Technical Document – Confidential

GSM PROTOCOL STACK

G23

RLP – DESIGN SPECIFICATION

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Important Notice

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Notes:

1. Initial version
2. Renumber

Table of Contents

List of Figures and Tables

List of References

[ISO 9000:2000] International Organization for Standardization. Quality management systems - Fundamentals and vocabulary. December 2000

1.1 References

[1] Rec. V.42 bis Data compression procedures for data circuit terminating equipment (DCE) using error correction procedures;
(CCITT-V.42 bis, 1990)

[2] European digital cellular telecommunications system (Phase 2);
Radio Link Protocol (RLP) for data and telematic services on the Mobile Station - Base Station System (MS - BSS) interface and the Base Station System - Mobile-service Switching Centre (BSS - MSC) interface
(GSM 4.22, September 1994, version 4.3.0)

[3] European digital cellular telecommunications system (Phase 2);
General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS);
(GSM 7.01, December 1995, version 4.10.0)

[4] European digital cellular telecommunications system (Phase 2);
Terminal Adaptation Functions (TAF) for services using asynchronous bearer capabilities;
(GSM 7.02, September 1994, version 4.5.1)

[5] MCU-DSP Interfaces for Data Applications;
Specification S844
(C. Bianconi, Texas Instruments, March 1998, version 0.1)

[6] Message Sequence Charts L2R
8411.202.98.100; Condat GmbH

1.2 Abbreviations

ACI	Application Control Interpreter (AT-Commands)
DCE	Data Communication Equipment (Mobile Station)
DPM	Dual Ported Memory
DTE	Data Terminal Equipment (Terminal, PC)
L2R	Layer 2 Relay entity
L2RCOP	L2R Character Oriented Protocol
RLP	Radio Link Protocol

2 Overview

G23 is a software package implementing Layers 2 and 3 of the ETSI-defined GSM air interface signalling protocol, and as such represents that part of a GSM Phase 2 compliant mobile station's protocol software which is both, platform and manufacturer independent. Therefore, G23 can be viewed as a building block providing standardised functionality through generic interfaces for easy integration.

The G23 suite of products consists of the following items:

- Layers 2 and 3 for speech & short message services,
- Layers 2 and 3 for fax & data services,
- Application control interface,
- Basic public MMI [02.30] and
- Test and integration support tools.

This document describes the design specification of the Radio Link Protocol entity (RLP).

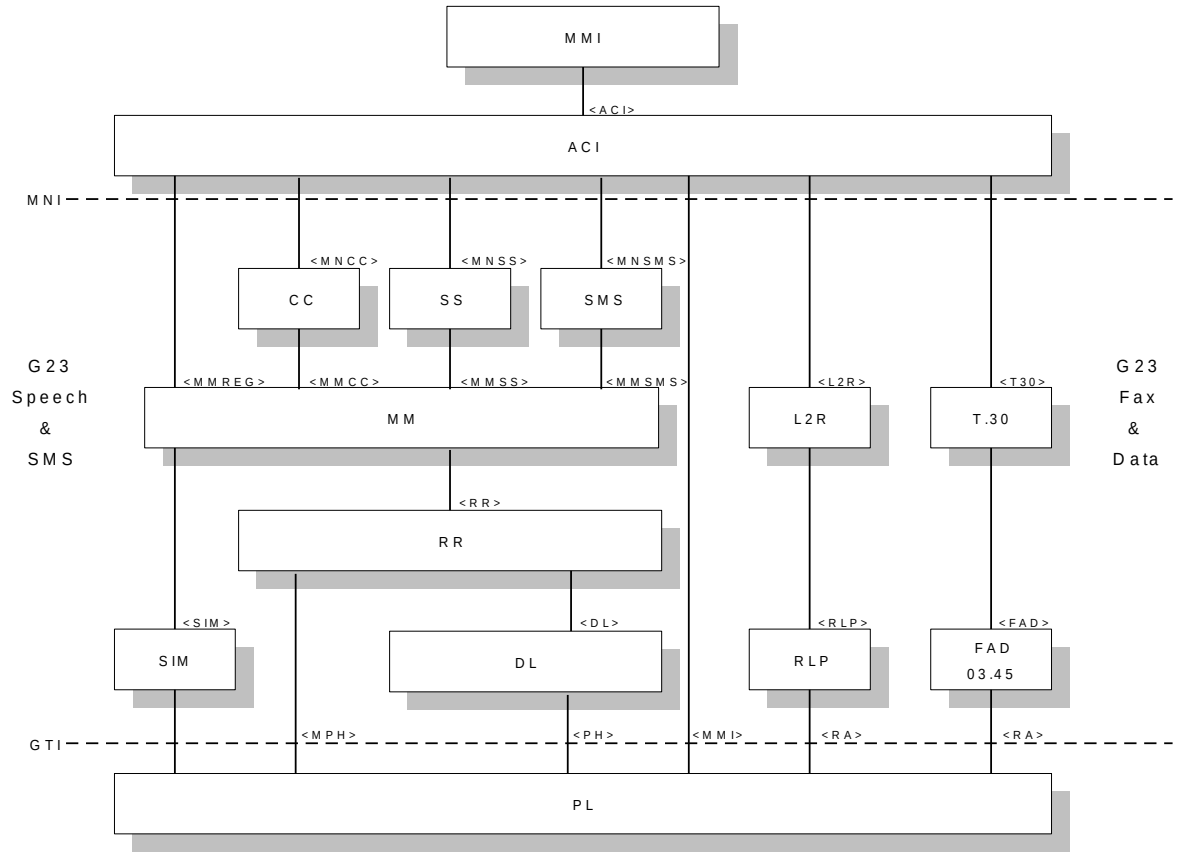

Figure 2-1: G23 Software Architecture

3 Software Architecture

The RLP entity implements the Radio Link Protocol. This is the GSM data link protocol for non transparent data services, which provides reliable data transfer with error correction and retransmission over the air interface. The services of the RLP entity are used by the L2R entity. RLP in turn uses the services offered by the RA entity.

The RLP entity consists of the three processes kernel, send_pdu and receive_pdu as shown in Figure 3-1. The process kernel makes use of the two modules sbm (send buffer manager) and rbm (receive buffer manager).

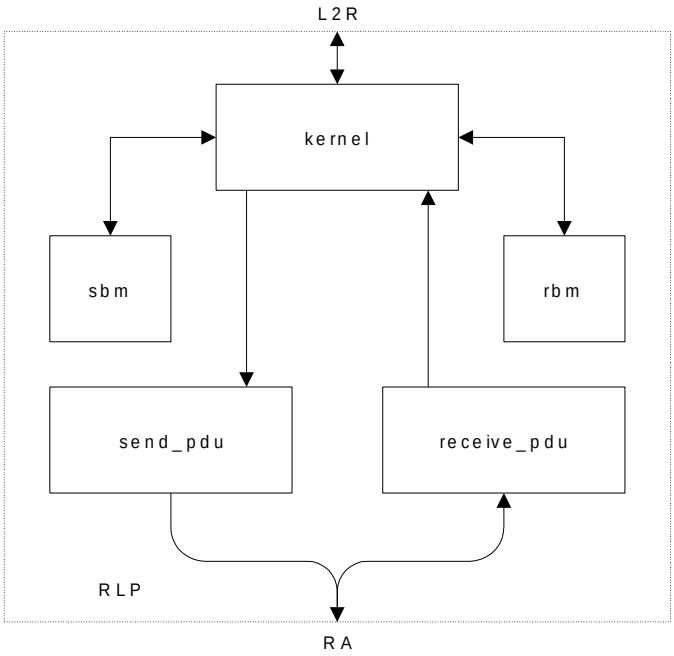

Figure 3-1: Structure of the RLP entity

Most of the RLP functions are handled by the kernel process. The processes send_pdu and receive_pdu are there for coding and decoding RLP frames. In particular the RLP frame headers are assembled and dissembled by them.

In contrast to the ETSI specification the error correction (calculation of frame check characters) is done by the DSP (Layer 1) and not by the RLP entity.

The send buffer manager provides a ring buffer, in which all primitives are stored until the data are received and acknowledged by the base station. The ring buffer is required to support retransmission with a window size bigger than one. The receive buffer manager handles the ring buffer for received data. If data are received in the wrong order, the frames are stored, until all preceding frames have also been received. Then all in sequence frames are delivered to the upper layer. Both rbm and sbm are implemented as a library-like set of functions. There is a a well defined interface for accessing these modules and a strict separation of internal and external variables. As a result sbm and rbm may be reused as a kind of library in other entities. In fact the FAD entity uses the same modules.

All primitives to and from the L2R entity, i.e. the primitives of the RLP SAP are received and sent by the kernel process. The primitives of the RA SAP are sent by the send_pdu process and received by the receive_pdu process.

In the release version RA is not implemented as a proper entity and data are not transferred by primitives between RLP and RA. In this case there is a functional interface between RLP and RA. Primitives are only used to awake the RLP entity after data have been received (RA_DATA_IND) and after a frame could be sent (RA_READY_IND).

Appendices

A. Acronyms

DS-WCDMA Direct Sequence/Spread Wideband Code Division Multiple Access

B. Glossary

International Mobile Telecommunication 2000 (IMT-2000/ITU-2000) Formerly referred to as FPLMTS (Future Public Land-Mobile Telephone System), this is the ITU's specification/family of standards for 3G. This initiative provides a global infrastructure through both satellite and terrestrial systems, for fixed and mobile phone users. The family of standards is a framework comprising a mix/blend of systems providing global roaming. <URL: http://www.imt-2000.org/>