Technical Specification Group, Radio Access Network
Meeting #5, Korea, 6 - 8 October 1999

TSGR#5(99)466

Source: **TSG RAN WG2**

Title: **Description of the PDCP protocol**

Document for: **approval**

Agenda Item:

The description of the PDCP protocol 25.323 v0.1.0 as approved on TSG RAN WG2 meeting #7.

3G TS RAN 25.323 V0.1.0 (1999-09)

Technical Specification

3rd Generation Partnership Project (3GPP);
Technical Specification Group (TSG) RAN;
Working Group 2 (WG2);

PDCP Protocol Specification
(3G TS 25.323 version 0.1.0)

3

Reference
<Workitem> (<Shortfilename>.PDF)

Keywords
Digital cellular telecommunications system, Universal Mobile Telecommunication System (UMTS), UTRA, IMT-2000

3GPP

Postal address

3GPP support office address
650 Route des Lucioles - Sophia Antipolis Valbonne - FRANCE Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet
http://www.3gpp.org

Contents

Intellectual Property Rights

IPRs essential or potentially essential to the present deliverable may have been declared to ETSI/3GPP. The information pertaining to these essential IPRs, if any, is publicly available for ETSI members and non-members, free of charge. This can be found in the latest version of the ETSI Technical Report: ETR 314: "Intellectual Property Rights (IPRs); Essential or potentially Essential, IPRs notified to ETSI in respect of ETSI standards". The most recent update of ETR 314, is available on the ETSI web server or on request from the Secretariat.

Pursuant to the ETSI Interim IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in the ETR 314, which are, or may be, or may become, essential to the present document.

Foreword

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

The contents of this TS are subject to continuing work within 3GPP TSG-RAN and may change following formal TSG RAN approval.

1. Scope

The present document provides the description of the Packet Data Convergence Protocol (PDCP).

PDCP provides its services to the NAS at the UE or the relay at the Radio Network Controler (RNC).

PDCP uses the services provided by the Radio Link Control (RLC) sublayer.

The main functions of PDCP are:

- Compression of redundant Network PDU control information (header compression) with different kinds of header compression methods.
- Transfer of packet data protocol user data using services provided by RLC protocol.

The following function is not part of release ´99 but will be included in Release 2000:

- Multiplexing of different RABs onto the same RLC-entity.

2. References

[1]   3GPP TS 25.401: "RAN Overall Description "

[2]   3GPP TR 25.945: "Vocabulary for the UTRAN"

[3]   3GPP TS 25.301: "Radio Interface Protocol Architecture"

[4]   3GPP TS 25.303: "UE Functions and Inter-Layer Procedures in Connected Mode"

[5]   3GPP TS 25.322: "RLC Protocol Specification"

[6]   3GPP TS.25.331: "RRC Protocol Specification"

[7]   3GPP TS 23.121 - "Architectural Requirements for Release 1999"

[8]   RFC 1144

3. Definitions and Abbreviations

AS   Access Stratum

C-SAP	Control Service Access Point
kbps	kilo-bits per second
L1	Layer 1 (physical layer)
L2	Layer 2 (data link layer)
L3	Layer 3 (network layer)
MAC	Medium Access Control
NAS	Non Access Stratum
PDCP	Packet Data Convergence Protocol
RAB	Radio Access Bearer
RLC	Radio Link Control
RRC	Radio Resource Control
UE	User Equipment
UMTS	Universal Mobile Telecommunications System
UTRA	UMTS Terrestrial Radio Access
UTRAN	UMTS Terrestrial Radio Access Network

4. General

4.1.Objective

The present document describes the functionality of the UTRAN PDCP. The overall UTRAN logical architecture is defined in 3GPP TS 25.301 [3].

Network layer protocols are intended to be capable of operating over services derived from a wide variety of subnetworks and data links. UMTS supports several network layer protocols providing protocol transparency for the users of the service. At that point of view supported protocols are IPv4 and IPv6. Introduction of new network layer protocols to be transferred over UTRAN shall be possible without any changes to UTRAN protocols. Therefore, all functions related to transfer of packets from higher layers (PDCP-SDUs) shall be carried out in a transparent way by the UTRAN network entities. This is one of the requirements for UTRAN PDCP.

Another requirement for the PDCP is to provide functions that help to improve channel efficiency. This requirement is fulfilled by means of retaining the possibility to implement different kinds of optimization methods. The currently known methods are header compression algorithms.
Multiplexing of RABs onto the same RLC entity will be included in release 2000 but is not avaible in release `99. Therefor, in release `99 every RAB, is connected to one PDCP entity and one PDCP entity is connected to one RLC entity. The PDCP entities are located in the PDCP sublayer.

Every PDCP entity uses one or several algorithm types with certain parameters. Several PDCP entities may use the same algorithm types. The algorithm types and their parameters are negotiated by RRC and indicated to PDCP through the PDCP Control Service Access Point (PDCP-C-SAP).

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

4.2.Overview on sublayer architecture

Figure 1 shows the model of the PDCP within the UTRAN protocol architecture.
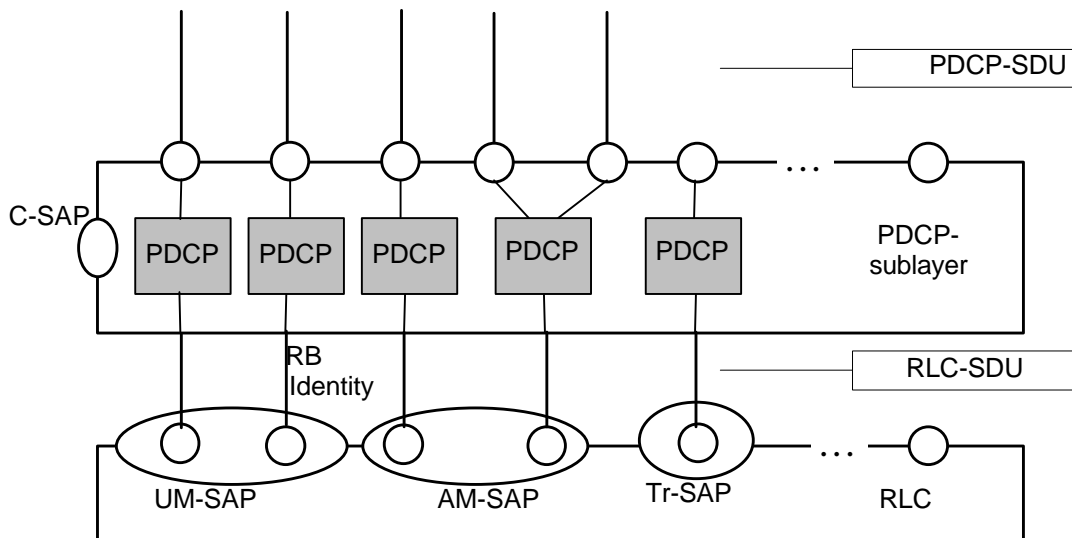
Figure 1 PDCP structure

5. Functions

Packet Data Convergence Protocol shall perform the following functions:

1. Compression of redundant protocol control information (e.g., TCP/IP and RTP/UDP/IP headers) at the transmitting entity and decompression at the receiving entity. The header compression method is specific to the particular network layer, transport layer or upper layer protocol combinations e.g. TCP/IP and RTP/UDP/IP.
2. Transfer of user data. Transmission of user data means that PDCP receives PDCP-SDU from the NAS and forwards it to appropriate radio bearer provided by RLC layer and vice versa.
3. Multiplexing of different RABs onto the same RLC entity. Multipexing is not part of release `99 but will be included in release 2000.

5.1.Protocol Control Information Compression

The protocol control information compression method is specific for each network layer protocol type. The compression algorithm and its parameters are negotiated by RRC for each PDCP entity and indicated to PDCP through the PDCP-C-SAP.

PDCP layer shall be able to support several header compression techniques and it shall allways be possible to extend the list of supported algorithms for the future.

5.1.1. TCP/IP header compression

[Note: A detailed desciption of the TCP/IP compression mechanism is to be added here.]

5.2.Multiplexing

Multiplexing of different RABs onto the same RLC entity. This function is not part of release `99 but will be included in release 2000.
[Note: A detailed description of the multplexing function is to be added here]

6. Services

6.1. Services provided to upper layers

- PDCP-SDU delivering.

6.2. Services provided to RRC layer

- The configuration of PDCP.

6.3. Services expected from RLC layer

For a detailed description of the following functions see [5].
- Data transfer in acknowledged mode,

- Data transfer in unacknowledged mode,

- Segmentation and reassembly,

- In-Sequence delivery.

7. Elements for layer-to-layer communication

7.1. Service primitives offered by PDCP

The primitives between PDCP and upper layers are shown in Table 1.

Generic Name	Parameter			
	Req.	Ind.	Resp.	Conf.
PDCP-DATA	Data	Data	Not Defined	Not Defined
CPDCP-ESTABLISH	FFS	FFS	Not Defined	Not Defined
CPDCP-RELEASE	FFS	FFS	Not Defined	Not Defined
CPDCP-MODIFY	FFS	FFS	Not Defined	Not Defined

Table 1: Primitives between PDCP and upper layers

Each Primitive is defined as follows:

a) PDCP-DATA-Req./Ind.

It is used for data transmission of point-to-point connection between the same level user entities.

b) CPDCP-Establish-Req./Ind.

It is used to create a PDCP entity and to assign the connection to NAS and Radio Bearer associated with that entity.

c) CPDCP-Release-Req./Ind.

It is used to release and delete a PDCP entity.

d) CPDCP-Modify-Req./Ind.

It is used to modify a PDCP entity.

8. Elements for peer-to-peer communication

8.1. Protocol data units

[All the section shall be reviewed when the protocol is defined]
The data PDU is needed.

9. Handling of unknown, unforeseen and erroneous protocol data

10. History

<table>
<tr><td colspan="3" align="center">Document history</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Date</td><td>Version</td><td>Comment</td></tr>
<tr><td>September 1999</td><td>0.0.1</td><td>version based on agreed changes to Tdoc 99c25</td></tr>
<tr><td>September 1999</td><td>0.1.0</td><td>version based on agreed changes to Tdoc 99c73</td></tr>
<tr><td colspan="3">Martin Hans

Bosch GmbH
Tel.: +49 5341 28 5851

e-mail: <u>Martin.Hans@de.bosch.com</u></td></tr>
<tr><td colspan="3"></td></tr>
<tr><td colspan="3" align="center">This document is written in Microsoft Word version 7/97.</td></tr>
</table>