TSG-RAN Meeting #8
Düsseldorf, Germany, 21-23 June 2000

RP-000264

Title: **Agreed CRs to TS 25.201**

Source: **TSG-RAN WG1**

Agenda item: **5.1.3**

No.	Doc #	Spec	CR	Rev	Subject	Cat	Current_v	New_v
1	R1-000545	25.201	002	-	Corrections to align with TS 25.212 and TR	F	3.0.2	3.1.0
2	R1-000659	25.201	003	1	Editorial corrections	F	3.0.2	3.1.0
3	R1-000644	25.201	004	-	Physical layer information flow	D	3.0.2	3.1.0
4	R1-000780	25.201	005	1	Preferred mathematical notation for editorial unity	D	3.0.2	3.1.0

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25.201	**CR**	**002**	Current Version:	3.0.2

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

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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 [X] Core Network [ ]

Source: TSG RAN WG1 **Date:** 7 April 2000

Subject: Corrections to align with TS 25.212 and TR 25.944

Work item:

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: To align with TS 25.212 V3.2.0, “no channel coding” should be “no coding” in section 4.2.2.
Because TR 25.944 is now V3.0.0, the editor note should be removed in section 5.14.

Clauses affected: 4.2.2, 5.14

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:

4.2.2 Channel coding and interleaving

For the channel coding in UTRA three options are supported:

- Convolutional coding.
- Turbo coding.
- No ~~channel~~ coding.

Channel coding selection is indicated by higher layers. In order to randomise transmission errors, bit interleaving is performed further.

5.14 TR 25.944: Channel coding and multiplexing examples

~~<Editor's Note: The document has not been finalised yet>~~

The scope is to describe examples of channel coding and multiplexing for transport channels of various types and cases.

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25.201	**CR**	**003r1**	Current Version:	3.0.2

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

For submission to: TSG RAN #8 *list expected approval meeting # here ↑*

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

Source: TSG RAN WG1 **Date:** 18 May 2000

Subject: Editorial corrections

Work item:

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

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

Release:

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

Reason for change: ODMA is removed from section 4.2.1, and added to section 5.13.
Two unused abbreviations are removed, and CPCH is newly added to the list.
Several typos are corrected.

Clauses affected: 3, 4.2.1, 5.5, 5.9, 5.13

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 Abbreviations

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

ARQ	Automatic Repeat Request
BER	Bit Error Rate
CCTrCH	Coded Composite Transport Channel
CPCH	Common Packet Channel
DCA	Dynamic channel allocation
DCH	Dedicated Channel
DS-CDMA	Direct-Sequence Code Division Multiple Access
DSCH	Downlink Shared Channel
FAUSCH	Fast Uplink Signalling Channel
FDD	Frequency Division Duplex
FEC	Forward Error Correction
FER	Frame Error Rate
GSM	Global System for Mobile Communication
L1	Layer 1 (physical layer)
L2	Layer 2 (data link layer)
L3	Layer 3 (network layer)
LAC	Link Access Control
MAC	Medium Access Control
Mcps	Mega Chip Per Second
ODMA	Opportunity Driven Multiple Access
~~PCS~~	~~Personal Communications System~~
~~PHS~~	~~Persona Handyphone System~~
QPSK	Quaternary Phase Shift Keying
RACH	Random Access Channel
RF	Radio Frequency
RLC	Radio Link Control
RRC	Radio Resource Control
SAP	Service Access Point
SCCC	Serial Concatenated Convolutional Code
SCH	Synchronisation Channel
SIR	Signal-to-Interference Ratio
TDD	Time Division Duplex
TDMA	Time Division Multiple Access
TFCI	Transport-Format Combination Indicator
UE	User Equipment
UMTS	Universal Mobile Telecommunications System
UTRA	UMTS Terrestrial Radio Access
UTRAN	UMTS Terrestrial Radio Access Network
WCDMA	Wide-band Code Division Multiple Access

4.2.1 Multiple Access

The access scheme is Direct-Sequence Code Division Multiple Access (DS-CDMA) with information spread over approximately 5 MHz bandwidth, thus also often denoted as Wideband CDMA (WCDMA) due that nature.

UTRA has two modes, FDD (Frequency Division Duplex) & TDD (Time Division Duplex), for operating with paired and unpaired bands respectively. The possibility to operate in either FDD or TDD mode allows for efficient utilisation of the available spectrum according to the frequency allocation in different regions. FDD and TDD modes are defined as follows:

FDD: A duplex method whereby uplink and downlink transmissions use two separated radio frequencies. In the FDD, each uplink and downlink uses the different frequency band. A pair of frequency bands which have specified separation shall be assigned for the system.

TDD: A duplex method whereby uplink and downlink transmissions are carried over same radio frequency by using synchronised time intervals. In the TDD, time slots in a physical channel are divided into transmission and reception part. Information on uplink and downlink are transmitted reciprocally.

In UTRA TDD there is TDMA component in the multiple access in addition to DS-CDMA. Thus the multiple access has been also often denoted as TDMA/CDMA due added TDMA nature.

A 10 ms radio frame is divided into 15 slots (2560 chip/slot at the chip rate 3.84 Mcps). A physical channel is therefore defined as a code (or number of codes) and additionally in TDD mode the sequence of time slots completes the definition of a physical channel.

The information rate of the channel varies with the symbol rate being derived from the 3.84 Mcps chip rate and the spreading factor. Spreading factors are from 256 to 4 with FDD uplink, from 512 to 4 with FDD downlink, and from 16 to 1 for TDD uplink and downlink. Thus the respective modulation symbol rates vary from 960 k symbols/s to 15 k symbols/s (7.5 k symbols/s) for FDD uplink (downlink), and for TDD the momentary modulation symbol rates shall vary from 3.84 M symbols/s to 240 k symbols/s.

~~Furthermore, relaying between nodes can be used by means of Opportunity Driven Multiple Access (ODMA) in TDD mode.~~

5.5 TS 25.213: Spreading and modulation (FDD)

The scope is to establish the characteristics of the spreading and modulation in the FDD mode, and to specify:

- the spreading (channeli~~z~~sation plus scrambling);
- generation of channeli~~z~~sation and scrambling codes;
- generation of RACH and CPCH preamble codes;
- generation of SCH synchronisation codes;
- modulation.

RF channel arrangements and Pulse shaping are specified in TS 25.101 for UE and in TS 25.104 for Node-B.

5.9 TS 25.222: Multiplexing and channel coding (TDD)

The scope is to describe multiplexing, channel coding and interleaving in the TDD mode, and to specify:

- channel coding and multiplexing of transport channels into CCTrCHs;
- channel coding alternatives;
- coding for Layer 1 control information, such as TFCI;
- interleaving;
- rate matching;
- physical channel segmentation~~n~~ and mapping.

5.10 TS 25.223: Spreading and modulation (TDD)

The scope is to establish the characteristics of the spreading and modulation in the TDD mode, and to specify:

- data modulation;
- spreading;
- generation of synchronisation codes.

RF channel arrangements and Pulse shaping are specified in TS 25.102 for UE and in TS 25.105 for Node-B.

5.11 TS 25.224: Physical layer procedures (TDD)

The scope is to establish the characteristics of the physical layer procedures in the TDD mode, and to specify:

- cell synchronisation;
- timing advance;
- power control procedures;
- idle mode tasks.

5.12 TS 25.225: Physical layer – Measurements (TDD)

The scope is to establish the characteristics of the physical layer measurements in the TDD mode, and to specify:

- the measurements that Layer 1 is to perform;
- reporting of measurements to higher layers and network;
- handover measurements, idle-mode measurements etc.

5.13 TR 25.833: Physical layer items not for inclusion in Release '99

The scope is to collect materials on UTRA physical layer items not included in the Release '99 specification documents, such as DSCH control channel, FAUSCH, Hybrid ARQ, 4-state SCCC turbo coding, and ODMA.

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25.201	CR	004	Current Version:	3.2.0

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

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

Source: TSG RAN WG1 **Date:** 12 May 2000

Subject: physical layer information flow

Work item:

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

F	Correction		**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	X		Release 99	X
				Release 00	

Reason for change: It is desirable to add an explanatory diagram in the Layer 1 overview document showing the relationships of the WG1 specifications in terms of information flow.

Clauses affected: 4.2.6 (new)

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:

<--------- double-click here for help and instructions on how to create a CR.

4.2.5 Physical layer measurements

Radio characteristics including FER, SIR, Interference power, etc., are measured and reported to higher layers and network. Such measurements are:

1) Handover measurements for handover within UTRA. Specific features being determined in addition to the relative strength of the cell, for the FDD mode the timing relation between for cells for support of asynchronous soft handover.

2) The measurement procedures for preparation for handover to GSM900/GSM1800.

3) The measurement procedures for UE before random access process.

4) The measurement procedures for Dynamic Channel Allocation (DCA) of TDD mode.

4.2.6 Relationship of the physical layer functions

The functionality of the layer 1 is split over several specifications each for FDD and TDD. The following figures, although not categorical, show as an introduction the relationship of layer 1 functions by specification in terms of users plane information flow.

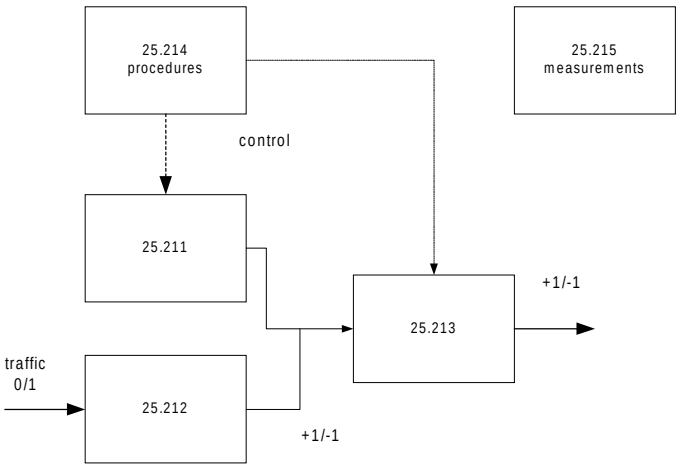

Figure 2 - FDD layer 1 functions relationships by specification

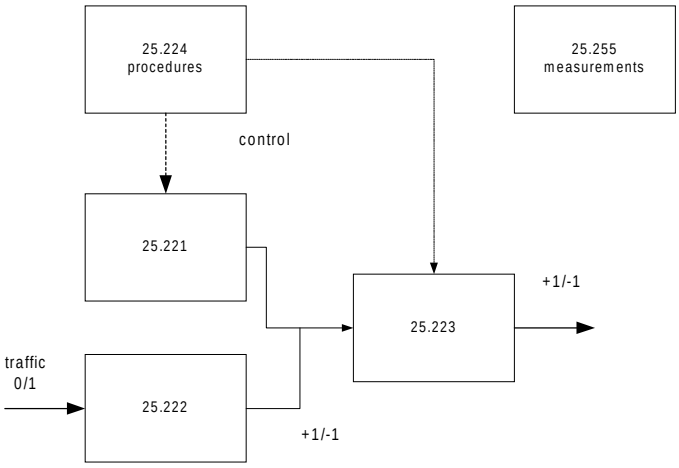

Figure 3 - TDD layer 1 functions relationships by specification

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25.201	CR	005r1	Current Version:	3.0.2

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

Source: TSG RAN WG1 **Date:** 25th May 2000

Subject: Preferred mathematical notation for editorial unity of L1 documentation

Work item: TS 25.201

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

F	Correction		**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	X		Release 99	X
				Release 00	

Reason for change: Currently no unified notation is used throughout RAN WG1 documentation

Clauses affected: New informative annex,

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: Annex A is renumbered Annex B

5.14 TR 25.944: Channel coding and multiplexing examples

<Editor's Note: The document has not been finalised yet>

The scope is to describe examples of channel coding and multiplexing for transport channels of various types and cases.

Annex A (informative) Preferred mathematical notations

The following table contains the preferred mathematical notations used in L1 documentation.

item	notation
multiply product	cross sign, e.g. $a \times b$
matrix product	dot sign, e.g. $a \cdot b$
scalar product (product of a matrix by a scalar)	dot sign, scalar should precede matrix e.g. $(1+j)\cdot\begin{bmatrix} u \\ v \end{bmatrix}$
matrix dimensioning	number of rows × number of column, e.g.: $R \times C$
Kronecker product	$a \otimes b$
bracketing of sets (all elements of same type, not ordered elements)	curly brackets {}, e.g. $\{a_1, a_2, \ldots, a_p\}$, or $\{a_i\}_{i \in \{1,2,\ldots,p\}}$
bracketing of lists (all elements not necessary of same type, ordered elements)	round brackets (), e.g. (A, u, x)
bracketing of sequences (all elements of same type, ordered elements)	angle brackets, e.g. $<a_1, a_2, \ldots, a_p>$ or $\langle a_i \rangle_{i \in \{1,2,\ldots,p\}}$
bracketing of function argument	round brackets, e.g. f(x)
bracketing of array index	square brackets, e.g. a[x]
bracketing of matrix or vector	square brackets [], e.g. $\begin{bmatrix} x \\ y \end{bmatrix}$, $\begin{bmatrix} x & y \end{bmatrix}$, or $\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$
Separation of indexes	use a comma : e.g. $N_{i,j}$
use of italic for symbols	a symbol should be either in italic or in normal font, but mixing up should be avoided.
bracketing of arithmetic expression to force precedence of operations	round brackets : e.g. $(a+b)\times c$
necessity of bracketing arithmetic expressions	When only + and × bracketing is not necessary. When the **mod** operator is used explicit bracketing of mod operands and possibly result should be done.

number type	in a context of non negative integer numbers, some notes should stress when a number is signed, or possibly fractional.
binary **xor** and **and**	respectively use + or ·. If no "mod 2" is explicitly in the expression some text should stress that the operation is modulo 2.
matrix or vector transpose	v^T
1×1 matrices	implicitly cast to its unique element.
vector dot product	$u^T \cdot v$ for column vectors, and $u \cdot v^T$ for line vectors
complex conjugate	v^*
matrix or vector Hermitian transpose	v^H
real part and imaginary part of complex numbers.	Re(x) and Im(x)

Annex ~~A~~ B (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
	RAN_05	RP-99586	-		Approved at TSG RAN #5 and placed under Change Control	-	3.0.0
14/01/00	-	-	-		Modified in terms of its formality. The contents were not changed.	3.0.0	3.0.1
31/03/00	RAN_07	RP-000059	001	-	Editorial revision	3.0.1	3.0.2