TSG RAN Meeting #16 **RP-020290**
Marco Island, FL, USA, 4 - 7 June 2002

Title **CRs (Rel-4 and Rel-5 Category A) to TS 25.104**
Source **TSG RAN WG4**
Agenda Item **7.4.4**

RAN4 Tdoc	Spec	Curr Ver	New Ver	CR	R	Cat	Ph	Title	Acronym
R4-020775	25.104	4.4.0	4.5.0	125		F	Rel-4	Reference measurement channels for UL RACH Ratio of preamble power and total message power	TEI4
R4-020776	25.104	5.2.0	5.3.0	126		A	Rel-5	Reference measurement channels for UL RACH Ratio of preamble power and total message power	TEI4
R4-020783	25.104	4.4.0	4.5.0	127		F	Rel-4	Correction of RACH preamble detection requirement	TEI4
R4-020784	25.104	5.2.0	5.3.0	128		A	Rel-5	Correction of RACH preamble detection requirement	TEI4

3GPP TSG RAN WG4 Meeting #23 **R4-020775**

Gyeongju, Korea 13th -17th May, 2002

CR-Form-v5

CHANGE REQUEST

⌘ **25.104** **CR** **125** ⌘ **rev** **-** ⌘ Current version: **4.4.0** ⌘

*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:	⌘	Reference measurement channels for UL RACH – Ratio of preamble power and total message power
Source:	⌘	RAN WG4
Work item code:	⌘	TEI4
Date:	⌘	17/5/2002
Category:	⌘	**F**
Release:	⌘	Rel-4

Use one of the following categories:
F *(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:	⌘	All simulations that form the basis for the RACH performance requirements were made with the ratio of preamble power and total message power set to 0 dB. The reason behind this was that at the cell border the UE would transmit using its maximum power and in that case it would be optimal to have the same output power in the preamble and in the message part. The current reference measurement channel description does not include the information of 0 dB power ratio.
Summary of change:	⌘	Adding the power ratio information to the reference measurement channels for UL RACH.
Consequences if not approved:	⌘	Since the requirements have been decided under these 0 dB power ratio conditions it is important to measure them under the same conditions to get relevant results. If the RACH performance is measured with other power ratio values than 0 dB the results will most likely look different.

Clauses affected:	⌘	Annex A7		
Other specs affected:	⌘	☐ Other core specifications ☒ Test specifications ☐ O&M Specifications	⌘	3GPP TS 25.141
Other comments:	⌘	Equivalent CRs in other Releases: CR126 cat. A to 25.104 v5.2.0		

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://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 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.

A.7 Reference measurement channels for UL RACH

The parameters for the UL RACH reference measurement channels are specified in Table A.7.

Table A.7: Reference measurement channels for UL RACH

Parameter			Unit
RACH	CRC	16	bits
	Channel Coding	Rate ½ conv. coding	
	TTI	20	ms
	TB size	168, 360	bits
	Rate Matching	Repetition	
	Number of diversity antennas	2	
	Preamble detection window size	256	Chips
	Ratio of preamble power and total message power	0	dB
Power ratio of RACH Control/Data TB = 168		-2.69	dB
Power ratio of Control/Data TB = 360		-3.52	dB

3GPP TSG RAN WG4 Meeting #23 **R4-020776**

Gyeongju, Korea 13th -17th May, 2002

CR-Form-v5

CHANGE REQUEST

⌘ **25.104** **CR** **126** ⌘ **rev** **-** ⌘ Current version: **5.2.0** ⌘

*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:	⌘	Reference measurement channels for UL RACH – Ratio of preamble power and total message power
Source:	⌘	RAN WG4
Work item code:	⌘	TEI4
Date:	⌘	17/5/2002
Category:	⌘	**A**
Release:	⌘	Rel-5

Use one of the following categories:
F *(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:	⌘	All simulations that form the basis for the RACH performance requirements were made with the ratio of preamble power and total message power set to 0 dB. The reason behind this was that at the cell border the UE would transmit using its maximum power and in that case it would be optimal to have the same output power in the preamble and in the message part. The current reference measurement channel description does not include the information of 0 dB power ratio.
Summary of change:	⌘	Adding the power ratio information to the reference measurement channels for UL RACH.
Consequences if not approved:	⌘	Since the requirements have been decided under these 0 dB power ratio conditions it is important to measure them under the same conditions to get relevant results. If the RACH performance is measured with other power ratio values than 0 dB the results will most likely look different.

Clauses affected:	⌘	Annex A7		
Other specs affected:	⌘	☐ Other core specifications ☒ Test specifications ☐ O&M Specifications	⌘	3GPP TS 25.141
Other comments:	⌘	Equivalent CRs in other Releases: CR125 cat. F to 25.104 v4.4.0		

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.
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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://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 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.

A.7 Reference measurement channels for UL RACH

The parameters for the UL RACH reference measurement channels are specified in Table A.7.

Table A.7: Reference measurement channels for UL RACH

Parameter			Unit
RACH	CRC	16	bits
	Channel Coding	Rate ½ conv. coding	
	TTI	20	ms
	TB size	168, 360	bits
	Rate Matching	Repetition	
	Number of diversity antennas	2	
	Preamble detection window size	256	Chips
	Ratio of preamble power and total message power	0	dB
Power ratio of RACH Control/Data TB = 168		-2.69	dB
Power ratio of Control/Data TB = 360		-3.52	dB

3GPP TSG RAN WG4 Meeting #23 **R4-020783**

Gyeongju, Korea 13th -17th May, 2002

CR-Form-v5

CHANGE REQUEST

⌘ **25.104** **CR** **127** ⌘ **rev** **-** ⌘ Current version: **4.4.0** ⌘

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

Title:	⌘	Correction of RACH requirement
Source:	⌘	RAN WG4
Work item code:	⌘	TEI4
Date:	⌘	17/5/2002
Category:	⌘	**F**
Release:	⌘	Rel-4

Use one of the following categories:
F *(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:	⌘	The RACH requirements are not expressed as a performance limit (Pd>x or BLER<x) for a certain signal level, but as a fixed value (Pd=x and BLER =x).
Summary of change:	⌘	The RACH requirement tables are updated to be aligned with the way other requirement are expressed
Consequences if not approved:	⌘	The requirements would be unclear and not aligned with the way they are tested.

Clauses affected:	⌘	8.7		
Other specs affected:	⌘	☐ Other core specifications ☒ Test specifications ☐ O&M Specifications	⌘	TS 25.141
Other comments:	⌘	Equivalent CRs in other Releases: CR128 cat. A to 25.104 v5.2.0		

8.7 Performance requirement for RACH

Performance requirements for RACH consists of two parts: preamble detection and message demodulation. Requirements for these are in sections 8.7.1 and 8.7.2, 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.

8.7.1 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 8.9 and 8.10 for static and case 3 fading.

Table 8.9: Requirements for Ec/N0 of Pd in static propagation condition

	E_c/N_0 for required Pd ≥ 0.99 ~~Pd = 0.99~~	E_c/N_0 for required Pd ≥ 0.999 ~~Pd = 0.999~~
~~Required Ec/N0~~	-20.5 dB	-20.1 dB

Table 8.10: Requirements of Ec/N0 of Pd in case 3 fading

	E_c/N_0 for required Pd ≥ 0.99 ~~Pd = 0.99~~	E_c/N_0 for required Pd ≥ 0.999 ~~Pd = 0.999~~
~~Required Ec/N0~~	-15.5 dB	-13.4 dB

8.7.2 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.

8.7.2.1 Minimum requirements for Static Propagation Condition

Table 8.11: Required Eb/N0 for static propagation

Transport Block size TB and TTI in frames	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}
168 bits, TTI = 20 ms	4.1 dB	5.0 dB
360 bits, TTI = 20 ms	3.9 dB	4.8 dB

	~~TB size = 168 bits~~		~~TB size = 360 bits~~	
	~~BLER=10^{-1}~~	~~BLER=10^{-2}~~	~~BLER=10^{-1}~~	~~BLER=10^{-2}~~
~~Required Eb/N0~~	~~4.1 dB~~	~~5.0 dB~~	~~3.9 dB~~	~~4.8 dB~~

8.7.2.2 Minimum requirements for Multipath Fading Case 3

Table 8.12: Required Eb/N0 for case 3 fading

Transport Block size TB and TTI in frames	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}
168 bits, TTI = 20 ms	7.4 dB	8.5 dB
360 bits, TTI = 20 ms	7.3 dB	8.3 dB

	~~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~~	~~8.5 dB~~	~~7.3 dB~~	~~8.3 dB~~

3GPP TSG RAN WG4 Meeting #23 **R4-020784**

Gyeongju, Korea 13th -17th May, 2002

CR-Form-v5

CHANGE REQUEST

⌘ **25.104** **CR** **128** ⌘ **rev** **-** ⌘ Current version: **5.2.0** ⌘

*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:	⌘	Correction of RACH requirement
Source:	⌘	RAN WG4
Work item code:	⌘	TEI4
Date:	⌘	17/5/2002
Category:	⌘	**A**
Release:	⌘	Rel-5

Use one of the following categories:
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Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

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R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	The RACH requirements are not expressed as a performance limit (Pd>x or BLER<x) for a certain signal level, but as a fixed value (Pd=x and BLER =x).
Summary of change:	⌘	The RACH requirement tables are updated to be aligned with the way other requirement are expressed
Consequences if not approved:	⌘	The requirements would be unclear and not aligned with the way they are tested.

Clauses affected:	⌘			
Other specs affected:	⌘	☐ Other core specifications ☒ Test specifications ☐ O&M Specifications	⌘	TS 25.141
Other comments:	⌘	Equivalent CRs in other Releases: CR127 cat. F to 25.104 v4.4.0		

8.7 Performance requirement for RACH

Performance requirements for RACH consists of two parts: preamble detection and message demodulation. Requirements for these are in sections 8.7.1 and 8.7.2, 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.

8.7.1 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 8.9 and 8.10 for static and case 3 fading.

Table 8.9: Requirements for Ec/N0 of Pd in static propagation condition

	E_c/N_0 for required Pd ≥ 0.99 ~~Pd = 0.99~~	E_c/N_0 for required Pd ≥ 0.999 ~~Pd = 0.999~~
~~Required Ec/N0~~	-20.5 dB	-20.1 dB

Table 8.10: Requirements of Ec/N0 of Pd in case 3 fading

	E_c/N_0 for required Pd ≥ 0.99 ~~Pd = 0.99~~	E_c/N_0 for required Pd ≥ 0.999 ~~Pd = 0.999~~
~~Required Ec/N0~~	-15.5 dB	-13.4 dB

8.7.2 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.

8.7.2.1 Minimum requirements for Static Propagation Condition

Table 8.11: Required Eb/N0 for static propagation

Transport Block size TB and TTI in frames	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}
168 bits, TTI = 20 ms	4.1 dB	5.0 dB
360 bits, TTI = 20 ms	3.9 dB	4.8 dB

	~~TB size = 168 bits~~		~~TB size = 360 bits~~	
	~~BLER=10^{-1}~~	~~BLER=10^{-2}~~	~~BLER=10^{-1}~~	~~BLER=10^{-2}~~
~~Required Eb/N0~~	~~4.1 dB~~	~~5.0 dB~~	~~3.9 dB~~	~~4.8 dB~~

8.7.2.2 Minimum requirements for Multipath Fading Case 3

Table 8.12: Required Eb/N0 for case 3 fading

Transport Block size TB and TTI in frames	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}
168 bits, TTI = 20 ms	7.4 dB	8.5 dB
360 bits, TTI = 20 ms	7.3 dB	8.3 dB

	~~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~~	~~8.5 dB~~	~~7.3 dB~~	~~8.3 dB~~