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Foreword

Introduction

1 Scope

This specification defines the stage-2 service description for a GSM/EDGE Radio Access Network (GERAN). CCITT I.130 describes a three-stage method for characterisation of telecommunication services, and CCITT Q.65 defines stage 2 of the method.

This document illustrates how the services requested by a GSM/UMTS Core Network are realized by the GERAN. There is no detailed description of the interfaces towards the core network and only references are given to the appropriate specifications.

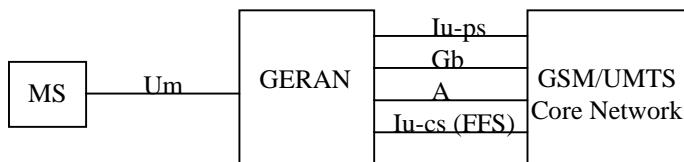


Figure 1. GSM/EDGE Radio Access Network.

2 References

References may be made to:

- a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or
- b) all versions up to and including the identified version (identified by "up to and including" before the version identity); or
- c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or
- d) publications without mention of a specific version, in which case 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.

2.1 Normative references

- [1] UMTS 25.410: "UTRAN Iu Interface: General Aspects and Principles".
- [2] UMTS 25.411: "UTRAN Iu interface Layer 1".
- [3] UMTS 25.412: "UTRAN Iu interface signalling transport".
- [4] UMTS 25.413: "UTRAN Iu interface RANAP signalling".
- [5] UMTS 25.414: "UTRAN Iu interface data transport & transport signalling".
- [6] UMTS 25.415 "UTRAN Iu interface user plane protocols".
- [7] GSM 08.14: "General Packet Radio Service (GPRS); Base Station System (BSS) - Serving GPRS Support Node (SGSN) interface; Gb interface Layer 1".
- [8] GSM 08.16: "General Packet Radio Service (GPRS); Base Station System (BSS) - Serving GPRS Support Node (SGSN) interface; Network Service".
- [9] GSM 08.18: "General Packet Radio Service (GPRS); Base Station System (BSS) - Serving GPRS Support Node (SGSN); BSS GPRS Protocol (BSSGP)"

- [10] GSM 05.01: "Digital cellular telecommunications system (Phase 2+); Physical layer on the radio path; General description"
- [11] GSM 05.02: "Digital cellular telecommunications system (Phase 2+); Multiplexing and multiple access on the radio path"

2.2 Informative references

- [12] UMTS 23.060: "General Packet Radio Service (GPRS); Service Description; Stage 2"
- [13] GSM 03.64: "General Packet Radio Service (GPRS); Overall description of the GPRS radio interface; Stage 2"
- [14] GSM 23.034: "High Speed Circuit Switched Data (HSCSD); Stage 2"

3 Definitions, symbols and abbreviations

3.1 Definitions

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

<defined term>: <Definition>.

example: The text serving as an example.

3.2 Symbols

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

<symbol> <Explanation>
<2nd symbol> <2nd Explanation>

3.3 Abbreviations

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

<ACRONYM1> <Explanation>
<ACRONYM2> <Explanation>

4 GERAN Architecture

4.1 Overall network architecture

Editor's note: Insert text and figure on reference architecture from S2 report on all-IP.

4.2 GERAN Reference Architecture

The reference architecture of GERAN is illustrated in Figure 2. GERAN connects with an Iu-ps, Gb and A interface to the core network. It is for further study if an Iu/cs is needed. The Base Station Controllers (BSCs) may be connected to each other with an Iur' interface.

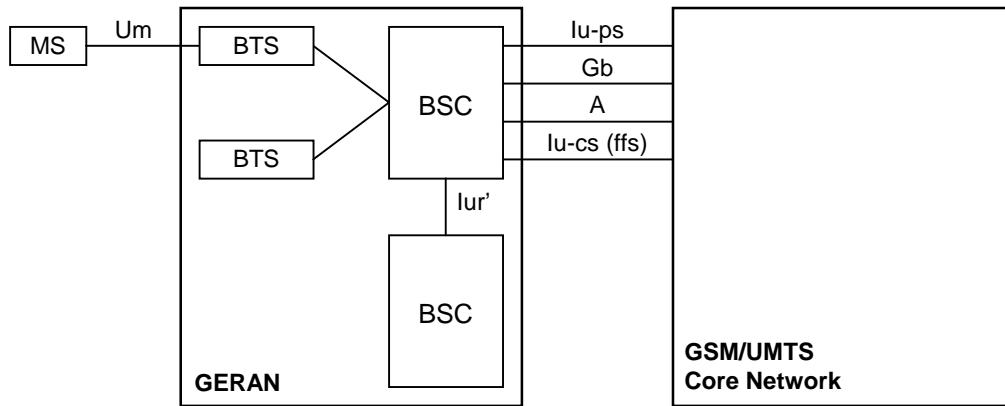


Figure 2. GERAN reference architecture.

4.3 User plane protocol architecture in PS domain

Figure 3 shows the user plane for GERAN connected to a packet switched core network domain. For reference, GPRS and UMTS protocol stacks when connected to the packet switched core network domain are depicted in Figures 4 of [12] and 6 of [12] respectively.

Specifications and more detailed descriptions of the Iu-ps interface protocols and architecture can be found in [1-6].

Specifications and more detailed descriptions of the Gb interface protocols and architecture can be found in [7-9].

The Um interface protocols are described in section 5 and 6.

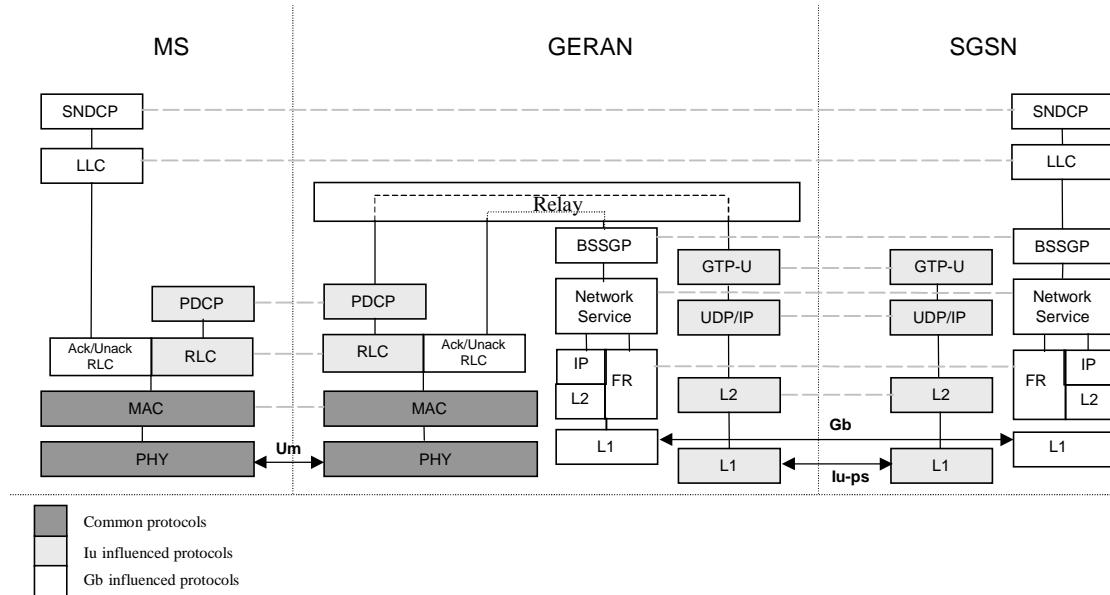


Figure 3. User Plane protocols towards Packet Switched Core Network domain.

4.4 Control plane protocol architecture in PS domain

The control plane protocol architecture in the PS domain is FFS.

4.5 User plane protocol architecture in CS domain

The user plane protocol architecture in the CS domain is FFS.

4.6 Control plane protocol architecture in CS domain

The control plane protocol architecture in the CS domain is FFS.

4.7 Iur' protocol architecture

The architecture and functionality of Iur' is FFS.

5 Radio Interface Protocol Architecture

The Radio Access Bearers offered by GERAN are aligned with those offered by UTRAN. Four different traffic classes, or types of radio access bearers, are defined: conversational, streaming, interactive and background. The approach used to create these radio access bearers in GERAN also resembles the UTRAN approach, in which combinations of different modes of protocols in one single stack provide a large set of radio bearers.

The Um user plane protocol stack of GERAN is shown in Figure 4. Different modes of PDCP, RLC and MAC, as well as different types of logical channels may be combined to create different types of radio bearers. The selection of protocol modes for a certain radio bearer is controlled by the GERAN Radio Resource Management (RR).

Informative examples of how radio access bearers may be created are given in Annex A. The MS capabilities for GERAN are given in [GSM 02.07].

The functionality provided by each protocol in each of its modes is described in the next Section.

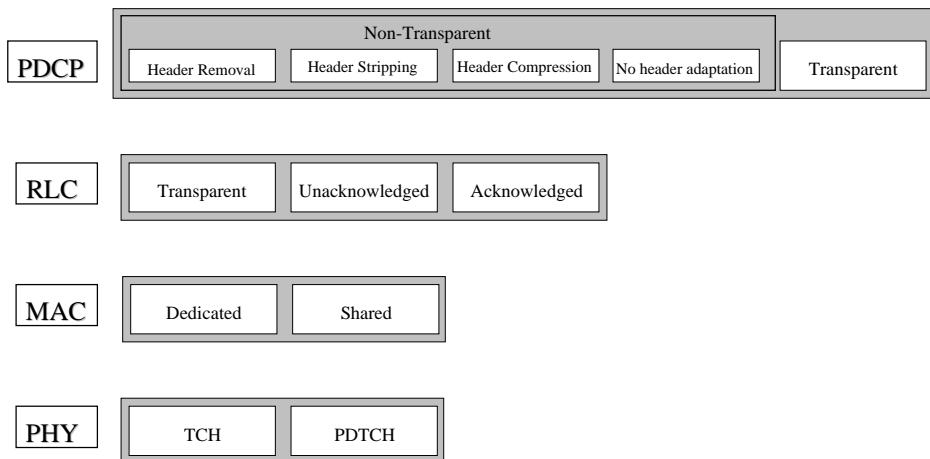


Figure 4. GERAN user plane protocol stack over Um interface. Different protocol modes may be combined to create different radio bearer types.

For a conversational class call, the GERAN offers the following multiplexing scenarios on the radio interface:

- **Operational Scenario 1.** Permanent allocation of a physical subchannel to a conversational class call, without any multiplexing capability.
- **Operational Scenario 2.** Permanent allocation of a physical subchannel to a conversational class call and multiplexing of best effort data from the same mobile station.

6 User and Control Plane Protocols

This section provides an overview on the user and control plane protocols of GERAN. For detailed description of each of the layer, please refer to the corresponding specification (see below).

6.1 Relay

The relay function of GERAN functionality and whether some functions need to be standardized are for FFS.

6.2 Radio Resource Control (RRC)

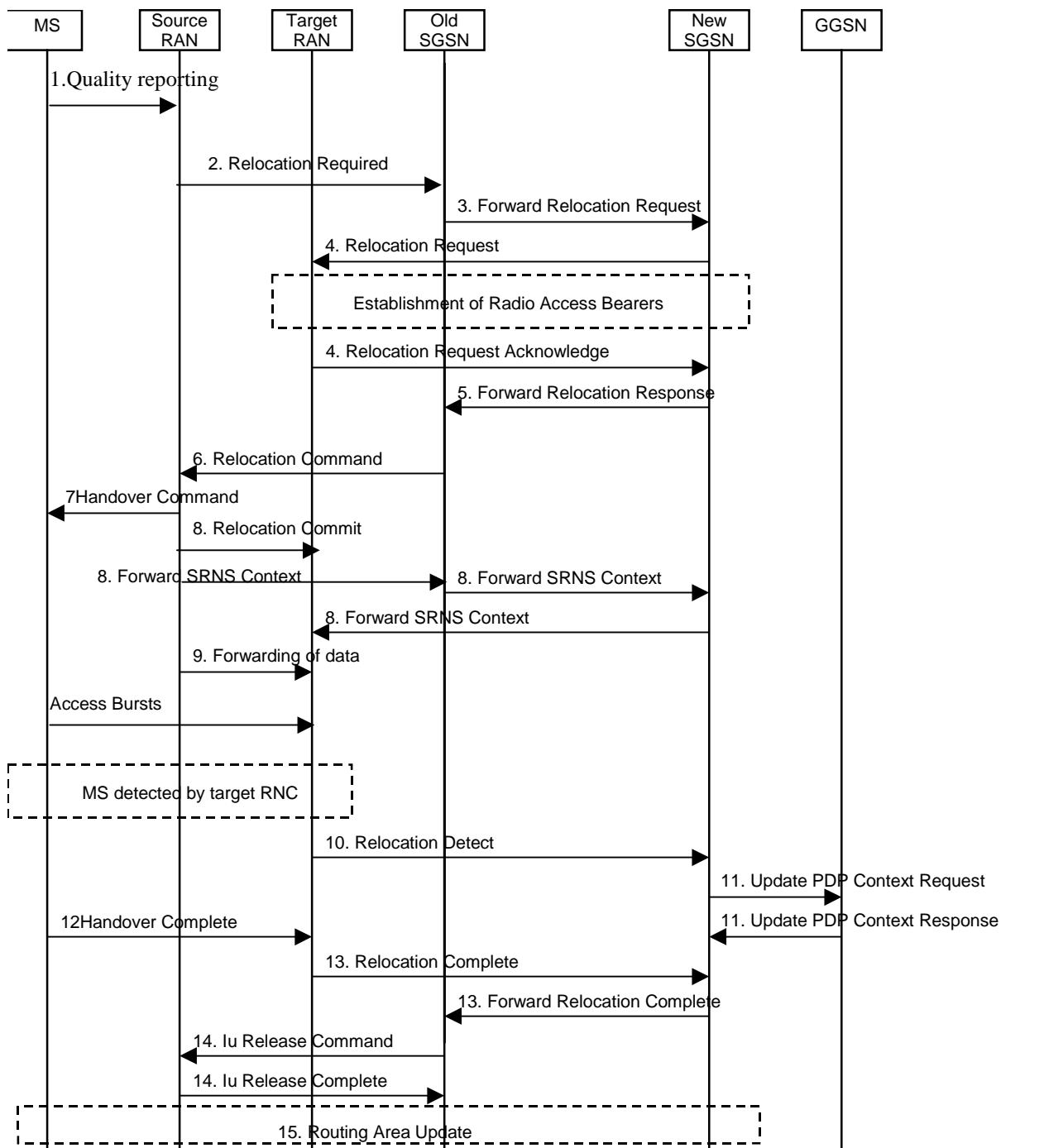
RRC is a control plane protocol for radio resource management. RRC design is FFS.

6.2.1 Handover and Cell Reselection

The handover concept for GERAN is based on GSM handover combined with UMTS relocation procedure used over Iu-ps interface. For non real-time services cell reselection procedure is supported.
Relocation should be simultaneous with radio handover.

6.2.1.1 Handover

The procedure is illustrated below assuming inter-SGSN handover.

**Figure 5 Handover signalling for GERAN**

The handover decision is made by GERAN RRC based on measurement reports. If the target cell is under a different BSC the source RAN initiates the Relocation Preparation procedure. The purpose of the Relocation Preparation procedure is to prepare relocation of SRNS with or without involving MS. The relocation procedure shall be coordinated in all Iu signalling connections existing for the MS in order to allow relocation co-ordination in the target BSC. The procedure uses connection-oriented signalling. The initiating message for this procedure is RELOCATION REQUIRED message.

The old SGSN will forward this message to the target SGSN, which in turn starts the Relocation Resource Allocation procedure. The purpose of the Relocation Resource Allocation procedure is to allocate resources from target RNS for a relocation of SRNS. The procedure shall be coordinated in all Iu signalling connections existing for the MS. The procedure uses connection-oriented signalling. The target SGSN shall initiate the procedure by generating

RELOCATION REQUEST message to the target RAN. This message shall contain the information (if any) required by the GERAN to build the new RAB configuration.

After all necessary resources for accepted RABs, including the Iu user plane, are successfully allocated, the target RAN shall send RELOCATION REQUEST ACKNOWLEDGE message to the target SGSN. The target SGSN shall forward this message to the old SGSN.

The RELOCATION REQUEST ACKNOWLEDGE message received by the old SGSN may optionally contain a transparent container, which shall be transferred by the CN to the source RAN or to the external relocation source while completing the Relocation Preparation procedure.

When the preparation including resource allocation in the target system is ready and the old SGSN has decided to continue the relocation of SRNS, the old SGSN shall send RELOCATION COMMAND message to the source BSC.

The source BSC will then generate and send the HANDOVER COMMAND message to the MS and launch the actual relocation of the SRNS Context. This can be done through Iu by sending Forward SRNS Context message from Source BSC to CN or through Iur by sending RELOCATION COMMIT message. At reception of the RELOCATION COMMIT message from the source BSC the target BSC finalizes the Relocation. If the message contains the transparent RANAP Relocation Information IE the target BSC shall use this information when finalizing the Relocation.

Upon reception of Handover Command the MS shall send four access bursts to the network. When target BSC detects the MS, it initiates the relocation detect procedure. The purpose of Relocation Detect procedure is to indicate by the BSC the detection of SRNS relocation execution to the CN. Procedure shall be coordinated in all Iu signalling connections existing for the MS. The procedure uses connection-oriented signalling.

The MS will issue the HANDOVER COMPLETE message upon which the target BSC will send the relocation complete message to the new SGSN. This message is forwarded to the old SGSN, which in turn initiates the Iu bearer release procedure. The new SGSN will update the PDP Context, while the source RAN will release the radio resources in the old cell.

6.2.1.2 Cell Reselection

FFS

6.2.1.3 Intersystem Handover

6.2.1.3.1 Intersystem Handover to GERAN

FFS

6.2.1.3.2 Intersystem Handover from GERAN

FFS

6.2.1.3.3 Intersystem Cell Reselection to GERAN

FFS

6.2.1.3.4 Intersystem Cell Relection from GERAN

FFS

6.3 Packet Data Convergence Protocol (PDCP)

This section provides an overview on services and functions provided by the Packet Data Convergence Protocol (PDCP). A detailed description of the PDCP is given in [Ref: GERAN'00 PDCP – 25.323].

6.3.1 Services provided to upper layers

The following services are provided by PDCP to upper layers:

- PDCP SDU delivery

6.3.2 Services expected from RLC layer

- Data transfer in acknowledged mode.
- Data transfer in unacknowledged mode.
- Data transfer in transparent mode.
- Segmentation and reassembly.
- In-Sequence delivery.

6.3.3 PDCP Functions

For clarity reason, two PDCP modes are defined in this TS: transparent and non-transparent. The transparent and non-transparent modes relate respectively to the PDCP-no-header PDU and the PDCP-data PDU cases described in UMTS 25.323.

The functions performed by the PDCP are dependent on the PDCP mode used.

6.3.3.1 Transparent Mode

The name "transparent" means that the PDCP layer does not change the incoming service data units (SDU), i.e. no header is added and possible TCP/IP or RTP/UDP/IP headers in the data are left untouched.

The functionalities of the transparent mode of PDCP are:

- **Transfer of user data**
- **Relocation of PDCP buffer**
- **PDCP SDU buffering**

6.3.3.2 Non-Transparent Mode

The functionalities of the non-transparent mode of PDCP are:

- **Header adaptation** of the IP data streams
- **Transfer of user data**
- **PDCP SDU buffering**
- **Relocation support appropriate to applicable QoS requirements**
- **Multiplexing of radio bearers onto RLC entities**

Different header adaptation mechanisms may be used by the PDCP:

- **Header compression.** This method compresses the headers added by the transport and network layers.

Header stripping. This method is a header compression mechanism dependent on how the data is transported in the lower layers (link and physical). Typically, all the transport and network layer headers are removed from the packets carrying voice samples.

- **Header removal.** This method is not a header compression scheme mechanism dependent on how the data is transported in the lower layers (link & physical). Typically, all the transport and network layer headers are

~~removed from the packets carrying voice samples. Whether the information related to RTP/UDP/IP headers is exchanged during the call is FFS. Transport and network layers are terminated at the network side and the payload only is transported to the mobile station. The IP headers are not regenerated at the mobile station side.~~

In case of header compression or ~~header stripping~~, the network and higher layer protocols terminate at the mobile station.

6.4 Radio Link Control (RLC)

This section provides an overview on services and functions provided by the Radio Link Control (RLC). A detailed description of the RLC is given in [Ref: GERAN'00 RLC – 04.60 + ffs].

6.4.1 Services provided to upper layer

- **Transparent data transfer.** This service transmits higher layer PDUs without adding any protocol information.
- **Acknowledged data transfer.** This service transmits higher layer PDUs and guarantees delivery to the peer entity.
- **Unacknowledged data transfer.** This service transmits higher layer PDUs without guaranteeing delivery to the peer entity.
- **Notification of unrecoverable errors.** RLC notifies the upper layer of errors that cannot be resolved by RLC itself by normal exception handling procedures, e.g. by adjusting the maximum number of retransmissions according to delay requirements.

There is a single RLC connection per Radio Bearer.

6.4.2 RLC Functions

6.4.2.1 Transparent Mode

RLC has no functionality when operating in transparent mode. The incoming SDUs are transferred to the MAC layer without being altered. No upper layer protocol information is removed. No RLC protocol information is added. All necessary signalling is made out of band.

6.4.2.2 Non-Transparent Mode

6.4.2.2.1 Acknowledged Mode

RLC has support for the following functions in acknowledged mode. For a detailed description, see GSM 04.60. In addition the RLC offers the possibility for adjusting the maximum number of retransmissions according to the delay requirements.

- **Segmentation** of upper layer PDUs into RLC data blocks.
- **Concatenation** of upper layer PDUs into RLC data blocks.
- **Padding** to fill out an RLC data block.
- **Backward Error Correction (BEC)** procedures enabling the selective retransmission of RLC data blocks. As for EGPRS R'99, either selective type I ARQ or selective type II hybrid ARQ (incremental redundancy) is used.
- **Reassembly** of RLC data blocks into upper layer PDUs.
- **In-sequence delivery** of upper layer PDUs.
- **Link Adaptation**

New services towards the Iu-ps interface using acknowledged RLC mode is based on the existing EGPRS R'99 modulation and coding schemes (MCS-1 to 9) if mapped on the PDTCH.

6.4.2.2.2 Unacknowledged Mode

RLC has support for the following fuctions in unacknowledged mode. For a detailed description, see GSM 04.60. No backward error correction procedure is supported in this mode.

- **Segmentation** of upper layer PDUs into RLC data blocks.
- **Concatenation** of upper layer PDUs into RLC data blocks.
- **Padding** to fill out an RLC data block
- **Reassembly** of RLC data blocks into upper layer PDUs
- **Sequence number check** to detect lost RLC blocks.
- **Link Adaptation**

The unacknowledged RLC mode is based on MCS-1 to 9 if mapped onto a PDTCH. If the RAB is mapped onto a TCH or E-TCH new coding schemes could be considered. Examples of bitrates supported per timeslot for these coding schemes are 9.6, 14.4, 28.8, 43.2. and 32 kbps. Other timeslot bitrates are for FFS. Higher bitrates can be achieved by combining several timeslots.

For control signalling unacknowledged RLC is used as for (E)GPRS release 97/99 if the radio access bearer uses PDTCH. If a TCH or E-TCH is used control signalling is performed via the FACCH and SACCH.

6.5 Medium Access Control (MAC)

This section provides an overview on services and functions provided by the Medium Access Control (MAC). A detailed description of the MAC is given in [Ref: ffs].

6.5.1 Services provided to upper layers

The MAC layer allows the transmission over the physical layer of upper layer PDUs from one mobile station when operating in dedicated mode, or one or more mobile stations when operating in shared mode. A MAC mode is associated with a physical subchannel for use by one or more mobile stations (dedicated or shared mode respectively). The MAC layer handles the access to and multiplexing onto the physical subchannels.

- **Data transfer.** This service provides unacknowledged transfer of MAC SDUs between peer MAC entities. This service does not provide any data segmentation. Therefore, segmentation/reassembly function should be achieved by upper layer.

6.5.2 MAC Functions

The functions of MAC include:

- **Configuring the Mmapping between logical channels and physical subchannels.** The MAC is responsible for configuring the mapping of logical channel(s) onto the appropriate physical subchannel(s).
- **Defining logical channels to be used for each radio bearer service.**

6.5.2.1 Dedicated Mode

In dedicated mode, the MS is allocated a dedicated physical subchannel for exclusive use of the bearers it supports.

- **Priority handling between data flows of one mobile station.** Priorities are e.g. given by attributes of Radio Bearer services.

- **Multiplexing/demultiplexing of higher layer PDUs delivered to/from the physical layer on dedicated physical subchannels.** This function can be utilised when several upper layer services (e.g. RLC instances) can be mapped efficiently on the same physical subchannel (operational scenario 2).

6.5.2.2 Shared Mode

In shared mode, traffic flows to/from one or more MSs may be multiplexed on the same physical subchannel.

- **Identification of different traffic flows of one or more MSs on the shared physical subchannels.** Inband identification is needed to address a flow to an MS in the downlink or identify a flow from an MS in the uplink.
- **Multiplexing/demultiplexing of higher layer PDUs delivered to/from the physical layer on shared physical subchannels.**

[Editor's Note: The control plane is for FFS.]

6.6 Physical Layer (Phy)

The physical layer (layer 1) is the lowest layer in the OSI Reference Model and it supports all functions required for the transmission of bit streams on the physical medium. This section provides an overview on services and functions provided by the Physical Layer. A detailed description of the physical layer is given in [Ref: 05 series].

6.6.1 Definitions

~~A physical channel is defined as one uplink and downlink timeslot/frequency repeated in each TDMA frame (see GSM 05.02). A physical channel uses a combination of frequency and time division multiplexing and is defined as a sequence of radio frequency channels and time slots. The complete definition of a particular physical channel consists of a description in the frequency domain, and a description in the time domain (see GSM 05.02).~~

A logical channel is defined by the type of data which is transferred and characterized by parameters such as channel coding and interleaving. It can be uni-directional or bi-directional [05.02]. Example: PDTCH/U, TCH/FS

A channel combination is defined as the combination of logical channels that is mapped on a certain physical channel [05.02]. Example: TCH/FS+FACCH/F+SACCH/TF

A physical subchannel is defined as a physical channel or a part of a physical channel and an associated multiframe structure. Example: PDCH, DPSCH/F.

6.6.2 Services provided to upper layer

The physical layer interfaces the Medium Access Control (MAC) sub-layer of Layer 2 and the Radio Resource Control (RRC) sub-layer of Layer 3. Through Service Access Points (SAP), the physical layer offers services described below:

– Access capabilities:

The physical layer offers logical channels and the transmission services associated to higher layers. Logical channels are multiplexed either in a fixed predefined manner (multiframe structure) or dynamically by the MAC on physical subchannels. Physical subchannels are the units scheduled on the radio medium. Some are reserved by the network for common use (e.g. for use by a combination of CCCH and BCCH), others are assigned to dedicated connections with MSs (dedicated physical subchannels), or are assigned to a shared usage between MSs (shared physical subchannels). ~~In time, the combination of logical channels used on an assigned physical subchannel may change.~~

– Error detection:

The physical layer offers an error protected transmission service, it includes error detection functions and to a lower level, error correction functions. Erroneous received frames ~~are not offered to upper layers but~~ may be notified to upper layer ~~and, depending on the need of the upper layer, offered to it.~~ The probability of one or more errors in a physical block transferred by the physical layer is defined in [Ref: GERAN'00 Phy - 05.05]. Due to ~~not non~~ specified methods of quality detection, the probability of residual errors in transferred blocks may vary between implementations.

Editor's note: Encryption is ffs (location; function/service).

6.6.2.1 Specific services of the physical layer in the MS

- **Measurement of the signal strength of neighbouring base stations.** Measurements are transferred to layer 3.
- **Measurement of the signal quality of the physical subchannel used.** Measurements are transferred to the MAC layer for reporting to the base station.
- **Cell/PLMN selection in idle mode or in packet mode.** In idle mode or in packet mode, the physical layer selects the best cell with its BCCH/CCCH (CPBCCH/CCCCH only for COMPACT and for packet mode only) in close co-operation with layer 3, meeting requirements for PLMN selection specified in [Ref: GERAN'00 Phy - 02.11].

6.6.3 Logical Channels

6.6.3.1 Traffic channels

Traffic channels of type TCH's are intended to carry either encoded speech or user data on physical subchannel in dedicated MAC mode. TCH's can ~~either~~ be either full rate (TCH/F) or half rate (TCH/H). Quarter rate TCH's (TCH/Q) are FFS.

Packet data traffic channels (PDTCH's) are intended to carry user data on physical subchannels in either dedicated or shared MAC mode. PDTCH's can ~~either~~ be either full rate (PDTCH/F) or half rate (PDTCH/H).

6.6.3.2 Control channels

Control channels ~~are intended to carry~~ signalling or synchronization data. Four categories of control channels are defined: broadcast, common, dedicated control channels and cell broadcast channels. Specific channels within these categories are defined in the subclauses following.

6.6.3.2.1 Broadcast channels

GERAN shall reuse R99 broadcast channels. Any addition shall be made in a backwards compatible manner.

6.6.3.2.2 Common control type channels

GERAN common control type channels shall be based on R99 common control type channels. Any addition shall be made in a backwards compatible manner.

6.6.3.2.3 Dedicated control channels

On a dedicated physical subchannel:

- i) The Fast Associated Control channel (FACCH) associated to one TCH. FACCH can either be full rate (FACCH/F) or half rate (FACCH/H) depending whether it is associated to a full rate or half rate TCH. Quarter Rate FACCH (FACCH/Q) are FFS.
- ii) The Packet Associated Control channel (PACCH) associated to one PDTCH: The PACCH is bi-directional. PACCH/U is used for the uplink and PACCH/D for the downlink. PACCH can either be full rate (PACCH/F) or half rate (PACCH/H) depending whether it is associated to a full rate or half rate PDTCH.
- iii) The Slow Associated Control channel (SACCH) associated to one TCH and/or PDTCH. SACCH can either be full rate (SACCH/TF) or half rate (SACCH/TH) depending whether it is associated to a full rate or half rate traffic channel. Quarter Rate SACCH (SACCH/TQ) are FFS.
- iv) Inband signalling associated to one TCH is for FFS.

On a shared physical subchannel:

- i) The Packet Associated Control channel (PACCH): The PACCH is bi-directional. PACCH/U is used for the uplink and PACCH/D for the downlink. PACCH can either be full rate (PACCH) or half rate (PACCH/H) depending whether it is associated to a full rate or half rate PDTCH.
- ii) The Packet Timing advance Control CHannel uplink (PTCCH/U): Used to transmit random access bursts to allow estimation of the timing advance for one MS in packet transfer mode.
- iii) The Packet Timing advance Control CHannel downlink (PTCCH/D): Used to transmit timing advance updates for several MS. One PTCCH/D is paired with several PTCCH/U's.

6.6.3.2.4 Cell Broadcast Channel (CBCH)

GERAN shall reuse R99 cell broadcast channel.

6.6.4 Physical Subchannels

Depending on the MAC mode, a physical subchannel can either be dedicated or shared.

All physical subchannels are bi-directional unless otherwise stated.

Unidirectional physical subchannels are ffs.

6.6.4.1 DPSCH - Dedicated Physical SubChannel

~~A dedicated physical subchannel shall be mapped on a 26 multiframe structure involving SACCH and idle bursts.~~

A DPSCH can either be full rate or half rate. Quarter rate DPSCH's are FFS.

6.6.4.2 SPSCH - Shared Physical SubChannel

~~A shared physical subchannel shall be mapped on a 52 multiframe structure involving PTCCH and idle bursts.~~

A SPSCH can either be full rate or half rate.

6.6.5 Mapping of logical channels onto physical subchannels

6.6.5.1 DPSCH full rate

Excluding CBCH, broadcast channels and common control type channels, the following channel combinations are the possible ways in which channels can be combined onto for a DPSCH full rate:

- i) TCH/F + FACCH/F + SACCH/TF
- ii) TCH/F + FACCH/F + SACCH/TF + PDTCH/F + PACCH/F
PDTCH and PACCH can occur only within the silent periods of a TCH
- iii) PDTCH/F + PACCH/F + SACCH/TF

6.6.5.1.1 Multiframe mapping of logical channels onto DPSCH/F

Figure 6 shows the multiframe mapping of the logical channels for DPSCH/F.

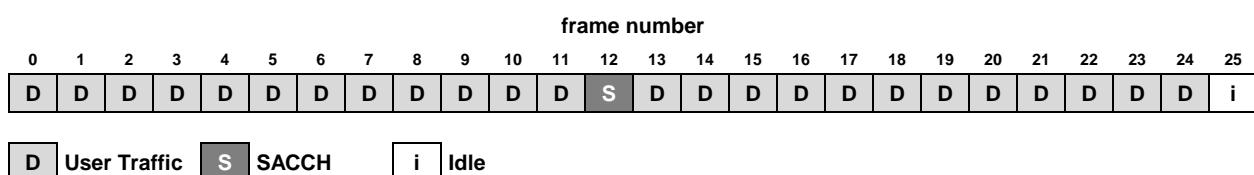


Figure 6. DPSCH/F – Multiframe mapping of logical channels

6.6.5.2 DPSCH half rate

The following channel combinations are the possible ways in which channels can be combined onto for a DPSCH half rate:

- i) TCH/H + FACCH/H + SACCH/TH
- ii) TCH/H + FACCH/H + SACCH/TH + PDTCH/H + PACCH/H
PDTCH and PACCH can occur only within the silent periods of a TCH
- iii) PDTCH/H + PACCH/H + SACCH/TH

6.6.5.2.1 Multiframe mapping of logical channels onto DPSCH/H

Figure 7 shows the multiframe mapping of the logical channels for DPSCH/H.

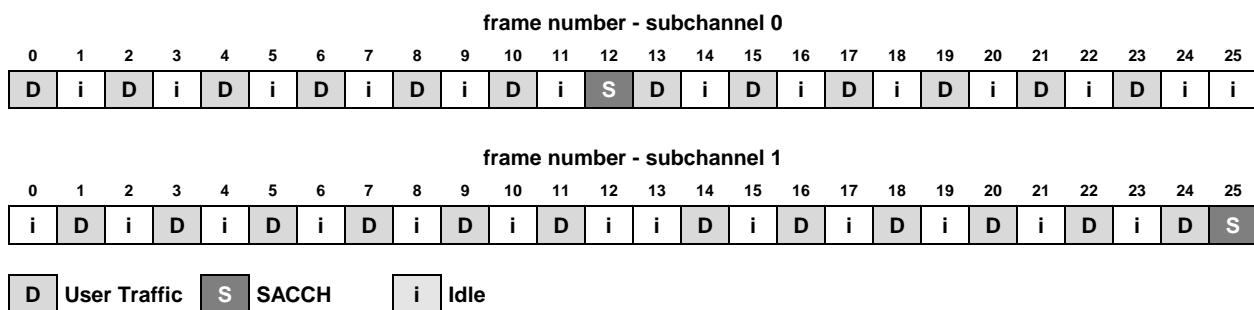


Figure 7. DPSCH/H – Multiframe mapping of logical channels

6.6.5.3 DPSCH quarter rate

This section is ffs.

6.6.5.4 SPSCH full rate

Excluding CBCH, broadcast channels and common control type channels, the following channel combination is possible the way in which channels can be combined onto for a SPSCH full rate:

PDTCH/F + PACCH/F + PTCCCH/F

6.6.5.4.1 Multiframe mapping of logical channels onto SPSCH/F

Figure 8 shows the multiframe mapping of the logical channels for SPSCH/F. Only half of the 52-multiframe is shown, the second half being identical to the first one.

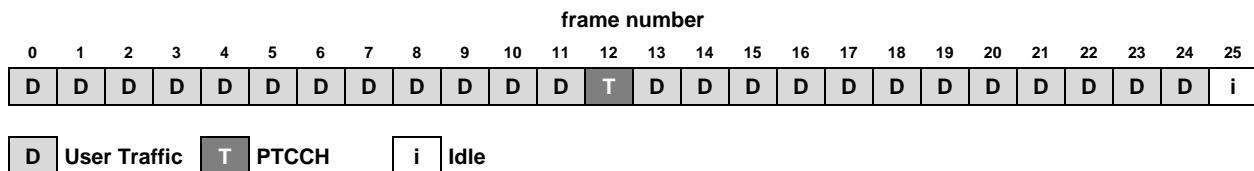


Figure 8. SPSCH/F – Multiframe mapping of logical channels

6.6.5.5 SPSCH half rate

The following channel combination is possible for the way in which channels can be combined onto a SPSCH half rate:

PDTCH/H + PACCH/H + PTCCCH/H

6.6.5.5.1 Multiframe mapping of logical channels onto SPSCH/H

Figure 9 shows the multiframe mapping of the logical channels for SPSCH/F. Only half of the 52-multiframe is shown, the second half being identical to the first one.

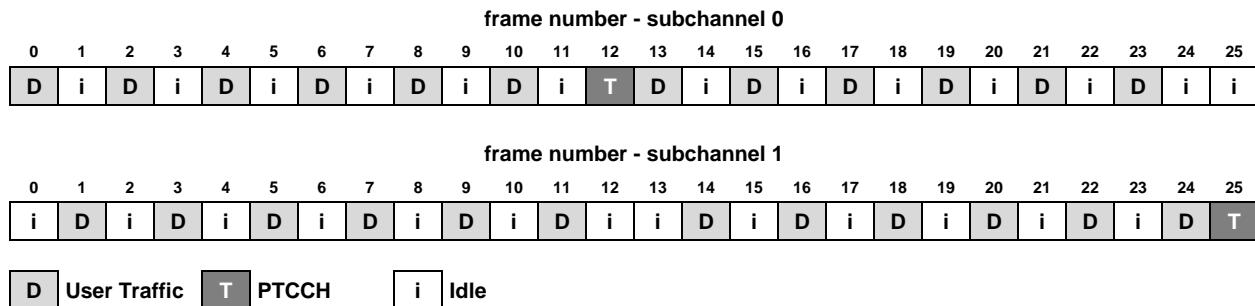


Figure 9. SPSCH/H – Multiframe mapping of logical channels

6.6.6 Physical Layer Functions

An overview of the functions which create the services of the physical layer can be found in [Ref: GERAN'00 Phy - 05.01].

6.6.7 Channel Coding

Table 2: Channel Coding

Logical Channel	Mod.	Radio Block / Frame Size (Bits)	SB (1)	Channel Coding		Interleaving				Physical Subchannel
				Type	Rate	Type	Depth (bursts)			
TCH/AFS	GMSK	464	8	CC		diag	8			DPSCH/F
	8PSK	1392	24	CC						
TCH/AHS	GMSK	232	4	CC		See GSM 05.03	4			DPSCH/H
	8PSK	696	12	CC						
TCH/F	GMSK	See GSM 05.03464	8	CC		diag	19			DPSCH/F (2)
	8PSK	See GSM 05.031392	24	RS+CC						
TCH/H	GMSK	464	8	CC						DPSCH/H (2)
	8PSK	1392	12	RS+CC						
PDTCH/F	GMSK	464	12		CC	rect	4			SPSCH/F
			12							
			8			ffs	ffs			DPSCH/F
			8							
	8PSK	1392	8		CC	rect	4			SPSCH/F (2)
			8							
			12			ffs	ffs			SPSCH/F
			12							
PDTCH/H	GMSK	464	12		CC	rect	4			SPSCH/H
			12							
			8			ffs	ffs			DPSCH/H
			8							
	8PSK	1392	8		CC	rect	4			SPSCH/H (2)
			8							
			12			ffs	ffs			SPSCH/H
			12							

(1) The number of Stealing Bits (SB) is ffs

(2) For DPSCH, whether TCH or PDTCH or both may be used is ffs.

CC: Convolutional Code

RS: Reed Solomon code

Editor's Note: the table above remains to be completed.

7 Mobility Management and Session Management (MM and SM)

This section is ffs.

Annex A (informative): Radio Access Bearer Realization

This annex describes how the different protocols of the GERAN User Plane protocol stack are configured to provide the desired radio access bearer classes (conversational, streaming, interactive and background). Only the traffic over Iu-ps interface is considered.

A.1 Conversational Radio Access Bearer

In the table below, case A represents optimized conversational RAB further described in section A.1.2. Case B represents the generic conversational RAB.

Table 2: Conversational RAB

PDCP	RLC	MAC	Physical Layer							OS	
			Physical SubChannel	Traffic Channel				Coding			
				Type	Interleav.	Mod.	Coding				
Non Transparent <i>Header Stripping</i>	Transp.	Dedicated	DPSCH/F	TCH/F	8 diag	GMSK	UEP	$\frac{As}{TCH/AFS}$	FACCH/F SACCH/TF	1 - 2	
						8PSK (1)	UEP	$\frac{As}{TCH/AFS}$	FACCH/F SACCH/TF	1 - 2	
			DPSCH/H	TCH/H	4 diag	GMSK	UEP	$\frac{As}{TCH/AHS}$	FACCH/H SACCH/TH	1 - 2	
						8PSK	UEP	$\frac{As}{TCH/AHS}$	FACCH/H SACCH/TH]	1 - 2	
Non Transparent <i>Header Compression or No Adaptation</i> Transparent	Unack	Dedicated	DPSCH/F	PDTCH/F TCH/F (2)	ffs	GMSK	EEP		FACCH/F SACCH/TF PACCH/F	1 - 2	
						8PSK	EEP		FACCH/F SACCH/TF PACCH/F	1 - 2	
			DPSCH/H	PDTCH/H TCH/H (2)	ffs	GMSK	EEP		FACCH/H SACCH/TH PACCH/H	1 - 2	
						8PSK	EEP		FACCH/H SACCH/TH PACCH/H	1 - 2	

UEP Unequal Error Protection - EEP Equal Error Protection - OS Operational Scenario Supported

- (1) This row is intended for the realization of wide-band speech codec and is ffs
(2) Whether TCH or PDTCH or both are used is ffs

A.2 Streaming, Interactive, Background Radio Access Bearers

A.2.1 Streaming

Table 3: Streaming RAB

PDCP	RLC	MAC	Physical Layer						OS	
			Physical SubChannel	Traffic Channel				Dedicated Control Channel		
				Type	Interleav.	Mod.	Coding			
Non Transparent <i>Header Compression or No Adaptation</i> Transparent	Unack	Dedicated	DPSCH/F	PDTCH/F TCH/F (1)	ffs	GMSK	EEP	FACCH/F SACCH/TF PACCH/F	NA	
						8PSK	EEP	FACCH/F SACCH/TF PACCH/F	NA	
			DPSCH/H	PDTCH/H TCH/H (1)	ffs	GMSK	EEP	FACCH/H SACCH/TH PACCH/H	NA	
						8PSK	EEP	FACCH/H SACCH/TH PACCH/H	NA	
	Ack	Dedicated	DPSCH/F	PDTCH/F TCH/F (1)	ffs	GMSK	EEP	FACCH/F SACCH/TF PACCH/F	NA	
						8PSK	EEP	FACCH/F SACCH/TF PACCH/F	NA	
			DPSCH/H	PDTCH/H TCH/H (1)	ffs	GMSK	EEP	FACCH/H SACCH/TH PACCH/H	NA	
						8PSK	EEP	FACCH/H SACCH/TH PACCH/H	NA	
Non Transparent <i>Header Compression or No Adaptation</i> Transparent	Unack	Shared	SPSCH/F	PDTCH/F	ffs	GMSK	EEP	PACCH/F PTCCH/F	NA	
						8PSK	EEP	PACCH/F PTCCH/F	NA	
			SPSCH/H	PDTCH/H	ffs	GMSK	EEP	PACCH/H PTCCH/H	NA	
						8PSK	EEP	PACCH/H PTCCH/H	NA	
	Ack	Shared	SPSCH/F	PDTCH/F	ffs	GMSK	EEP	PACCH/F PTCCH/F	NA	
						8PSK	EEP	PACCH/F PTCCH/F	NA	
			SPSCH/H	PDTCH/H	ffs	GMSK	EEP	PACCH/H PTCCH/H	NA	
						8PSK	EEP	PACCH/H PTCCH/H	NA	

UEP Unequal Error Protection - EEP Equal Error Protection - OS Operational Scenario Supported

(1) Whether TCH or PDCTH or both are used is FFS

A.2.2 Interactive

Table 4: Interactive RAB

PDCP	RLC	MAC	Physical Layer							OS	
			Physical SubChannel	Traffic Channel				Dedicated Control Channel			
				Type	Interleav.	Mod.	Coding				
Non Transparent <i>Header Compression</i> <i>No Adaptation</i> Transparent	Ack	Dedicated	DPSCH/F	PDTCH/F	4 rect.	GMSK	EEP	PACCH/F SACCH/TF	FFS	A	
						8PSK	EEP	PACCH/F SACCH/TF	FFS		
			DPSCH/H	PDTCH/H	4 rect.	GMSK	EEP	PACCH/FH SACCH/TH	FFS		
						8PSK	EEP	PACCH/H SACCH/TH	FFS		
	Ack	Shared	SPSCH/F	PDTCH/F	4 rect.	GMSK	EEP	PACCH/F PTCCH/F	NA	B	
						8PSK	EEP	PACCH/F PTCCH/F	NA		
			SPSCH/H	PDTCH/H	4 rect.	GMSK	EEP	PACCH/H PTCCH/H	NA		
						8PSK	EEP	PACCH/H PTCCH/H	NA		

UEP Unequal Error Protection - EEP Equal Error Protection - OS Operational Scenario Supported

A.2.3 Background

Table 5: Background RAB

PDCP	RLC	MAC	Physical Layer							OS	
			Physical SubChannel	Traffic Channel				Dedicated Control Channel			
				Type	Interleav.	Mod.	Coding				
Non Transparent <i>Header Compression</i> <i>No Adaptation</i> Transparent	Ack	Dedicated	DPSCH/F	PDTCH/F	4 rect.	GMSK	EEP	PACCH/F SACCH/TF	2	A	
						8PSK	EEP	PACCH/F SACCH/TF	2		
			DPSCH/H	PDTCH/H	4 rect.	GMSK	EEP	PACCH/FH SACCH/TH	2		
						8PSK	EEP	PACCH/H SACCH/TH	2		
	Ack	Shared	SPSCH/F	PDTCH/F	4 rect.	GMSK	EEP	PACCH/F PTCCH/F	NA	B	
						8PSK	EEP	PACCH/F PTCCH/F	NA		
			SPSCH/H	PDTCH/H	4 rect.	GMSK	EEP	PACCH/H PTCCH/H	NA		
						8PSK	EEP	PACCH/H PTCCH/H	NA		

UEP Unequal Error Protection - EEP Equal Error Protection - OS Operational Scenario Supported

Annex B (informative): Bibliography

The following material, though not specifically referenced in the body of the present document, gives supporting information.

- <Publication>: "<Title>".

Annex C (informative): Document Change History

Document history		
0.0.1	2000-05-05	First version