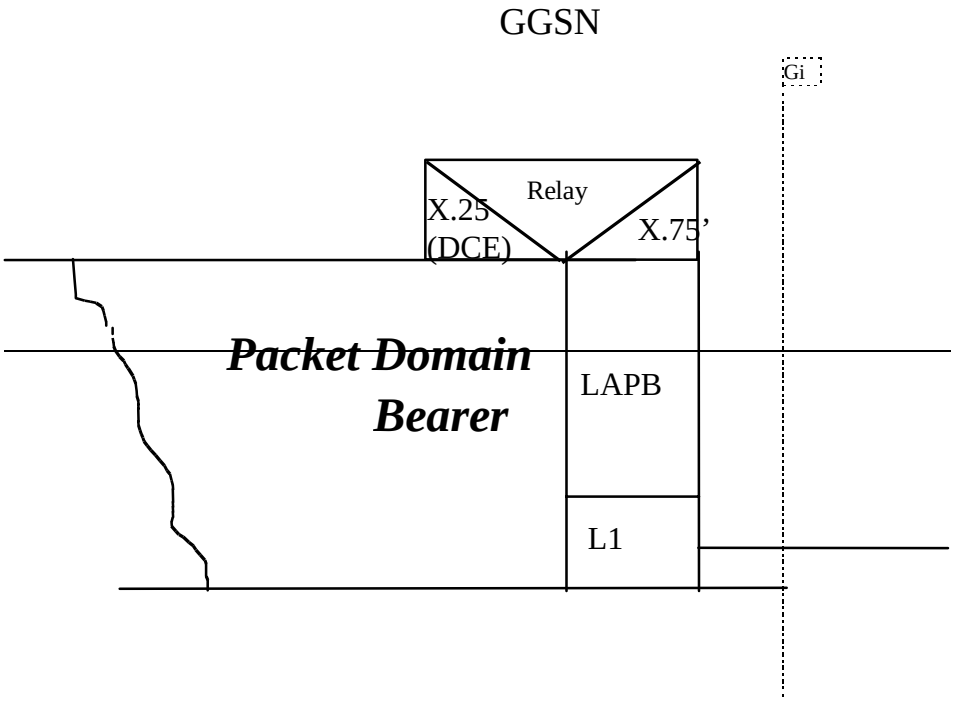
~~The X.75' access method is supported when mobile users are resident on HPLMN or VPLMN. A roaming user may be allocated a dynamic address from the VPLMN.~~

~~A.3.2 PSDN Interworking Model using X.75' Interworking at the Gi Reference Point~~

~~Figure A.1 represents the case where X.75' is used as the interworking protocol, as used between interconnect X.25 PSDNs within the BOC's LATA. The GPRS network will look like any other PSDN in the BOC's LATA and will use X.75' addressing. Figure 4 shows the interconnecting protocol stacks to the Packet Domain bearer. The Packet Domain bearer is described in 3G TS 27.060, which uses the protocols described in 3G TS 23.060.~~



~~Figure A.1: PSPDN Interworking with X.75' at Gi Reference Point~~



~~Figure A.2: The Protocol Stack for the X.75' Gi Reference Point~~

A.3.3 Numbering and Addressing

A PLMN interworking with a PSPDN requires a DNIC or PNIC.

X.121 addresses allocated to subscribers belong to the PLMN operator.

A.3.4 Charging

Charging of X.25 packets is done at the GGSN.

A.3.5 User Facilities

These are the same as in section 10.3 in the main part of this specification.

A.3.6 The Packet Domain Interworking to PSDN Characteristics

These are the same as in section 10.4 in the main part of this specification.

3GPP TSG-CN WG3/SMG 3 WPD Meeting #8
Sophia-Antipolis, France, 28 Feb-03 Mar 2000

***Document* N3-000032**
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

29.061	CR	013	Current Version:	3.2.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	TSG_CN#7	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from:* ftp://ftp.3gpp.org/Information/CR-Form-v2.doc

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [ ] UTRAN / Radio [ ] Core Network [X]

Source: TSG_CN WG3 **Date:** 2000-02-07

Subject: N1 vocabulary alignment

Work item: R99 Service Clean up

Category: *(only one category shall be marked with an X)*

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change:

In 3G TS 24.008, section 2.2.2 (Vocabulary), it is stated that:
(…)
- The label (GSM only) indicates this section or paragraph applies only to GSM system. For multi system case this is determined by the current serving radio access network.
- The label (UMTS only) indicates this section or paragraph applies only to UMTS system. For multi system case this is determined by the current serving radio access network.
- In GSM,... Indicates this paragraph applies only to GSM System. For multi system case this is determined by the current serving radio access network.
- In UMTS,... Indicates this paragraph applies only to UMTS System. For multi system case this is determined by the current serving radio access network."

This CR aligns the text in the specification with these rules. In particular it removes the use of the term 'GPRS' for indicating that text is applicable only to systems using the 2G (i.e. GSM) radio access network.

Clauses affected: 3.1, 3.3, 7.1, 7.2, 11.2.1.3, 11.3, 12.2, 12.2.1, 13.2

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

3.1 Definitions

Refer to UMTS 22.060 and UMTS 23.060.

2G- / 3G- The prefixes 2G- and 3G- refers to functionality that supports only GSM ~~GPRS~~ or UMTS, respectively, e.g., 2G-SGSN refers only to the GSM ~~GPRS~~ functionality of an SGSN. When the prefix is omitted, reference is made independently from the GSM ~~GPRS~~ or UMTS functionality.

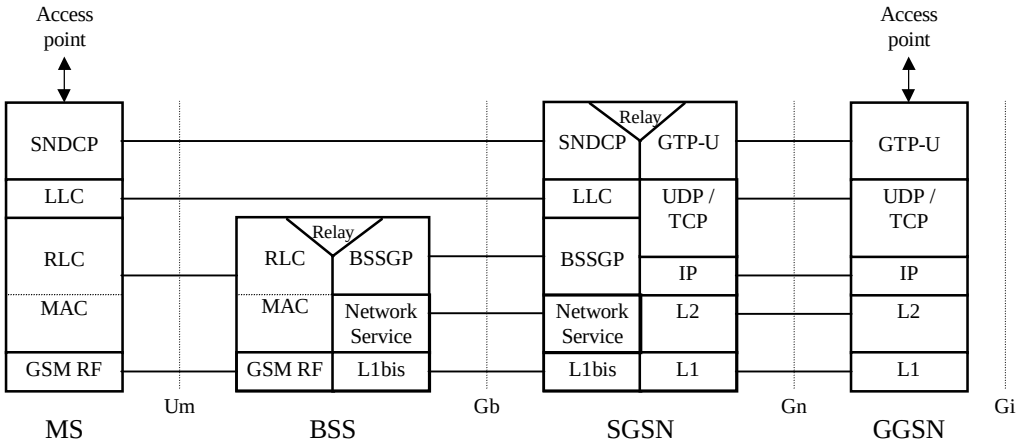
3.3 Symbols

For the purposes of the present document, the following symbols apply:

Gb	Interface between an SGSN and a BSC.
Gi	Reference point between Packet Domain and an external packet data network.
Gn	Interface between two GSNs within the same PLMN.
Gp	Interface between two GSNs in different PLMNs. The Gp interface allows support of Packet Domain network services across areas served by the co-operating PLMNs.
Gs	Interface between an SGSN and MSC.
Iu	Interface between the RNS and the core network. It is also considered as a reference point.
R	The reference point between a non-ISDN compatible TE and MT. Typically this reference point supports a standard serial interface.
Um	The interface between the MS and the ~~GPRS~~ GSM fixed network part. The Um interface is the ~~GPRS~~ GSM network interface for providing packet data services over the radio to the MS. The MT part of the MS is used to access the ~~GPRS~~ GSM services through this interface.
Uu	Interface between the mobile station (MS) and the UMTS fixed network part. The Uu interface is the UMTS network interface for providing packet data services over the radio to the MS. The MT part of the MS is used to access the UMTS services through this interface.

7.1 ~~GPRS~~GSM

The following Figure 2a shows the relationship of the ~~GPRS~~ GSM Packet Domain Bearer terminating at the SNDCP layer, to the rest of the ~~GPRS~~ GSM Packet Domain environment. It is shown for reference purposes only and detailed information can be found in 3G TS 23.060.



NOTE: In the SGSN and GGSN UDP is mandatory. TCP is optional but recommended for X.25 services.

Figure 2a: ~~GPRS Transmission~~User Plane for Packet Domain services in GSM

7.2 UMTS

The following figure 2b shows the relationship of the UMTS Packet Domain Bearer, terminating at the PDCP layer, to the rest of the UMTS Packet Domain environment. It is shown for reference purposes only and detailed information can be found in 3G TS 23.060.

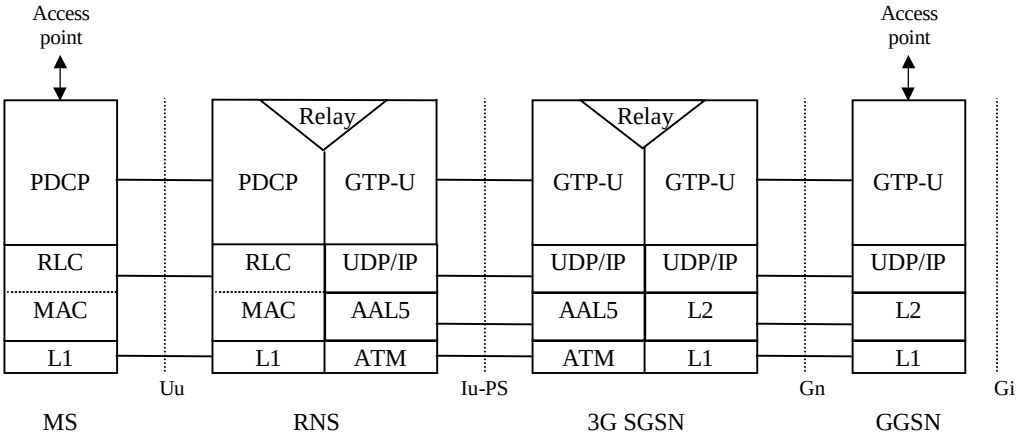


Figure 2b: ~~UMTS~~ User Plane for Packet Domain services in UMTS

11.2.1.3 Access to Internet, Intranet or ISP with Mobile IPv4

General

A way to allow users to roam from one environment to another, between fixed and mobile, between public and private as well as between different public systems is to use Mobile IP [RFC2002]. Mobile IP (MIP) is a mobility management protocol developed by IETF. The Mobile IP Foreign Agent (FA) [RFC2002] is located in the Core Network in the GGSN. MIP also uses a Home Agent (HA) [RFC2002] which may or may not be located in a ~~GPRS~~GSM/UMTS network.

Interworking model for MIP

A FA is located in the GGSN. The interface between the GGSN and the FA will probably not be standardised as the GGSN/FA is considered being one integrated node. The mapping between these two is a matter of implementation. Each FA must be configured with at least one care-of address. In addition a FA must maintain a list that combines IP addresses with TEIDs of all the visiting MSs that have registered with the FA. IP packets destined for the MS are intercepted by the HA and tunneled to the MS's care-of address, i.e. the FA. The FA de-tunnels the packets and forwards the packets to the MS. Mobile IP related signalling between the MS and the FA is done in the user plane. MIP registration messages [RFC2002] are sent with UDP.

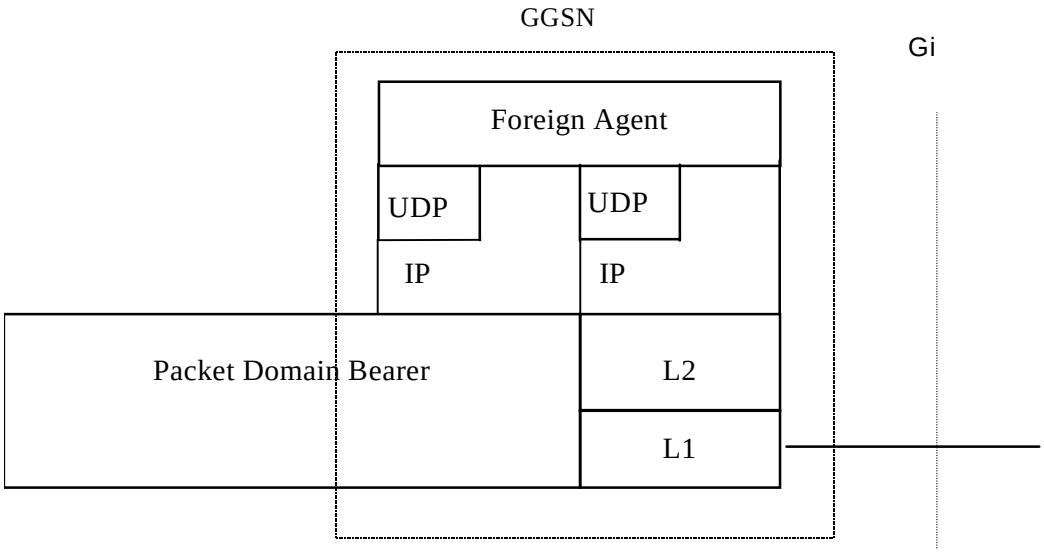


Figure 11c: The protocol stacks for the Gi IP reference point in the MIP signalling plane

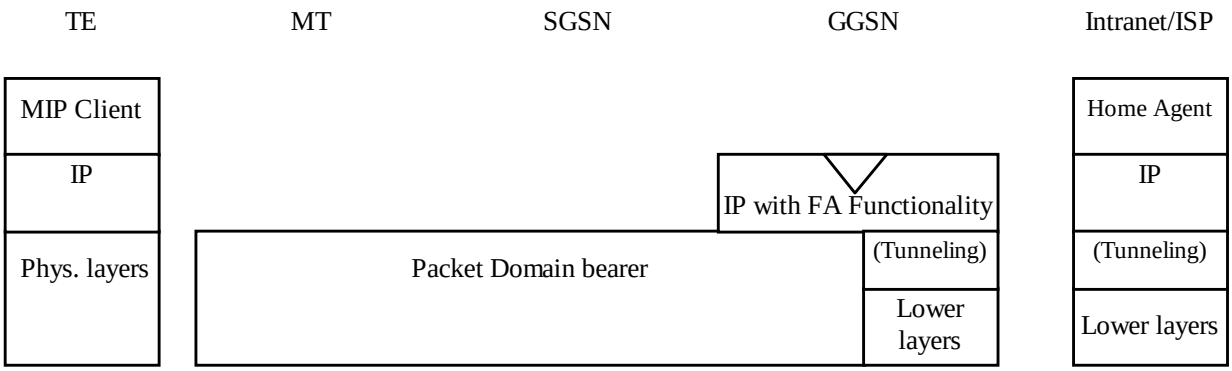


Figure 11d: Protocol stacks for user access with MIP

In Figure 11d: "(Tunneling)" is intended to show asymmetric traffic flow. Tunneling (IP-in-IP) is only used in the direction from the ISP towards the MT.

Authentication of the user is supported in Mobile IPv4. This authentication mechanism may involve communication with an authentication server (e.g. RADIUS), although this is not shown in Figure 11d.

Address allocation - at PDP context activation no IP address is allocated to the MS indicated by 0.0.0.0. in the "Requested PDP Address" field. If the MS does not have a static IP address which it could register with the HA, it will acquire a dynamic IP address from the HA [25]. After completion of the PDP activation the SGSN is informed of the assigned IP address by means of the GGSN initiated PDP Context Modification Procedure.

A signalling scheme, shown in figure 11e, is described below. The PS attach procedures have been omitted for clarity.

IPv4 - Registration UMTS/GPRS + MIP , FA care-of address

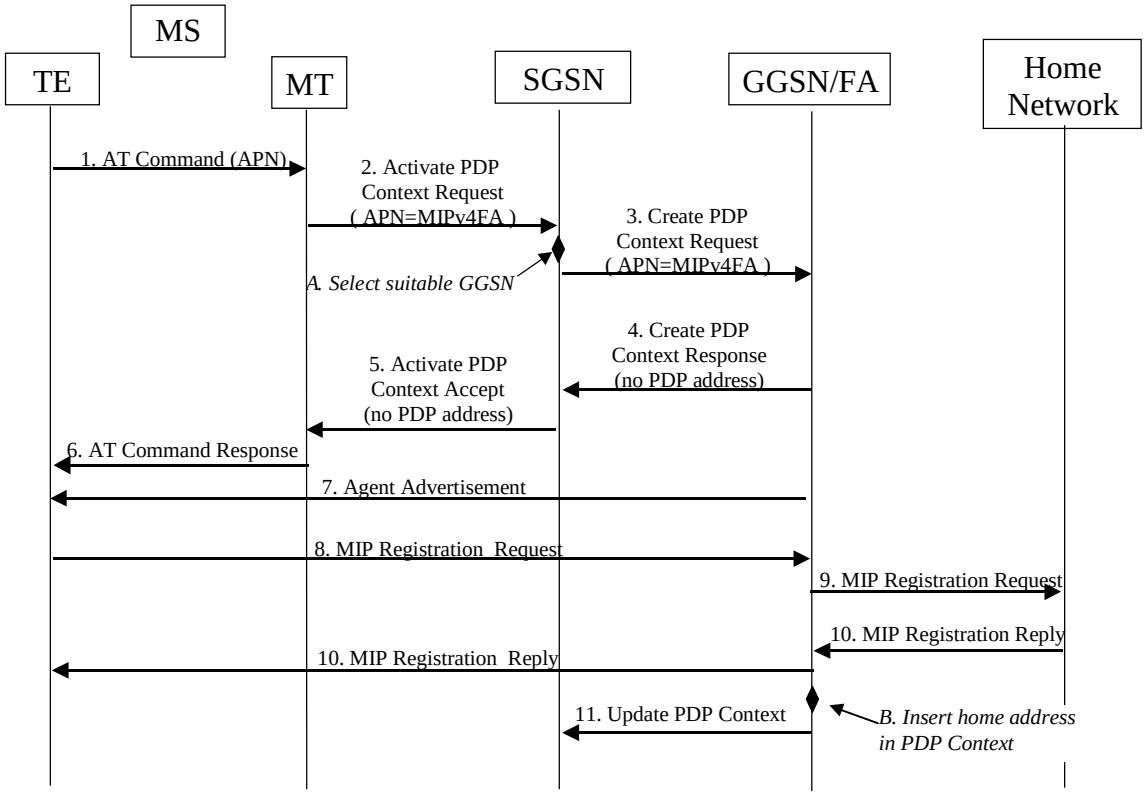


Figure 11e: PDP Context activation with Mobile IP registration (the PS attach procedure not included)

1. The AT command carries parameters that the MT needs to request the PDP Context Activation. The important parameter here, is the APN (Access Point Name), see section A below. The AT command is followed by a setup of the PPP connection between the MT and the TE, which are not included in the figure.

2. The MT sends the “Activate PDP Context Request” to the SGSN. The message includes various parameters of which the “APN” (Access Point Name) and the “Requested PDP Address” are of interest here. The TE/MT may use APN to select a reference point to a certain external network or to select a service. APN is a logical name referring to the external packet data network or to a service that the subscriber wishes to connect to. The “Requested PDP Address” should be omitted for all MS’s using Mobile IP. This is done irrespective of if the MT has a permanently assigned Mobile IP address from its Mobile IP home network, a previously assigned dynamic home address from its Mobile IP home network or if it wishes the Mobile IP home network to allocate a “new” dynamic home address.

A. The SGSN will base the choice of GGSN based on the APN that is given by the MS.

3. The SGSN requests the selected GGSN to set up a PDP Context for the MS. The PDP address and APN fields are the same as in the “Activate PDP Context Request” message.

4. A Create PDP Context Response is sent from the GGSN/FA to the SGSN. If the creation of PDP Context was successful, some parameters will be returned to the SGSN, if not, an error code will be returned. If the GGSN has been configured, by the operator, to use a Foreign Agent for the requested APN, the PDP address returned by the

GGSN shall be set to 0.0.0.0. indicating that the PDP address shall be reset by the MS with a Home Agent after the PDP context activation procedure.

5. The Activate PDP Context Accept message is sent by the SGSN to the MS and contains similar information as the Create PDP Context Response message.

6. The MT sends an AT response back to the TE to confirm that the PDP context activation has been done.

7. The Agent Advertisement [RFC2002] is an ICMP (Internet Control Message Protocol) Router Advertisement message with a mobility agent advertisement extension. The latter part contains parameters of the FA that the mobile node needs, among those are one or more care-of addresses that the FA offers. This message should be sent, in the ~~UMTS/GPRS~~Packet Domain user plane, as an IP limited broadcast message, i.e. destination address 255.255.255.255, however only on the TEID for the requesting MS to avoid broadcast over the radio interface.

8. The Mobile IP Registration Request is sent from the mobile node to the GGSN/FA across the ~~GPRS/UMTS~~Packet Domain backbone as user traffic. The mobile node includes its (permanent) home address as a parameter [RFC2002]. Alternatively, it can request a temporary address assigned by the home network by sending 0.0.0.0 as its home address, and include the Network Access Identifier (NAI) in a Mobile-Node-NAI Extension [23][RFC2486].

9. The FA forwards the Mobile IP Registration Request to the home network of the mobile node, where a home agent (HA) processes it. Meanwhile, the GGSN/FA needs to store the home address of the mobile node or the NAI and the local link address of the MS, i.e. the TEID (Tunnel Endpoint ID).

10. The Registration Reply is sent from the home network to the FA, which extracts the information it needs and forwards the message to the mobile node in the ~~UMTS/GPRS~~ Packet Domain user plane. As the FA/GGSN knows the TEID and the NAI or home address, it can pass it on to the correct MS.

B. The GGSN/FA extracts the home address from the Mobile IP Registration Reply message and updates its GGSN PDP Context.

11. The GGSN triggers a “GGSN initiated PDP Context modification procedure” in order to update the PDP address in the SGSN.

11.3 Numbering and Addressing

In the case of interworking with public IP networks (such as the Internet), the ~~GPRS~~ PLMN operator shall use public network addresses. These public addresses can be reserved from the responsible IP numbering body, or from an ISP with which the ~~GPRS~~ PLMN operator has an agreement.

In the case of interworking with private IP networks, two scenarios can be identified:

1. The ~~GPRS~~ PLMN operator manages internally the subnetwork addresses. Each private network is assigned a unique subnetwork address. Normal routing functions are used to route packets to the appropriate private network.

2. Each private network manages its own addressing. In general this will result in different private networks having overlapping address ranges. A logically separate connection (e.g. an IP in IP tunnel or layer 2 virtual circuit) is used between the GGSN and each private network. In this case the IP address alone is not necessarily unique. The pair of values, Access Point Name (APN) and IP address, is unique.

The ~~GPRS~~ PLMN operator allocates the IP addresses for the subscribers in either of the following ways.

- The ~~GPRS~~ PLMN operator allocates a static IP address when the subscription record is built. The IP address is reserved from a pool of free IP addresses. Each external network has its own pool of addresses.

- The ~~GPRS~~ PLMN operator allocates (either on its own or in conjunction with the external network) a dynamic IP address when the MS performs the PDP Context Activation procedure with dynamic address allocation as described in 3G TS 23.060.

12.2 PDN Interworking Model

The interworking point is at the Gi reference point. The GGSN for interworking with the ISP/PDN is the access point of the Packet Domain (see Figure 13). The GGSN will either terminate the PPP connection towards the MS or may further relay PPP frames to the PDN. The PPP frames may be tunnelled in e.g. L2TP.

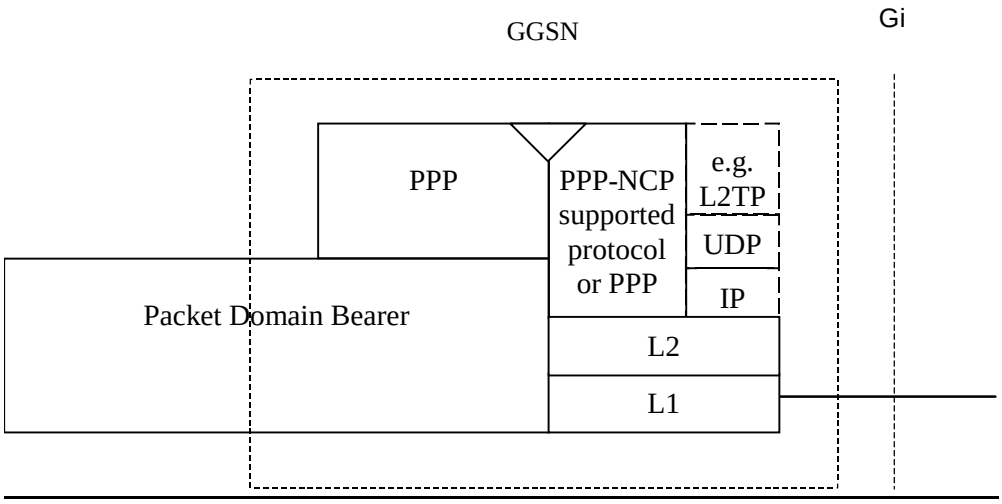


Figure 13: The protocol stacks for the Gi PPP reference point

In case the external PDN is an IP based network and the GGSN terminates PPP the same description applies as specified in section 11.2.

In case the GGSN tunnels PPP frames to the PDN, the GGSN may behave like a LAC towards the external network.

12.2.1 Virtual dial-up- and direct Access to PDNs, or ISPs through Packet Domain

The access to PDNs, or ISPs may involve specific functions such as: user authentication, user's authorization, end to end encryption between MS and PDN/ISP, allocation of a dynamic address belonging to the PLMN/PDN/ISP addressing space, etc.

For this purpose the PLMN may offer, based on configuration data:

– Direct access to an IP based Intranet/ISP using a protocol configuration as depicted in figure 14. Here DHCP and/or RADIUS are used between the GGSN and Intranet/ISP for performing the specific functions mentioned above. The Packet Domain may also offer access to networks based on any protocol supported by PPP through one of its Network Control Protocols (NCPs).

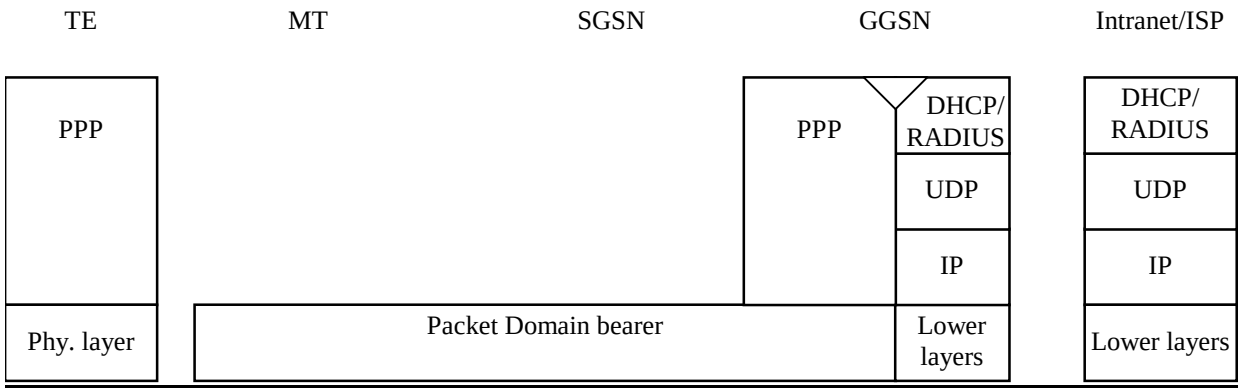


Figure 14: Protocol stack for direct access to IP-based Intranets/ISPs

– Virtual dial-up access to a PDN with PPP frame tunnelling as depicted in figure 15.

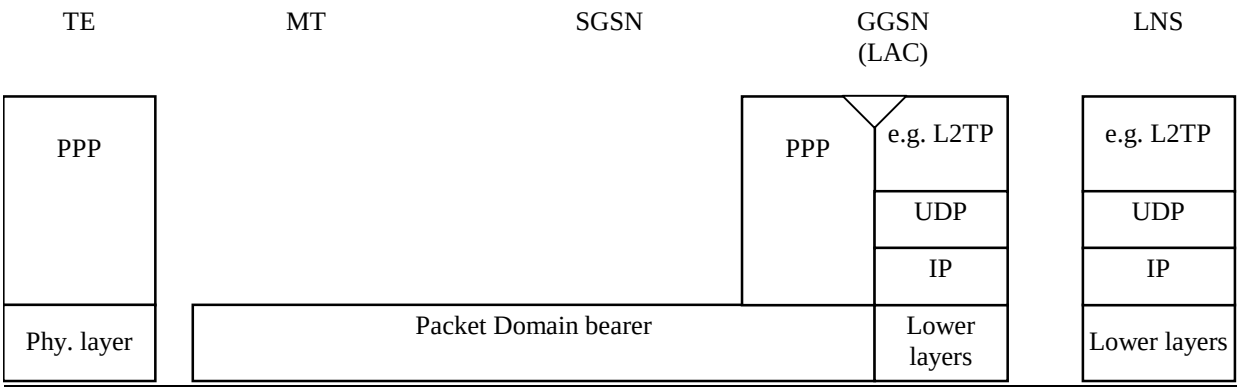


Figure 15: Protocol stack for virtual dial-up access with PPP frame tunnelling

13.2 PDN Interworking Model for DHCP

A DHCP relay agent shall be located in the GGSN used for interworking with the IP network as illustrated in the following figure 16b.

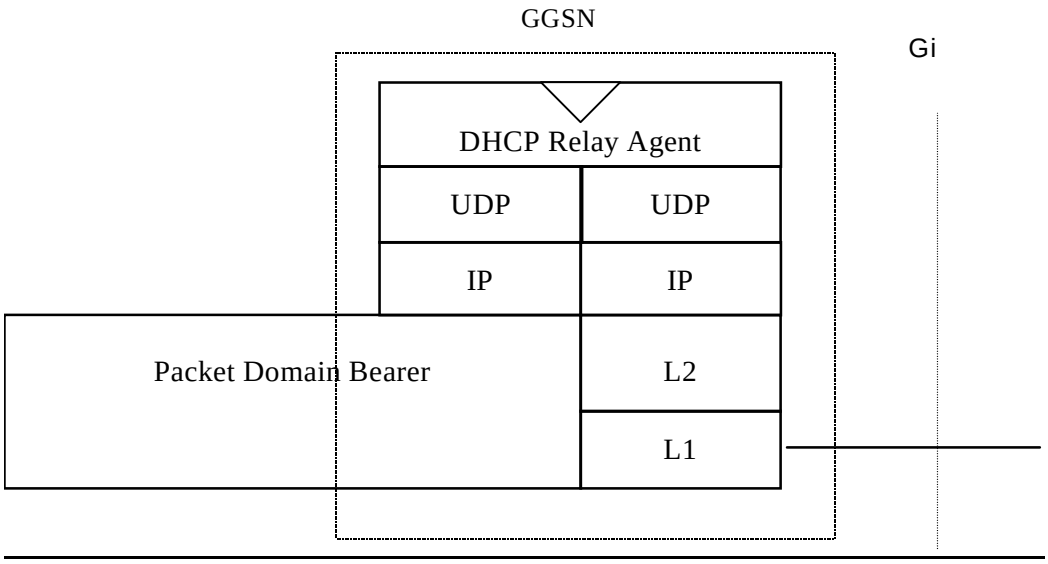


Figure 16b: The protocol stacks for the Gi IP reference point for DHCP

The DHCP relay agent relays the requests received from the DHCP client to the DHCP server(s), and the replies received from the server(s) to the corresponding client. The DHCP relay agent allows for the replies from DHCP servers to be delivered to the correct terminal, as the logical connection from the MT terminates in the GGSN, and consequently only the GGSN holds enough information to locate the DHCP client. How the DHCP relay agent identifies the MT based on the DHCP messages is out of the scope of ~~GPRS~~ UMTS standardisation.

DHCP provides mechanisms for user authentication and integrity protection, but does not offer any message confidentiality, therefore additional mechanisms (e.g. IPsec tunnel) may be provided if the link towards the external network is not secure. However this is out of the scope of this specification.

Apart from the particulars mentioned above, this model is basically the same as the one for interworking with IP networks described elsewhere in this Specification. Using DHCP corresponds to the transparent access case as the GGSN does not take part in the functions of authentication, authorisation, address allocation, etc.