TSG-RAN Meeting #11 ***RP-010100***
Palm Springs, CA, U.S.A., 13-16 March 2001

Title: **CRs (Rel-4) for WI "RAN Technical Small Enhancements and Improvements"**

Source: **TSG-RAN WG4**

Agenda item: **6.8**

WI Acronym: TEI4

Doc-2nd-Level	Spec	CR	Subject	Cat	Version-	Version-
R4-010454	25.101	98	Performance requirements for Acquisition Indicator channel	F	3.5.0	4.0.0
R4-010413	25.101	97	Performance requirements for paging channel	F	3.5.0	4.0.0
R4-010281	25.101	96	Performance requirements BCH	F	3.5.0	4.0.0
R4-010252	25.102	47	UE Performance Requirements for 2 Mbps	F	3.5.0	4.0.0
R4-010254	25.102	46	Service Mapping for 2 Mbps	B	3.5.0	4.0.0
R4-010384	25.104	63	RACH implementation requirements	B	3.5.0	4.0.0

3GPP TSG RAN WG4 Meeting #16 **R4-010281**

Vienna, Austria 19th - 23rd February 2001

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CHANGE REQUEST

⌘ **25.101** **CR** **96** ⌘ rev **-** ⌘ Current version: **3.5.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☒ Radio Access Network ☐ Core Network ☐

Title:	⌘	Performance requirements BCH
Source:	⌘	RAN WG4
Work item code:	⌘	TEI4
Date:	⌘	14 February 2001
Category:	⌘	**F**
Release:	⌘	REL-4

Use one of the following categories:
- ***F*** *(essential correction)*
- ***A*** *(corresponds to a correction in an earlier release)*
- ***B*** *(Addition of feature),*
- ***C*** *(Functional modification of feature)*
- ***D*** *(Editorial modification)*

Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	Performance requirements for BCH have been missing. RAN WG4 has agreed to input such tests for release 4.
Summary of change:	⌘	Test parameters and requirements for these tests have been added. Note that the requirements are marked as informative since testing of these requirements seem to be impossible with current 3GPP specifications.
Consequences if not approved:	⌘	There is no information of BCH reception performance in UE core requirements

Clauses affected:	⌘	8.11 (New)
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications
	⌘	
Other comments:	⌘	

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8.10 Blind transport format detection

Performance of Blind transport format detection is determined by the Block Error Ratio (BLER) values and by the measured average transmitted DPCH_Ec/Ior value.

8.10.1 Minimum requirement

For the parameters specified in Table 8.37 the average downlink $\frac{DPCH\_E_c}{I_{or}}$ power shall be below the specified value for the BLER shown in Table 8.38.

Table 8.37: Test parameters for Blind transport format detection

Parameter	Unit	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
$\hat{I}_{or}/I_{oc}$	dB	-1			-3		
I_{oc}	dBm/3.84 MHz	-60					
Information Data Rate	kbps	12.2 (rate 1)	7.95 (rate 2)	1.95 (rate 3)	12.2 (rate 1)	7.95 (rate 2)	1.95 (rate 3)
propagation condition	-	static			multi-path fading case 3		
TFCI	-	off					

Table 8.38: The Requirements for DCH reception in Blind transport format detection

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER	FDR
1	[-17.7dB]	10^{-2}	10^{-4}
2	[-17.8 dB]	10^{-2}	10^{-4}
3	[-18.4 dB]	10^{-2}	10^{-4}
4	[-13.0 dB]	10^{-2}	10^{-4}
5	[-13.2 dB]	10^{-2}	10^{-4}
6	[-13.8 dB]	10^{-2}	10^{-4}

* The value of DPCH_Ec/Ior, Ioc, and Ior/Ioc are defined in case of DPCH is transmitted

NOTE: In this test, 9 different Transport Format Combinations (Table 8.39) are sent during the call set up procedure, so that the UE has to detect the correct transport format from these 9 candidates.

Table 8.39: Transport format combinations informed during the call set up procedure in the test

	1	2	3	4	5	6	7	8	9
DTCH	12.2k	10.2k	7.95k	7.4k	6.7k	5.9k	5.15k	4.75k	1.95k
DCCH				2.4k					

8.11 Detection of Broadcast channel (BCH)

The receiver characteristics of Broadcast Channel (BCH) are determined by the Block Error Ratio (BLER) values. BCH is mapped into the primary common control physical channel (P-CCPCH).

8.11.1 Minimum requirement ~~(Informative)~~

For the parameters specified in Table 8.40 the average downlink power P-CCPCH Ec/Ior shall be below the specified value for the BLER shown in Table 8.41.

Table 8.40: Parameters for BCH detection

Parameter	Unit	Test 1	Test 2
Phase reference	-	P-CPICH	
I_{oc}	dBm/3.84 MHz	-60	
$\hat{I}_{or}/I_{oc}$	dB	-1	-3
Propagation condition		Static	Case 3

Table 8.41: Test requirements for BCH detection

Test Number	P-CCPCH Ec/Ior	BLER
1	-18.5 dB	0.01
2	-12.8 dB	0.01

This doesn't need to be tested.

3GPP TSG RAN WG4 Meeting #16 **R4-010413**

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CHANGE REQUEST

⌘ **25.101** **CR** **97** ⌘ rev **-** ⌘ Current version: **3.5.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☒ Radio Access Network ☐ Core Network ☐

Title:	⌘	Performance requirements for paging channel
Source:	⌘	RAN WG4
Work item code:	⌘	TEI4
Date:	⌘	20 February 2001
Category:	⌘	**F**
Release:	⌘	REL-4

Use one of the following categories:
- ***F*** *(essential correction)*
- ***A*** *(corresponds to a correction in an earlier release)*
- ***B*** *(Addition of feature),*
- ***C*** *(Functional modification of feature)*
- ***D*** *(Editorial modification)*

Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	Performance requirements for paging channel have been missing. RAN WG4 has agreed to input such tests for release 4 in order to increase the reliability of the paging procedure.
Summary of change:	⌘	Test parameters and requirements for these tests have been added into Section 8. Physical channels during the tests have been added into Annex A.
Consequences if not approved:	⌘	There is no performance requirements for paging procedure. Thus in a network there might be UEs with very different performance to receive paging messages. This complicates network planning and has a negative effect on network capacity.

Clauses affected:	⌘	8.2, 8.11 (New), Annex A.6 (New)		
Other specs affected:	⌘	☐ Other core specifications ☒ Test specifications ☐ O&M Specifications	⌘	34.121
Other comments:	⌘			

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8 Performance requirement

8.1 General

The performance requirements for the UE in this subclause are specified for the measurement channels specified in Annex A, the propagation conditions specified in Annex B and the Down link Physical channels specified in Annex C. Unless stated DL power control is OFF.

8.2 Demodulation in static propagation conditions

8.2.1 VoidDemodulation of Paging Channel (PCH)

The receive characteristics of the paging channel in the static environment is determined by the Paging Message Error Ratio (MER). MER is measured at the data rate specified for the paging channel. The UE sleep mode has an upper limit after which it must up wake up and demodulate the paging channel and associated paging messages.

8.2.1.1 Minimum requirement

For the parameters specified in Table 8.1 the MER shall not exceed the piece-wise linear MER curve specified by the points in Table 8.2.

Table 8.1: VoidPCH parameters in static propagation conditions

Parameter	Unit	Value
Phase reference		P-CPICH
$\frac{DPCH\_E_c}{I_{or}}$	dB	
$\frac{SCCPCH\_E_c}{I_{or}}$	dB	
$\hat{I}_{or}/I_{oc}$	dB	-1
I_{oc}	dBm/3.84 MHz	-60
Paging Data Rate		

Table 8.2: VoidPCH requirement in static propagation conditions

TBD	MER
TBD	TBD
TBD	TBD
TBD	TBD

8.2.2 Demodulation of Forward Access Channel (FACH)

The receive characteristics of the Forward Access Channel (FACH) in the static environment are determined by the average message error Ratio (MER). MER is measured at the data rate specified for the FACH.

8.2.2.1 Minimum requirement

For the parameters specified in Table 8.3 the MER shall not exceed the piece-wise linear MER curve specified by the points in table 8.4.

Table 8.3: FACH parameters in static propagation conditions

Parameter	Unit	Value
Phase reference		P-CPICH
$\frac{DPCH\_E_c}{I_{or}}$	dB	
$\frac{SCCPCH\_E_c}{I_{or}}$	dB	
$\hat{I}_{or}/I_{oc}$	dB	-1
I_{oc}	dBm/3.84 MHz	-60
Control Data Rate	?	

Table 8.4: FACH requirements in static propagation conditions

TBD	MER
TBD	TBD
TBD	TBD
TBD	TBD

8.10 Blind transport format detection

Performance of Blind transport format detection is determined by the Block Error Ratio (BLER) values and by the measured average transmitted DPCH_Ec/Ior value.

8.10.1 Minimum requirement

For the parameters specified in Table 8.37 the average downlink $\frac{DPCH\_E_c}{I_{or}}$ power shall be below the specified value for the BLER shown in Table 8.38.

Table 8.37: Test parameters for Blind transport format detection

Parameter	Unit	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
$\hat{I}_{or}/I_{oc}$	dB	-1			-3		
I_{oc}	dBm/3.84 MHz	-60					
Information Data Rate	kbps	12.2 (rate 1)	7.95 (rate 2)	1.95 (rate 3)	12.2 (rate 1)	7.95 (rate 2)	1.95 (rate 3)
propagation condition	-	static			multi-path fading case 3		
TFCI	-	off					

Table 8.38: The Requirements for DCH reception in Blind transport format detection

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER	FDR
1	[-17.7dB]	10^{-2}	10^{-4}
2	[-17.8 dB]	10^{-2}	10^{-4}
3	[-18.4 dB]	10^{-2}	10^{-4}
4	[-13.0 dB]	10^{-2}	10^{-4}
5	[-13.2 dB]	10^{-2}	10^{-4}
6	[-13.8 dB]	10^{-2}	10^{-4}

* The value of DPCH_Ec/Ior, Ioc, and Ior/Ioc are defined in case of DPCH is transmitted

NOTE: In this test, 9 different Transport Format Combinations (Table 8.39) are sent during the call set up procedure, so that the UE has to detect the correct transport format from these 9 candidates.

Table 8.39: Transport format combinations informed during the call set up procedure in the test

	1	2	3	4	5	6	7	8	9
DTCH	12.2k	10.2k	7.95k	7.4k	6.7k	5.9k	5.15k	4.75k	1.95k
DCCH				2.4k					

8.11 Demodulation of Paging Channel (PCH)

The receiver characteristics of paging channel are determined by the probability of missed paging message (Pm-p). PCH is mapped into the S-CCPCH and it is associated with the transmission of Paging Indicators (PI) to support efficient sleep-mode procedures.

8.11.1 Minimum requirement

For the parameters specified in Table 8.40 the average probability of missed paging (Pm-p) shall be below the specified value in Table 8.41. Power of downlink channels other than S-CCPCH and PICH are as defined in Table C.3 of Annex C. S-CCPCH structure is as defined in Annex A.6.

Table 8.40: Parameters for PCH detection

Parameter	Unit	Test 1	Test 2
Number of paging indicators per frame (Np)	-	72	
Phase reference	-	P-CPICH	
I_{oc}	dBm/3.84 MHz	-60	
$\hat{I}_{or}/I_{oc}$	dB	-1	-3
Propagation condition		Static	Case 3

Table 8.41: Test requirements for PCH detection

Test Number	S-CCPCH Ec/Ior	PICH Ec/Ior	Pm-p
1	-14.8	-19.2	0.01
2	-9.8	-12.2	0.01

A.5 DL reference compressed mode parameters

Parameters described in Table A.21 are used in some test specified in TS 25.101 while parameters described in Table A.22 are used in some tests specified in TS 25.133.

Set 1 parameters in Table A.21 are applicable when compressed mode by spreading factor reduction is used in downlink. Set 2 parameters in Table A.21 are applicable when compressed mode by puncturing is used in downlink.

Table A.21: Compressed mode reference pattern 1 parameters

Parameter	Set 1	Set 2	Note
TGSN (Transmission Gap Starting Slot Number)	11	11	
TGL1 (Transmission Gap Length 1)	7	7	
TGL2 (Transmission Gap Length 2)	-	-	Only one gap in use.
TGD (Transmission Gap Distance)	0	0	Only one gap in use.
TGPL1 (Transmission Gap Pattern Length)	2	4	
TGPL2 (Transmission Gap Pattern Length)	-	-	Only one pattern in use.
TGPRC (Transmission Gap Pattern Repetition Count)	NA	NA	Defined by higher layers
TGCFN (Transmission Gap Connection Frame Number):	NA	NA	Defined by higher layers
UL/DL compressed mode selection	DL & UL	DL & UL	2 configurations possible DL &UL / DL
UL compressed mode method	SF/2	SF/2	
DL compressed mode method	SF/2	Puncturing	
Downlink frame type and Slot format	11B	11A	
Scrambling code change	No	No	
RPP (Recovery period power control mode)	0	0	
ITP (Initial transmission power control mode)	0	0	

Table A.22: Compressed mode reference pattern 2 parameters

Parameter	Set 1	Set 2	Note
TGSN (Transmission Gap Starting Slot Number)	4	4	
TGL1 (Transmission Gap Length 1)	7	7	
TGL2 (Transmission Gap Length 2)	-	-	Only one gap in use.
TGD (Transmission Gap Distance)	0	0	
TGPL1 (Transmission Gap Pattern Length)	3	12	
TGPL2 (Transmission Gap Pattern Length)	-	-	Only one pattern in use.
TGPRC (Transmission Gap Pattern Repetition Count)	NA	NA	Defined by higher layers
TGCFN (Transmission Gap Connection Frame Number):	NA	NA	Defined by higher layers
UL/DL compressed mode selection	DL & UL	DL & UL	2 configurations possible. DL & UL / DL
UL compressed mode method	SF/2	SF/2	
DL compressed mode method	SF/2	SF/2	
Downlink frame type and Slot format	11B	11B	
Scrambling code change	No	No	
RPP (Recovery period power control mode)	0	0	
ITP (Initial transmission power control mode)	0	0	

A.6 DL reference parameters for PCH tests

The parameters for the PCH demodulation tests are specified in Table A.23 and Table A.24.

Table A.23: Physical channel parameters for S-CCPCH.

Parameter	Unit	Level
Channel bit rate	kbps	60
Channel symbol rate	ksps	30
Slot Format #i	-	4
TFCI	-	OFF
Power offsets of TFCI and Pilot fields relative to data field	dB	0

Table A.24: Transport channel parameters for S-CCPCH

Parameter	PCH
Transport Channel Number	1
Transport Block Size	240
Transport Block Set Size	240
Transmission Time Interval	10 ms
Type of Error Protection	Convolution Coding
Coding Rate	1/2
Rate Matching attribute	256
Size of CRC	16
Position of TrCH in radio frame	fixed

3GPP TSG RAN WG4 Meeting #16 **R4-010454**

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CHANGE REQUEST

⌘ **25.101** **CR** **98** ⌘ rev **-** ⌘ Current version: **3.5.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☒ Radio Access Network ☐ Core Network ☐

Title:	⌘	Performance requirements for Acquisition Indicator channel
Source:	⌘	RAN WG4
Work item code:	⌘	TEI4
Date:	⌘	23 February 2001
Category:	⌘	**F**
Release:	⌘	REL-4

Use one of the following categories:
- ***F*** *(essential correction)*
- ***A*** *(corresponds to a correction in an earlier release)*
- ***B*** *(Addition of feature),*
- ***C*** *(Functional modification of feature)*
- ***D*** *(Editorial modification)*

Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	Performance requirements for AI have been missing.
Summary of change:	⌘	Test parameters and requirements for AI test have been added into Section 8.
Consequences if not approved:	⌘	There is no performance requirements for AICH procedure. Thus in a network there might be UEs with very different performance of receiving Acquisition Indicators. This complicates network planning and has a negative effect on network capacity.

Clauses affected:	⌘	8.11 (New)		
Other specs affected:	⌘	☐ Other core specifications ☒ Test specifications ☐ O&M Specifications	⌘	34.121
Other comments:	⌘			

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8.10 Blind transport format detection

Performance of Blind transport format detection is determined by the Block Error Ratio (BLER) values and by the measured average transmitted DPCH_Ec/Ior value.

8.10.1 Minimum requirement

For the parameters specified in Table 8.37 the average downlink $\frac{DPCH\_E_c}{I_{or}}$ power shall be below the specified value for the BLER shown in Table 8.38.

Table 8.37: Test parameters for Blind transport format detection

Parameter	Unit	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
$\hat{I}_{or}/I_{oc}$	dB	-1			-3		
I_{oc}	dBm/3.84 MHz	-60					
Information Data Rate	kbps	12.2 (rate 1)	7.95 (rate 2)	1.95 (rate 3)	12.2 (rate 1)	7.95 (rate 2)	1.95 (rate 3)
propagation condition	-	static			multi-path fading case 3		
TFCI	-	off					

Table 8.38: The Requirements for DCH reception in Blind transport format detection

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER	FDR
1	[-17.7dB]	10^{-2}	10^{-4}
2	[-17.8 dB]	10^{-2}	10^{-4}
3	[-18.4 dB]	10^{-2}	10^{-4}
4	[-13.0 dB]	10^{-2}	10^{-4}
5	[-13.2 dB]	10^{-2}	10^{-4}
6	[-13.8 dB]	10^{-2}	10^{-4}

* The value of DPCH_Ec/Ior, Ioc, and Ior/Ioc are defined in case of DPCH is transmitted

NOTE: In this test, 9 different Transport Format Combinations (Table 8.39) are sent during the call set up procedure, so that the UE has to detect the correct transport format from these 9 candidates.

Table 8.39: Transport format combinations informed during the call set up procedure in the test

	1	2	3	4	5	6	7	8	9
DTCH	12.2k	10.2k	7.95k	7.4k	6.7k	5.9k	5.15k	4.75k	1.95k
DCCH				2.4k					

8.11 Detection of Acquisition Indicator (AI)

The receiver characteristics of Acquisition Indicator (AI) are determined by the probability of false alarm Pfa and probability of correct detection Pd. Pfa is defined as a conditional probability of detection of AI signature given that a AI signature was not transmitted. Pd is defined as a conditional probability of correct detection of AI signature given that the AI signature is transmitted.

8.11.1 Minimum requirement

For the parameters specified in Table8.40 the Pfa and 1-Pd shall not the exceed the specified values in Table 8.41. Power of downlink channels other than AICH is as defined in Table C.3 of Annex C.

Table 8.40: Parameters for AI detection

Parameter	Unit	Test 1
Phase reference	-	P-CPICH
I_{oc}	dBm/3.84 MHz	-60
Number of other transmitted AI signatures on AICH	-	0
$\hat{I}_{or}/I_{oc}$	dB	-1
AICH_Ec/Ior	dB	-23.0
AICH Power Offset	dB	-13.0
Propagation condition	-	Static

Note that AICH_Ec/Ior can not be set. Its value is calculated from other parameters and it is given for information only. (AICH_Ec/Ior = AICH Power Offset + CPICH_Ec/Ior)

Table 8.41: Test requirements for AI detection

Test Number	Pfa	1-Pd
1	0.01	0.01

3GPP TSG RAN WG4 Meeting #16 **R4-010254**

Vienna, Austria 19th - 23rd February 2001

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CHANGE REQUEST

⌘ **25.102** **CR** **46** ⌘ rev **x** ⌘ Current version: **3.5.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☒ Radio Access Network ☐ Core Network ☐

Title:	⌘	Service Mapping for 2 Mbps
Source:	⌘	RAN WG4
Work item code:	⌘	TEI4
Date:	⌘	19-23 Feb 2001
Category:	⌘	**B**
Release:	⌘	REL-4

Use one of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	Reference measurement channel for DL 2 Mbps not available.
Summary of change:	⌘	Added service mapping for DL 2 Mbps in Annex A.
Consequences if not approved:	⌘	The references are necessary for the completeness of specification

Clauses affected:	⌘	Annex A 2.6 (new)
Other specs Affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications
	⌘	
Other comments:	⌘	

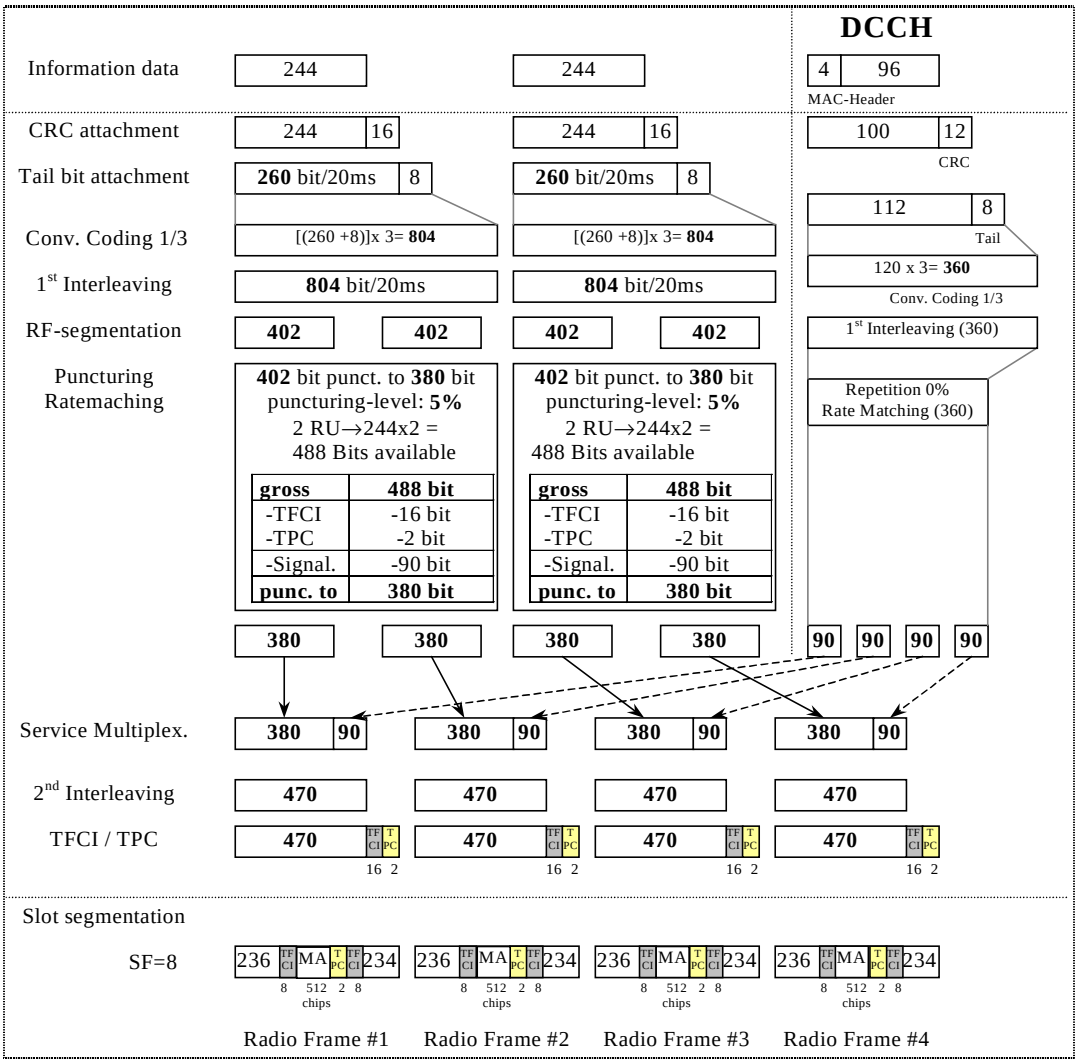
Annex A (normative): Measurement channels

A.1 General

A.2 Reference measurement channel

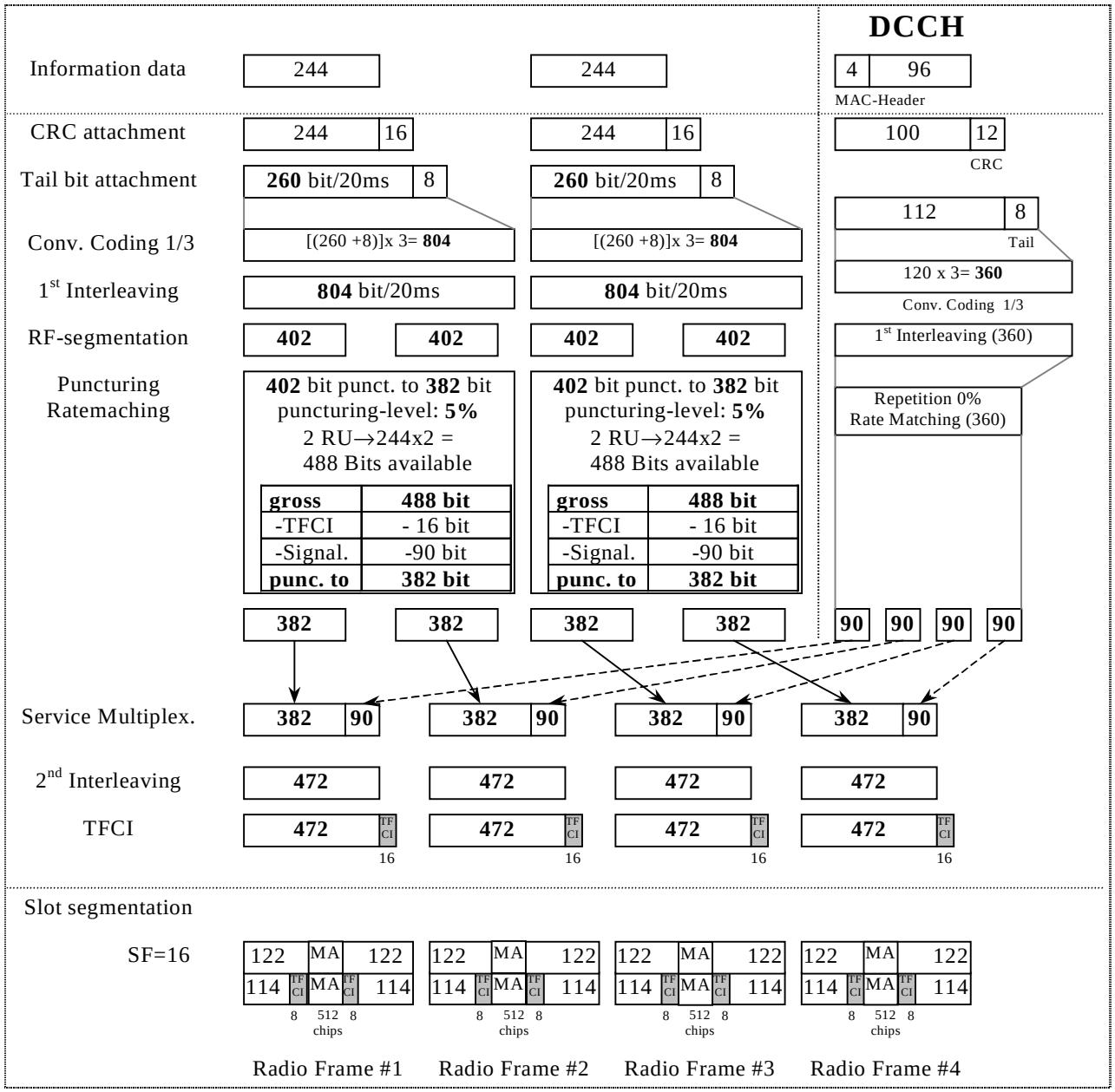
A.2.1 UL reference measurement channel (12.2 kbps)

Parameter	
Information data rate	*12.2 kbps*
RU´s allocated	*2 RU*
Midamble	**512** chips
Interleaving	20 ms
Power control	2 Bit/user
TFCI	16 Bit/user
Inband signalling DCCH	2 kbps
Puncturing level at Code rate 1/3 : DCH / DCCH	5% / 0%


DCCH
Information data
244
244
4
96
MAC-Header
CRC attachment
244
16
244
16
100
12
CRC
Tail bit attachment
260 bit/20ms
8
260 bit/20ms
8
112
8
Tail
Conv. Coding 1/3
[(260 +8)]x 3= 804
[(260 +8)]x 3= 804
120 x 3= 360
Conv. Coding 1/3
1st Interleaving
804 bit/20ms
804 bit/20ms
RF-segmentation
402
402
402
402
1st Interleaving (360)
Puncturing
Ratematching
402 bit punct. to 380 bit
puncturing-level: 5%
2 RU→244x2 =
488 Bits available
gross
488 bit
-TFCI
-TPC
-16 bit
-2 bit
-Signal.
-90 bit
punc. to
380 bit
402 bit punct. to 380 bit
puncturing-level: 5%
2 RU→244x2 =
488 Bits available
gross
488 bit
-TFCI
-TPC
-16 bit
-2 bit
-Signal.
-90 bit
punc. to
380 bit
Repetition 0%
Rate Matching (360)
380
380
380
380
90
90
90
90
Service Multiplex.
380
90
380
90
380
90
380
90
2nd Interleaving
470
470
470
470
TFCI / TPC
470
TFCI
TPC
16 2
470
TFCI
TPC
16 2
470
TFCI
TPC
16 2
470
TFCI
TPC
16 2
Slot segmentation
SF=8
236
TFCI
MA
TPC
TFCI
234
8 512 2 8
chips
236
TFCI
MA
TPC
TFCI
234
8 512 2 8
chips
236
TFCI
MA
TPC
TFCI
234
8 512 2 8
chips
236
TFCI
MA
TPC
TFCI
234
8 512 2 8
chips
Radio Frame #1
Radio Frame #2
Radio Frame #3
Radio Frame #4

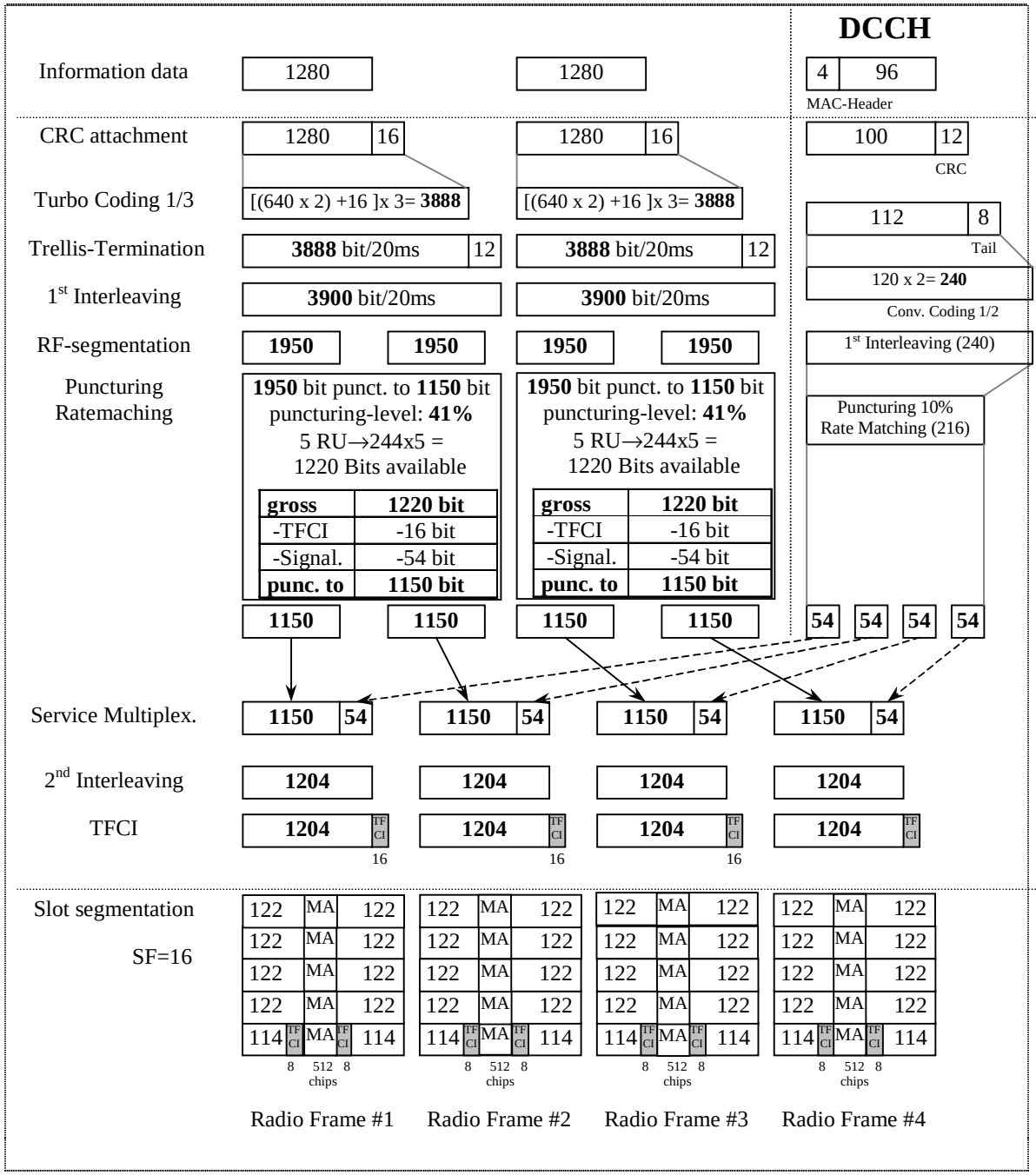
A.2.2 DL reference measurement channel (12.2 kbps)

Parameter	
Information data rate	12.2 kbps
RU´s allocated	2 RU
Midamble	512 chips
Interleaving	20 ms
Power control	0 Bit/user
TFCI	16 Bit/user
Inband signalling DCCH	2 kbps
Puncturing level at Code rate 1/3 : DCH / DCCH	5% / 0 %



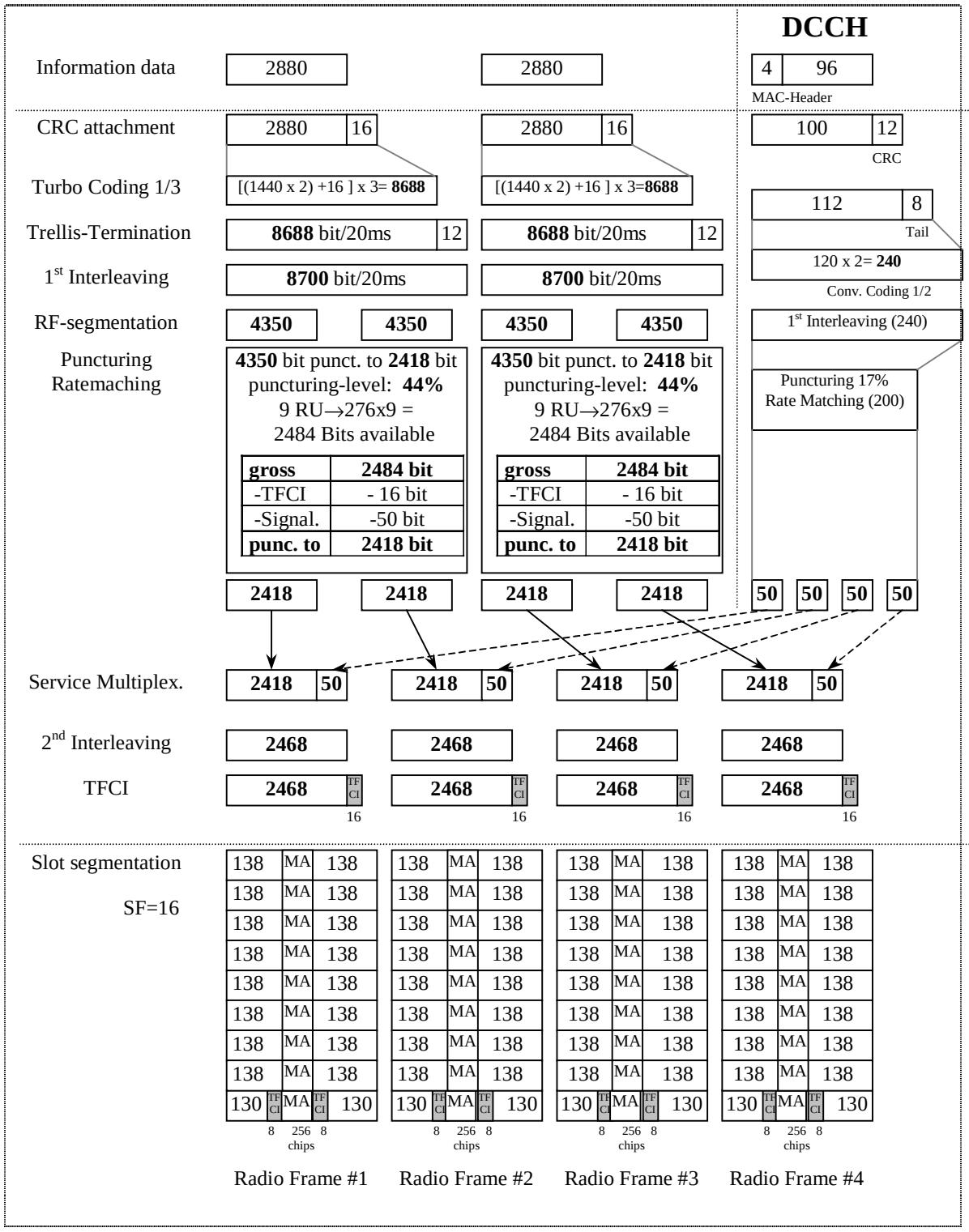
A.2.3 DL reference measurement channel (64 kbps)

Parameter	
Information data rate	64 kbps
RU´s allocated	5 codes SF16 = 5RU
Midamble	512 chips
Interleaving	20 ms
Power control	0 Bit/user
TFCI	16 Bit/user
Inband signalling DCCH	2 kbps
Puncturing level at Code rate : 1/3 DCH / ½ DCCH	41.1% / 10%


DCCH
Information data
1280
1280
4
96
MAC-Header
CRC attachment
1280
16
1280
16
100
12
CRC
Turbo Coding 1/3
[(640 x 2) +16]x 3= 3888
[(640 x 2) +16]x 3= 3888
112
8
Tail
Trellis-Termination
3888 bit/20ms
12
3888 bit/20ms
12
120 x 2= 240
Conv. Coding 1/2
1st Interleaving
3900 bit/20ms
3900 bit/20ms
1st Interleaving (240)
RF-segmentation
1950
1950
1950
1950
Puncturing
Ratemaching
1950 bit punct. to 1150 bit
puncturing-level: 41%
5 RU→244x5 =
1220 Bits available
gross 1220 bit
-TFCI -16 bit
-Signal. -54 bit
punc. to 1150 bit
1950 bit punct. to 1150 bit
puncturing-level: 41%
5 RU→244x5 =
1220 Bits available
gross 1220 bit
-TFCI -16 bit
-Signal. -54 bit
punc. to 1150 bit
Puncturing 10%
Rate Matching (216)
1150
1150
1150
1150
54
54
54
54
Service Multiplex.
1150
54
1150
54
1150
54
1150
54
2nd Interleaving
1204
1204
1204
1204
TFCI
1204
TF CI
16
1204
TF CI
16
1204
TF CI
16
1204
TF CI
Slot segmentation
SF=16
122 MA 122
114 TF CI MA TF CI 114
8 512 8 chips
Radio Frame #1
Radio Frame #2
Radio Frame #3
Radio Frame #4

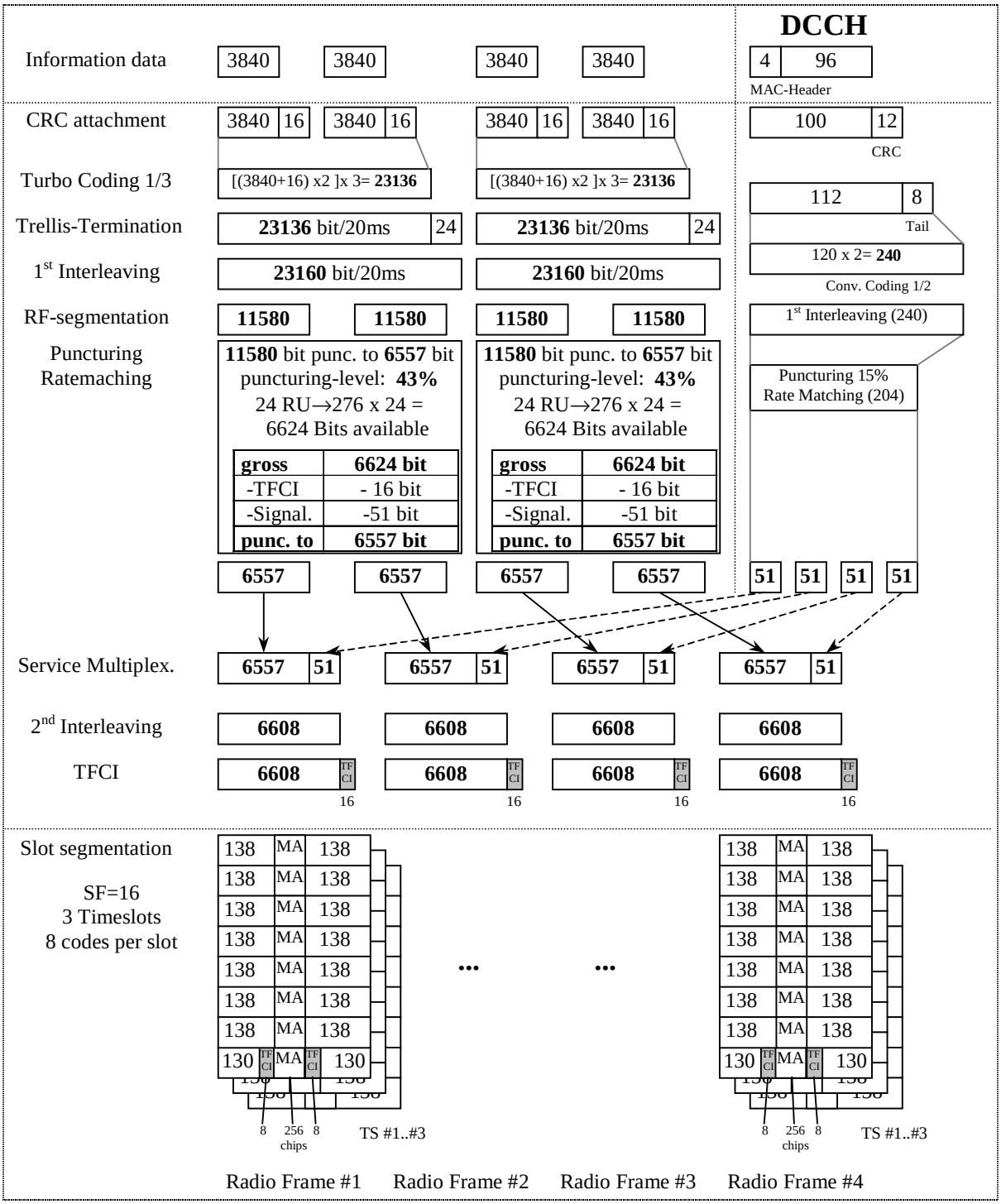
A.2.4 DL reference measurement channel (144 kbps)

Parameter	
Information data rate	144 kbps
RU´s allocated	9 codes SF16 = 9RU
Midamble	256 chips
Interleaving	20 ms
Power control	0 Bit/user
TFCI	16 Bit/user
Inband signalling DCCH	2 kbps
Puncturing level at Code rate: 1/3 DCH / ½ DCCH	44.5% / 16.6%


DCCH
Information data
2880
2880
4
96
MAC-Header
CRC attachment
2880
16
2880
16
100
12
CRC
Turbo Coding 1/3
[(1440 x 2) +16] x 3= 8688
[(1440 x 2) +16] x 3=8688
112
8
Tail
Trellis-Termination
8688 bit/20ms
12
8688 bit/20ms
12
120 x 2= 240
Conv. Coding 1/2
1st Interleaving
8700 bit/20ms
8700 bit/20ms
RF-segmentation
4350
4350
4350
4350
1st Interleaving (240)
Puncturing
Ratemaching
4350 bit punct. to 2418 bit
puncturing-level: 44%
9 RU→276x9 =
2484 Bits available
gross 2484 bit
-TFCI - 16 bit
-Signal. -50 bit
punc. to 2418 bit
4350 bit punct. to 2418 bit
puncturing-level: 44%
9 RU→276x9 =
2484 Bits available
gross 2484 bit
-TFCI - 16 bit
-Signal. -50 bit
punc. to 2418 bit
Puncturing 17%
Rate Matching (200)
2418
2418
2418
2418
50
50
50
50
Service Multiplex.
2418
50
2418
50
2418
50
2418
50
2nd Interleaving
2468
2468
2468
2468
TFCI
2468
TF CI
16
2468
TF CI
16
2468
TF CI
16
2468
TF CI
16
Slot segmentation
SF=16
138
MA
138
130
TF CI
8
256 chips
Radio Frame #1
Radio Frame #2
Radio Frame #3
Radio Frame #4

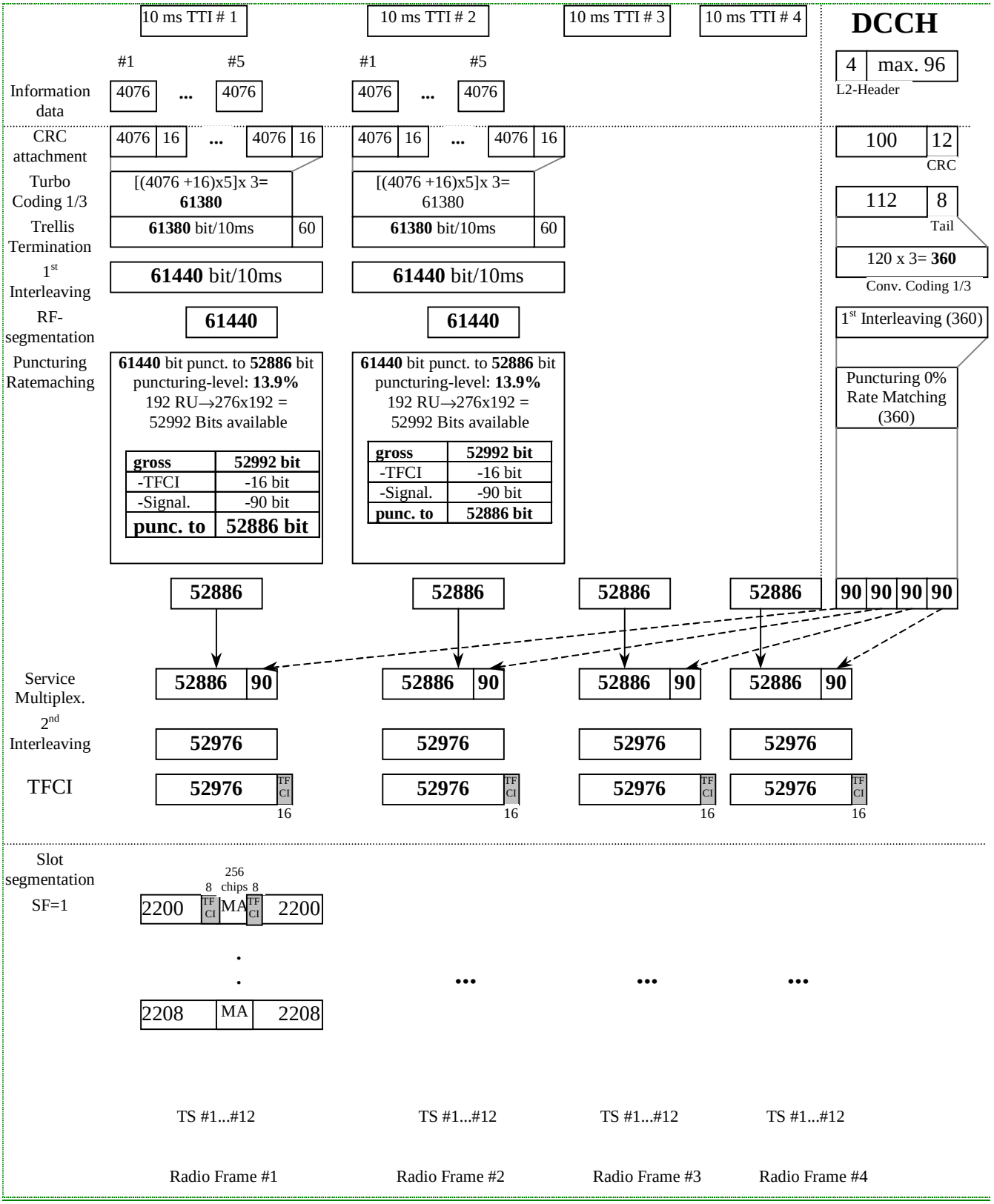
A.2.5 DL reference measurement channel (384 kbps)

Parameter	
Information data rate	384 kbps
RU´s allocated	8*3TS = 24RU
Midamble	256 chips
Interleaving	20 ms
Power control	0 Bit/user
TFCI	16 Bit/user
Inband signalling DCCH	2 kbps
Puncturing level at Code rate : 1/3 DCH / ½ DCCH	43.4% / 15.3%


DCCH
Information data
3840
3840
3840
3840
4
96
MAC-Header
CRC attachment
3840
16
3840
16
3840
16
3840
16
100
12
CRC
Turbo Coding 1/3
[(3840+16) x2]x 3= 23136
[(3840+16) x2]x 3= 23136
112
8
Tail
Trellis-Termination
23136 bit/20ms
24
23136 bit/20ms
24
120 x 2= 240
1st Interleaving
23160 bit/20ms
23160 bit/20ms
Conv. Coding 1/2
RF-segmentation
11580
11580
11580
11580
1st Interleaving (240)
Puncturing
Ratemaching
11580 bit punc. to 6557 bit
puncturing-level: 43%
24 RU→276 x 24 =
6624 Bits available
11580 bit punc. to 6557 bit
puncturing-level: 43%
24 RU→276 x 24 =
6624 Bits available
Puncturing 15%
Rate Matching (204)
gross
6624 bit
-TFCI
- 16 bit
-Signal.
-51 bit
punc. to
6557 bit
gross
6624 bit
-TFCI
- 16 bit
-Signal.
-51 bit
punc. to
6557 bit
6557
6557
6557
6557
51
51
51
51
Service Multiplex.
6557
51
6557
51
6557
51
6557
51
2nd Interleaving
6608
6608
6608
6608
TFCI
6608
TF CI
16
6608
TF CI
16
6608
TF CI
16
6608
TF CI
16
Slot segmentation
SF=16
3 Timeslots
8 codes per slot
138
MA
138
130
TF CI
MA
TF CI
130
8
256 chips
8
TS #1..#3
Radio Frame #1
Radio Frame #2
Radio Frame #3
Radio Frame #4

A.2.6 DL reference measurement channel (2 Mbps)

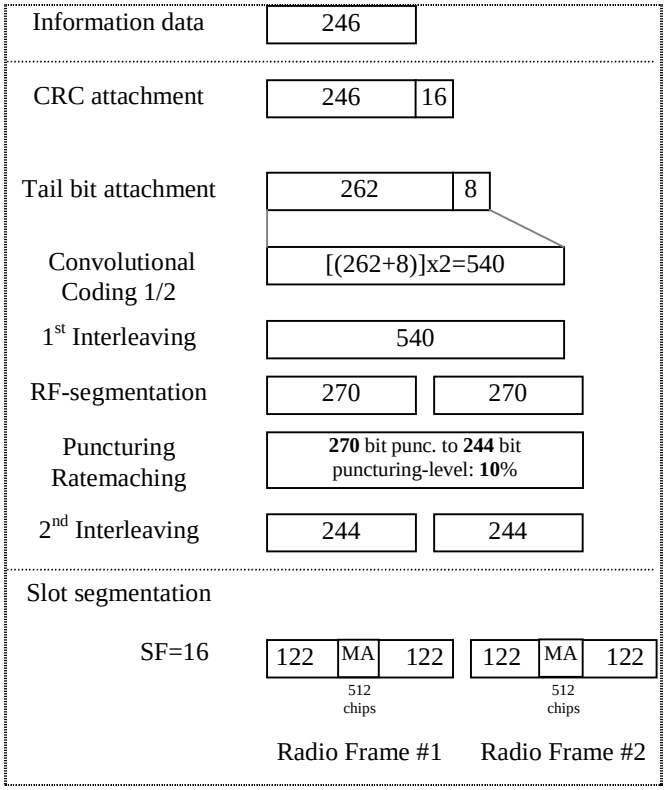
Parameter	
Information data rate	**2048 kbps**
RU´s allocated	*16*12TS = 192RU*
Midamble	**256** chips
Interleaving	10 ms
Power control	0 Bit/user
TFCI	16 Bit/user
Inband signalling DCCH	2 kbps
Puncturing level at Code rate 1/3 : DCH / DCCH	13.9% / 0%


10 ms TTI # 1
10 ms TTI # 2
10 ms TTI # 3
10 ms TTI # 4
DCCH
#1
#5
#1
#5
Information data
4076
...
4076
4076
...
4076
4
max. 96
L2-Header
CRC attachment
4076
16
...
4076
16
4076
16
...
4076
16
100
12
CRC
Turbo Coding 1/3
[(4076 +16)x5]x 3= 61380
[(4076 +16)x5]x 3= 61380
112
8
Tail
Trellis Termination
61380 bit/10ms
60
61380 bit/10ms
60
120 x 3= 360
Conv. Coding 1/3
1st Interleaving
61440 bit/10ms
61440 bit/10ms
RF-segmentation
61440
61440
1st Interleaving (360)
Puncturing Ratematching
61440 bit punct. to 52886 bit puncturing-level: 13.9%
192 RU→276x192 = 52992 Bits available
gross 52992 bit
-TFCI -16 bit
-Signal. -90 bit
punc. to 52886 bit
61440 bit punct. to 52886 bit puncturing-level: 13.9%
192 RU→276x192 = 52992 Bits available
gross 52992 bit
-TFCI -16 bit
-Signal. -90 bit
punc. to 52886 bit
Puncturing 0% Rate Matching (360)
52886
52886
52886
52886
90
90
90
90
Service Multiplex.
52886
90
52886
90
52886
90
52886
90
2nd Interleaving
52976
52976
52976
52976
TFCI
52976
TF CI
16
52976
TF CI
16
52976
TF CI
16
52976
TF CI
16
Slot segmentation
SF=1
256 chips
8
8
2200
TF CI
MA
TF CI
2200
2208
MA
2208
...
...
...
TS #1...#12
TS #1...#12
TS #1...#12
TS #1...#12
Radio Frame #1
Radio Frame #2
Radio Frame #3
Radio Frame #4

A.2.7~~6~~BCH reference measurement channel

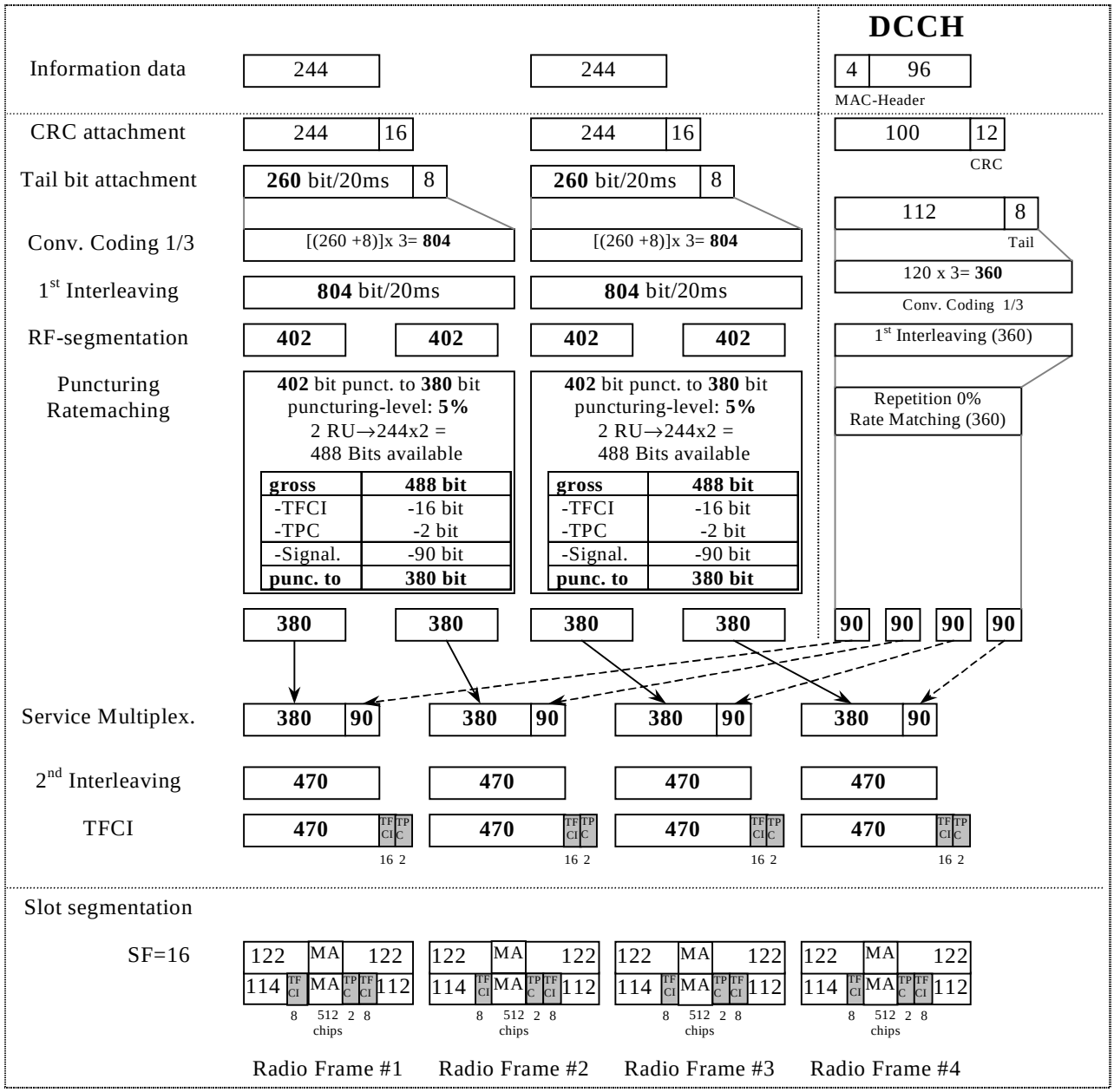
[mapped to 1 code SF16]

Parameter	
Information data rate:	12.3 kbps
RU´s allocated	1 RU
Midamble	**512** chips
Interleaving	20 ms
Power control	0 bit
TFCI	0 bit
Puncturing level	10%



A.2.~~8~~7 UL multi code reference measurement channel (12.2 kbps)

Parameter	
Information data rate	12.2 kbps
RU´s allocated	2 RU
Midamble	512 chips
Interleaving	20 ms
Power control	2 Bit/user
TFCI	16 Bit/user
Inband signalling DCCH	2 kbps
Puncturing level at Code rate 1/3 : DCH / DCCH	5% / 0 %



3GPP TSG RAN WG4 Meeting #16 **R4-010252**

Vienna, Austria 19th - 23rd February 2001

CR-Form-v3

CHANGE REQUEST

⌘ **25.102** **CR** **47** ⌘ rev **x** ⌘ Current version: **3.5.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☒ Radio Access Network ☐ Core Network ☐

Title:	⌘	UE Performance Requirements for 2 Mbps
Source:	⌘	RAN WG4
Work item code:	⌘	TEI4
Date:	⌘	19-23 Feb 2001
Category:	⌘	**F**
Release:	⌘	REL-4

Use one of the following categories:
- ***F*** *(essential correction)*
- ***A*** *(corresponds to a correction in an earlier release)*
- ***B*** *(Addition of feature),*
- ***C*** *(Functional modification of feature)*
- ***D*** *(Editorial modification)*

Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	Based on simulation results, 2 Mbps UE performance requirements are proposed.
Summary of change:	⌘	UE Performance Requirements for 2 Mbps service are added in Section 8.
Consequences if not approved:	⌘	UE can not be tested for 2 Mbps without specified performance requirements.

Clauses affected:	⌘	8.1, 8.2.1.1, 8.3.2.1, 8.3.3.1
Other specs Affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

8 Performance requirement

8.1 General

The performance requirements for the UE in this section are specified for the measurement channels specified in Annex A and the propagation condition specified in Annex B.

Table 8.1: Summary of UE performance targets

Test Chs.	Information Data Rate	Static	Multi-path Case 1	Multi-path Case 2	Multi-path Case 3
		Performance metric			
DCH	12.2 kbps	BLER<10^{-2}	BLER<10^{-2}	BLER<10^{-2}	BLER<10^{-2}
	64 kbps	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}, 10^{-3}
	144 kbps	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}, 10^{-3}
	384 kbps	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}, 10^{-3}
	2048 kbps	BLER < 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}	BLER<10^{-1}, 10^{-2}, 10^{-3}
BCH	12.3kbps		BLER< 10^{-2}		

8.2 Demodulation in static propagation conditions

8.2.1 Demodulation of DCH

The performance requirement of DCH in static propagation conditions is determined by the maximum Block Error Ratio (BLER). The BLER is specified for each individual data rate of the DCH. DCH is mapped into the Dedicated Physical Channel (DPCH).

8.2.1.1 Minimum requirement

For the parameters specified in Table 8.2 the BLER should not exceed the piece-wise linear BLER curve specified in Table 8.3. These requirements are applicable for TFCS size 16.

Table 8.2: DCH parameters in static propagation conditions

Parameters	Unit	Test 1	Test 2	Test 3	Test 4	Test 5
$\frac{\Sigma DPCH\_E_c}{I_{or}}$	dB	-6	-3	0	0	0
I_{oc}	dBm/3.84 MHz	-60				
Information Data Rate	kbps	12.2	64	144	384	2048

Table 8.3: Performance requirements in AWGN channel.

Test Number	$\frac{\hat{I}_{or}}{I_{oc}}$ [dB]	BLER
1	0.1	10^{-2}
2	2.3	10^{-1}
	2.6	10^{-2}
3	2.2	10^{-1}
	2.4	10^{-2}
4	1.6	10^{-1}
	1.8	10^{-2}
5	3.5	10^{-1}
	3.6	10^{-2}

8.3 Demodulation of DCH in multipath fading conditions

8.3.1 Multipath fading Case 1

The performance requirement of DCH is determined by the maximum Block Error Ratio (BLER). The BLER is specified for each individual data rate of the DCH. DCH is mapped into the Dedicated Physical Channel (DPCH).

8.3.1.1 Minimum requirement

For the parameters specified in Table 8.4 the BLER should not exceed the piece-wise linear BLER curve specified in Table 8.5. These requirement are applicable for TFCS size 16.

Table 8.4: DCH parameters in multipath Case 1 channel

Parameters	Unit	Test 1	Test 2	Test 3	Test 4	Test 5
$\frac{\Sigma DPCH\_E_c}{I_{or}}$	DB	-6	-3	0	0	0
I_{oc}	dBm/3.84 MHz	-60				
Information Data Rate	kbps	12.2	64	144	384	2048

Table 8.5: Performance requirements in multipath Case 1 channel.

Test Number	$\frac{\hat{I}_{or}}{I_{oc}}$ [dB]	BLER
1	13.5	10^{-2}
2	13.3	10^{-1}
	19.6	10^{-2}
3	13.3	10^{-1}
	19.7	10^{-2}
4	13.5	10^{-1}
	20.2	10^{-2}
5	13.2	10^{-1}
	17.8	10^{-2}

8.3.2 Multipath fading Case 2

The performance requirement of DCH is determined by the maximum Block Error Ratio (BLER). The BLER is specified for each individual data rate of the DCH. DCH is mapped into the Dedicated Physical Channel (DPCH).

8.3.2.1 Minimum requirement

For the parameters specified in Table 8.6 the BLER should not exceed the piece-wise linear BLER curve specified in Table 8.7. These requirements are applicable for TFCS size 16.

Table 8.6: DCH parameters in multipath Case 2 channel

Parameters	Unit	Test 1	Test 2	Test 3	Test 4	Test 5
$\frac{\Sigma DPCH\_E_c}{I_{or}}$	DB	-3	0	0	0	0
I_{oc}	dBm/3.84 MHz	-60				
Information Data Rate	kbps	12.2	64	144	384	2048

Table 8.7: Performance requirements in multipath Case 2 channel.

Test Number	$\frac{\hat{I}_{or}}{I_{oc}}$ [dB]	BLER
1	5.5	10^{-2}
2	5.8	10^{-1}
	9.7	10^{-2}
3	9.5	10^{-1}
	13.2	10^{-2}
4	8.5	10^{-1}
	12.6	10^{-2}
5	10.3	10^{-1}
	12.7	10^{-2}

8.3.3 Multipath fading Case 3

The performance requirement of DCH is determined by the maximum Block Error Ratio (BLER). The BLER is specified for each individual data rate of the DCH. DCH is mapped into the Dedicated Physical Channel (DPCH).

8.3.3.1 Minimum requirement

For the parameters specified in Table 8.8 the BLER should not exceed the piece-wise linear BLER curve specified in Table 8.9. These requirements are applicable for TFCS size 16.

Table 8.8: DCH parameters in multipath Case 3 channel

Parameters	Unit	Test 1	Test 2	Test 3	Test 4	Test 5
$\frac{\Sigma DPCH\_E_c}{I_{or}}$	dB	-3	0	0	0	0
I_{oc}	dBm/3.84 MHz	-60				
Information Data Rate	kbps	12.2	64	144	384	2048

Table 8.9: Performance requirements in multipath Case 3 channel.

Test Number	$\frac{\hat{I}_{or}}{I_{oc}}$ [dB]	BLER
1~~12.2 kbps~~	4.7	10^{-2}
2~~64 kbps~~	5.2	10^{-1}
	8.4	10^{-2}
	12.1	10^{-3}
3~~144 kbps~~	11.7	10^{-1}
	15.2	10^{-2}
	17.8	10^{-3}
4~~384 kbps~~	8.2	10^{-1}
	11.3	10^{-2}
	13.0	10^{-3}
5	9.4	10^{-1}
	11.5	10^{-2}
	13.6	10^{-3}

8.4 Base station transmit diversity mode

8.4.1 Demodulation of BCH in Block STTD mode

The performance requirement of BCH is determined by the maximum Block Error Rate (BLER). The BLER is specified for the BCH. BCH is mapped into the Primary Common Control Physical Channel (P-CCPCH).

8.4.1.1 Minimum requirement

For the parameters specified in Table 8.10 the BLER should not exceed the BLER specified in Table 8.11.

Table 8.10: P-CCPCH parameters in multipath Case 1 channel

Parameters	Unit	Test 1
$\frac{PCCPCH\_E_c}{I_{or}}$	dB	-3
I	dBm/3.84 MHz	-60
Information Data Rate	Kbps	12.3

Table 8.11: Performance requirements in multipath Case 1 channel.

Test Number	$\frac{\hat{I}_{or}}{I_{oc}}$ [dB]	BLER
1	8.4	10^{-2}

8.5 Power control in downlink

Power control in the downlink is the ability of the UE receiver to converge to the required link quality set by the network while using minimum downlink power.

8.5.1 Minimum requirements

For the parameters specified in Table 8.12 the average downlink $\hat{I}_{or}/I_{oc}$ power shall not exceed the values specified in Table 8.13. Downlink power control is ON during the test.

Table 8.12: Test parameters for downlink power control

Parameter	Unit	Test 1	Test 2
$\frac{DPCH\_E_c}{I_{or}}$	dB	0	[ ]
I_{oc}	dBm/3.84 MHz	-60	
Information Data Rate	kbps	12.2	
Target quality value on DTCH	BLER	0.01	
Propagation condition		Case 4	

Table 8.13: Requirements for downlink power control

Parameter	Unit	Test 1	Test 2
$\hat{I}_{or}/I_{oc}$	dB	[ ]	[ ]
Measured quality on DTCH	BLER	0.01±30%	0.01±30%

3GPP TSG RAN WG4 Meeting #16 **R4-010384**

Vienna, Austria 19th - 23rd February 2001

CR-Form-v3

CHANGE REQUEST

⌘ **25.104** **CR** **63** ⌘ rev **-** ⌘ Current version: **3.5.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☒ Core Network ☐

Title:	⌘	RACH implementation requirements
Source:	⌘	RAN WG4
Work item code:	⌘	TEI4
Date:	⌘	20.2.2001
Category:	⌘	**B**
Release:	⌘	*REL-4*

Use one of the following categories:
- ***F*** *(essential correction)*
- ***A*** *(corresponds to a correction in an earlier release)*
- ***B*** *(Addition of feature),*
- ***C*** *(Functional modification of feature)*
- ***D*** *(Editorial modification)*

Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	No requirements have been defined for RACH
Summary of change:	⌘	RACH requirements are added for preamble detection and message reception.
Consequences if not approved:	⌘	

Clauses affected:	⌘			
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	
Other comments:	⌘			

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.
3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

1 Introduction

In last meetings of WG4 there has been discussion about how to test RACH and corresponding simulation results. These results and test strategies are gathered in [1].

This CR proposes implementation margins for probability of detection (Pd) and required Eb/No's in static channel and case 3 fading for message reception.

The rest of this contribution is organized as follows: chapter 2 summarizes the averages simulation result for both probability of preamble detection and RACH message reception. Chapter 3 proposes implementation margins and final required Ec/N0's and Eb/N0's are summarized in tables of chapter 4.

2 Summary of simulations

2.1 Probability of detection

Probability of false alarm of preamble was set to 10^{-3}. Required Ec/N0 for probability of detection of the preamble was simulated. Only one signature was used and it was known by the receiver. The numbers in tables are averages all simulations.

Table 1. Ec/No's for preamble detection for Pfa=10^{-3} in static propagation condition.

	Pd = 0.99	Pd = 0.999
Average	-24.5 dB	-24.1 dB

Table 2. Ec/No's for preamble detection for Pfa=10^{-3} in case 3 fading.

	Pd = 0.99	Pd = 0.999
Average	-20.6 dB	-18.4 dB

2.2 RACH message reception

RACH message reception was measured so that consecutive pairs of preambles and messages were sent. The receiver then tries to detect the preamble and receive the message correctly. Pfa is set to 10^{-3}. Only those messages for which the preamble was detected are taken into account when BLER is calculated.

Payloads to be used in the tests are 168 bits and 360 bits. TTI is 20 ms. CRC is 16 bits.

Table 3. Eb/N0's for message reception in static propagation condition (ideal parameter estimation)

	TB size = 168 bits		TB size = 360 bits	
	BLER=10^{-1}	BLER=10^{-2}	BLER=10^{-1}	BLER=10^{-2}
Average	1.1 dB	2.0 dB	0.9 dB	1.8 dB

Table 4. Eb/N0's for message reception in fading case 3 (ideal parameter estimation)

	TB size = 168 bits		TB size = 360 bits	
	BLER=10^{-1}	BLER=10^{-2}	BLER=10^{-1}	BLER=10^{-2}
Average	1.4	2.5	1.3	2.3

3 Implementation margins

In [2] implementation margin for Pd in fading channel case 3 was proposed to be 3.5 dB. We propose that for static channel and for fading case 3 the margin to be 4 dB.

For RACH message reception we propose implementation margins of 3 dB and 6 dB for static and case 3 fading, respectively.

4 Requirement for RACH receiver

Requirement is average of simulated ideal result + implementation margin:

Table 5. Ec/No's for preamble detection for Pfa=10^{-3} in static propagation condition.

	Pd = 0.99	Pd = 0.999
Static propagation	-20.5 dB	-20.1 dB

Table 6. Ec/No's for preamble detection for Pfa=10^{-3} in case 3 fading.

	Pd = 0.99	Pd = 0.999
Fading, case 3.	-16.6 dB	-14.4 dB

Table 7. Eb/N0's for message reception in static propagation condition.

	TB size = 168 bits		TB size = 360 bits	
	BLER=10^{-1}	BLER=10^{-2}	BLER=10^{-1}	BLER=10^{-2}
Average	3.1 dB	5.0 dB	3.9 dB	4.8 dB

Table 8. Eb/N0's for message reception in fading case 3.

	TB size = 168 bits		TB size = 360 bits	
	BLER=10^{-1}	BLER=10^{-2}	BLER=10^{-1}	BLER=10^{-2}
Average	7.4	7.5	7.3	8.3

5 References

[1] TR25.845 FDD RACH and AICH Performance Requirements, version 0.0.3

[2] RACH Preamble Simulation Results, Tdoc R4-010177, Motorola

Addition to 25.104

8.x Performance requirement for RACH

Performance requirements for RACH consists of two parts: preamble detection and message demodulation. Requirements for these are in chapters 8.x.1 and 8.x.2, respectively. Requirements are defined for two propagation conditions: static and fading case 3. The propagation conditions are defined in annexes B.1 and B.2.

8.x.1 Performance requirement for RACH preamble detection

Probability of false alarm, Pfa (=false detection of the preamble) when the preamble was not sent, shall be 10^{-3} or less. The performance measure Required Ec/N0 at probability of detection, Pd of 0.99 and 0.999. Only 1 signature is used and it is known by the receiver. The requirement for preamble detection, when the preamble was sent is in table 8.x.1 and 8.x.2 for static and case 3 fading.

Table 8.x.1. Requirements for Ec/N0 of Pd in static propagation condition

	Pd = 0.99	Pd = 0.999
Required Ec/N0	-20.5 dB	-20.1 dB

Table 8.x.2. Requirements of Ec/N0 of Pd in case 3 fading

	Pd = 0.99	Pd = 0.999
Required Ec/N0	-16.6 dB	-14.4 dB

8.x.2 Demodulation of RACH message

The performance measure is required Eb/N0 for block error rate (BLER) of 10^{-1} and 10^{-2}. Both measurement channels have TTI=20 ms. Payloads are 168 and 360 bits. Channel coding is rate ½ convolutional coding.

8.x.2.1 Minimum requirements for Static Propagation Condition

Table 8.x.3. Required Eb/N0 for static propagation

	TB size = 168 bits	TB size = 360 bits

	BLER=10^{-1}	BLER=10^{-2}	BLER=10^{-1}	BLER=10^{-2}
Required Eb/N0	3.1 dB	5.0 dB	3.9 dB	4.8 dB

8.x.2.2 Minimum requirements for Multipath Fading Case 3

Table 8.x.4. Required Eb/N0 for case 3 fading

	TB size = 168 bits		TB size = 360 bits	
	BLER=10^{-1}	BLER=10^{-2}	BLER=10^{-1}	BLER=10^{-2}
Required Eb/N0	7.4 dB	7.5 dB	7.3 dB	8.3 dB