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Contents

Foreword

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1 Scope

The present document provides the description of the Subnetwork Dependent Convergence Protocol (SNDCP) for the General Packet Radio Service (GPRS).

The user of the services provided by SNDCP is a packet data protocol (PDP) at the mobile Station (MS) or the Relay at the Serving GPRS Support Node (SGSN). Additionally, a control entity, e.g. AT command interpreter, may be an SNDCP user. SNDCP uses the services provided by the Logical Link Control (LLC) layer [4] and the Session Management (SM) sub-layer [2].

The main functions of SNDCP are:

- Multiplexing of several PDPs.
- Compression / decompression of user data.
- Compression / decompression of protocol control information.
- Segmentation of a network protocol data unit (N-PDU) into Logical Link Control Protocol Data Units (LL-PDUs) and re-assembly of LL-PDUs into an N-PDU.

3GPP TS 44.065 is applicable to GPRS MS and SGSN.

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
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[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 22.060: "General Packet Radio Service (GPRS); Service Description; Stage 1".

[3] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service Description; Stage 2".

[4] 3GPP TS 24.007: "Mobile radio interface signalling layer 3; General aspects".

[5] 3GPP TS 44.018: "Mobile radio interface; Layer 3 specification; Radio Resource Control Protocol".

[5a] 3GPP TS 24.008: "Mobile radio interface; Layer 3 specification; Core Network Protocols; Stage 3".

[6] 3GPP TS 44.064: "General Packet Radio Service (GPRS); Mobile Station - Serving GPRS Support Node (MS-SGSN) Logical Link Control (LLC) layer specification".

[7] 3GPP TS 29.060: "General Packet Radio Service (GPRS); GPRS Tunnelling Protocol (GTP) across the Gn and Gp Interface".

[8] ITU-T Recommendation V.42 bis: "Data compression procedures for data circuit-terminating equipment (DCE) using error correcting procedures".

[9] IETF RFC 1144: "Compressing TCP/IP headers for low-speed serial links", V. Jacobson.

[10] IETF RFC 2507: "IP Header Compression", M. Degermark, B. Nordgren, S. Pink.

[11] ITU-T Recommendation V.44: "Data compression procedures".

[12] IETF RFC 3095: "RObust Header Compression (ROHC): Framework and four profiles: RTP, UDP, ESP, and uncompressed". C. Bormann et al.

[13] IETF RFC 3241: "Robust Header Compression (ROHC) over PPP". C. Bormann.

[14] "RObust Header Compression (ROHC) Profile Identifiers". IANA registry at: *http://www.iana.org/assignments/rohc-pro-ids*

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TS 21.905 [1] and 3GPP TS 22.060 [2] and the following apply:

Feedback N-PDU: an N-PDU which is generated by an SNDCP protocol control information compression entity or data compression entity and contains only control information for its peer compression entity, but no payload from any SNDCP user.

N201: LLC layer parameter (see 3GPP TS 44.064 [6] for clarity).
Defines maximum number of octets in the information field of LL-PDU. Separate values are applicable for I (see N201-I), U and UI (see N201-U) LL-PDUs.

N201-I: LLC layer parameter (see 3GPP TS 44.064 [6] for clarity).
Defines maximum number of octets available to a SN-DATA PDU for a specific SAPI.

N201-U: LLC layer parameter (see 3GPP TS 44.064 [6] for clarity).
Defines maximum number of octets available to a SN-UNITDATA PDU for a specific SAPI.

N-PDU number: a sequence number assigned to N-PDUs per NSAPI.

NSAPI: for each SN-PDU the NSAPI is an index to the PDP context of the PDP that is using the services provided by the SNDCP layer.

Receive N-PDU number: the value of the N-PDU number expected in the next N-PDU received by an NSAPI using acknowledged peer-to-peer LLC operation.

Recovery state: a state for an NSAPI in which duplicated received N-PDUs shall be detected and discarded.
The recovery state only applies to NSAPIs using acknowledged peer-to-peer LLC operation.

SAPI: identifies the Service Access Point that the SN-PDU is using at the LLC layer.

Segment number: a sequence number assigned to SN-UNITDATA PDUs carrying segments of an N-PDU.

Send N-PDU number: the value to be assigned as the N-PDU number to the next N-PDU received from the SNDCP user by an NSAPI using acknowledged peer-to-peer LLC operation.

Send N-PDU number (unacknowledged): the value to be assigned as the N-PDU number to the next N-PDU received from the SNDCP user by an NSAPI using unacknowledged peer-to-peer LLC operation**.**

SNDCP entity: handles the service functions provided by the SNDCP layer. The SNDCP entity is temporary logical link identity specific.

SNDCP management entity: handles communication with SM sub-layer and controls the operation of the SNDCP entity.

SNDCP user: protocol entity that is using the services provided by the SNDCP layer. PDP entities and control entities, e.g. AT command interpreter, are the SNDCP users at the MS. Relay entity is the SNDCP user at the SGSN.

SNDCP XID block: the collection of SNDCP XID parameters being negotiated. It is transferred by the LL-XID and LL-ESTABLISH primitives between SNDCP and LLC.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TS 21.905 [1], 3GPP TS 22.060 [2], and 3GPP TS 23.060 [3], and the following apply:

CID	Context Identifier
DCOMP	Identifier of the user data compression algorithm used for the N-PDU
ESP	Encapsulating Security Payload
F	First segment indicator bit
GMM	GPRS Mobility Management
IP	Internet Protocol
LLC	Logical Link Control
LSB	Least Significant Bits
M	More bit used to indicate the last segment of N-PDU
N-PDU	Network Protocol Data Unit
MRRU	Maximum Reconstructed Reception Unit
MSB	Most Significant Bits
NSAPI	Network Layer Service Access Point Identifier
P	Propose bit
PCOMP	Identifier of the protocol control information compression algorithm used for the N-PDU
PDP	Packet Data Protocol (e.g. IPv4 or IPv6)
PDU	Protocol Data Unit
PID	Protocol Identifier
PTP	Point to Point
QoS	Quality of Service
ROHC	RObust Header Compression
RTP	Real Time Protocol
SAPI	Service Access Point Identifier
SDU	Service Data Unit
SGSN	Serving GPRS Support Node
SM	Session Management
SNDCP	Subnetwork Dependent Convergence Protocol
SNSM	SNDCP-SM
TCP	Transmission Control Protocol
TLLI	Temporary Logical Link Identifier
X	Spare bit

4 General

The present document describes the functionality of the GPRS SNDCP. The overall GPRS logical architecture is defined in 3GPP TS 23.060 [3]. Location of the SNDCP in GPRS protocol stack can be seen in figure 1.

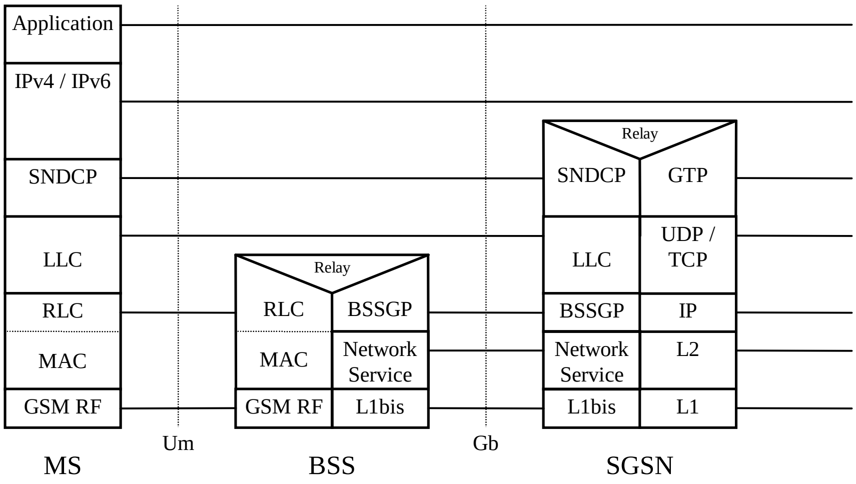

Figure 1: GPRS protocol stack

Network layer protocols are intended to be capable of operating over services derived from a wide variety of subnetworks and data links. GPRS supports several network layer protocols providing protocol transparency for the users of the service. Introduction of new network layer protocols to be transferred over GPRS shall be possible without any changes to GPRS. Therefore, all functions related to transfer of Network layer Protocol Data Units (N-PDUs) shall be carried out in a transparent way by the GPRS network entities. This is one of the requirements for GPRS SNDCP.

Another requirement for the SNDCP is to provide functions that help to improve channel efficiency. This requirement is fulfilled by means of compression techniques.

The set of protocol entities above SNDCP consists of commonly used network protocols. They all use the same SNDCP entity, which then performs multiplexing of data coming from different sources to be sent using the service provided by the LLC layer (figure 2). The Network Service Access Point Identifier (NSAPI) is an index to the PDP context (see 3GPP TS 23.060 [3]) of the PDP that is using the services provided by SNDCP. One PDP may have several PDP contexts and NSAPIs. However, it is possible that each allocated NSAPI is used by separate PDP. Each active NSAPI shall use the services provided by the Service Access Point Identifier (SAPI) in the LLC layer. Several NSAPIs may be associated with the same SAPI.

Since the adaptation of different network layer protocols to SNDCP is implementation dependent, it is not defined in the present document.

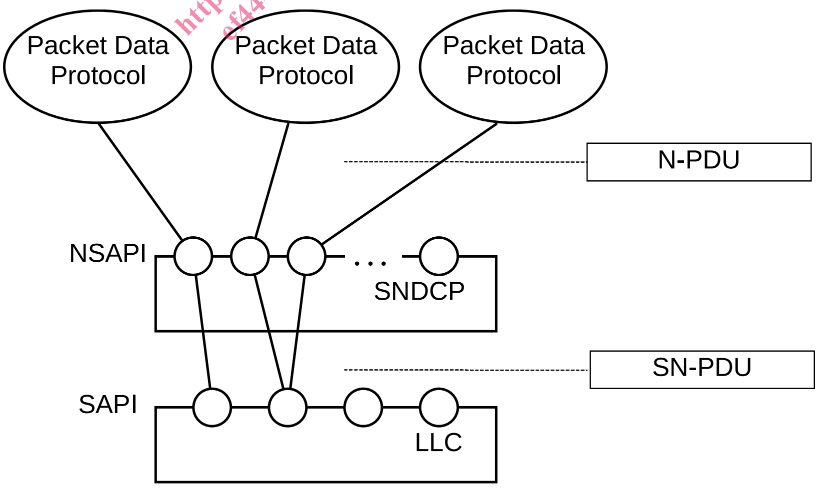

Figure 2: Example for multiplexing of different protocols

5 Service primitives and functions

5.1 Service primitives

This subclause explains the service primitives used for communication between the SNDCP layer and other layers. See also 3GPP TS 24.007 [4] to get an overall picture of the service primitives. Figure 3 illustrates the service access points through which the primitives are carried out.

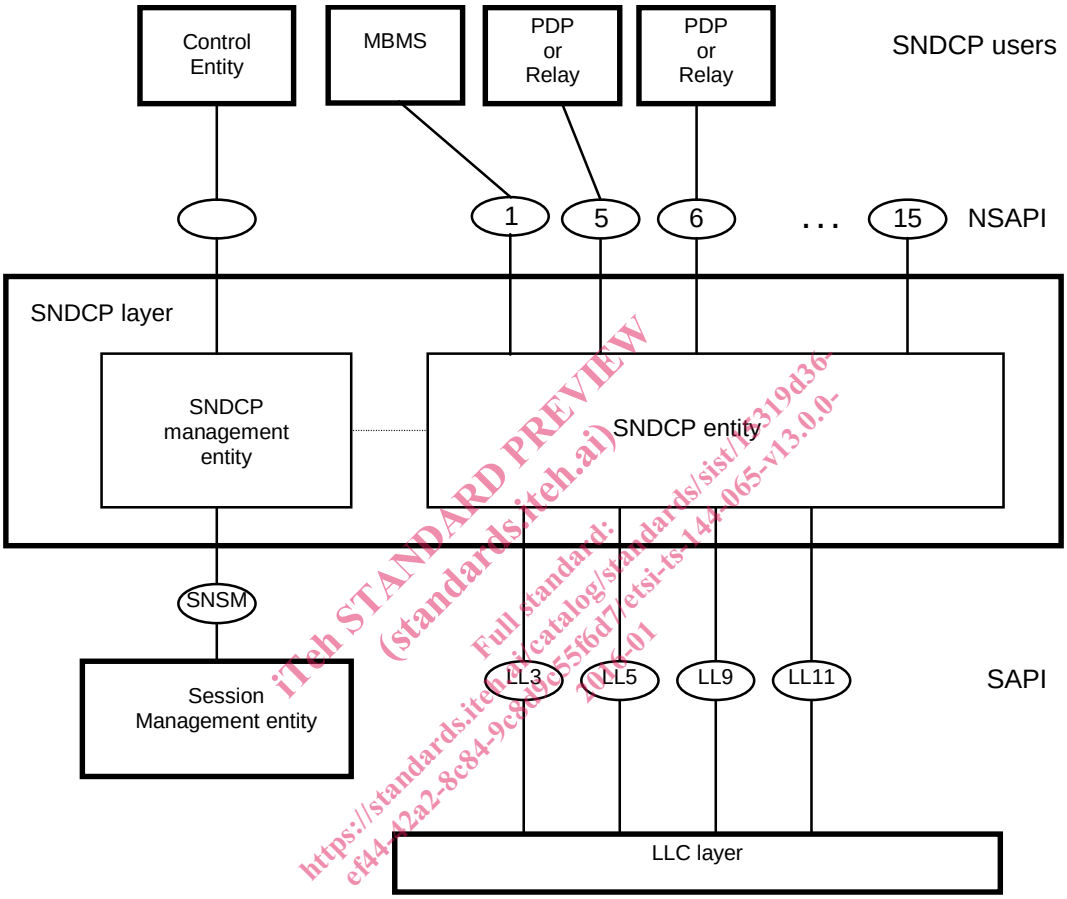

Figure 3: Service Access Points provided and used by SNDCP

5.1.1 SNDCP service primitives

The primitives provided by the SNDCP layer are listed in table 1.

Table 1: SNDCP layer service primitives

Generic Name	Type				Parameters
	Request	Indication	Response	Confirm	
SNDCP User (PDP or the SGSN Relay) ↔ SNDCP					
SN-DATA	X	-	-	-	N-PDU, NSAPI, N-PDU Number
SN-DATA	-	X	-	-	N-PDU, NSAPI
SN-UNITDATA	X	X	-	-	N-PDU, NSAPI
SN-XID	X	X	-	-	Requested SNDCP XID Parameters
SN-XID	-	-	X	X	Negotiated SNDCP XID Parameters

5.1.1.1 SN-DATA.request

Request used by the SNDCP user for acknowledged transmission of N-PDU. The successful transmission of SN-PDU shall be confirmed by the LLC layer. The SN-DATA.request primitive conveys NSAPI to identify the PDP using the service. N-PDU Number, if present, indicates the N-PDU number previously assigned to this N-PDU.

NOTE: An N-PDU number may have been assigned to an N-PDU by the old SGSN before an inter-SGSN routeing area update.

5.1.1.2 SN-DATA.indication

Indication used by the SNDCP entity to deliver the received N-PDU to the SNDCP user. Successful reception has been acknowledged by the LLC layer.

5.1.1.3 SN-UNITDATA.request

Request used by the SNDCP user for unacknowledged transmission of N-PDU. The SN-UNITDATA.request primitive conveys NSAPI to identify the PDP using the service.

5.1.1.4 SN-UNITDATA.indication

Indication used by the SNDCP entity to deliver the received N-PDU to the SNDCP user.

5.1.1.5 SN-XID.request

Request used by the SNDCP user at the initiating entity to deliver the list of requested XID parameters to the peer entity.

5.1.1.6 SN-XID.indication

Indication used by the SNDCP entity to deliver the list of requested XID parameters to the SNDCP user.

5.1.1.7 SN-XID.response

Response used by the SNDCP user to deliver the list of negotiated XID parameters to the peer entity.

5.1.1.8 SN-XID.confirm

Confirm used by the SNDCP entity to deliver the list of negotiated XID parameters to the SNDCP user.

5.1.2 Service primitives used by SNDCP layer

The SNDCP layer uses the service primitives provided by the SM sublayer and the LLC layer (see table 2). SM is specified in 3GPP TS 24.008 [5a] and LLC in 3GPP TS 44.064 [6].