#### **RP-020793**

TSG RAN Meeting #18 New Orleans, US, 3 - 6 December, 2002

# TitleCRs (Rel-4 and Rel-5 Category A) to TS 25.106 & TS 25.143 on "EVM test:<br/>change requirement for the use of HSDPA"SourceTSG RAN WG4Agenda Item7.4.4

RAN4 Tdoc	Spec	CR	R	Cat	Rel	Curr Ver	Title	Work Item
R4-021677	25.106	019		F	Rel-4	4.3.0	EVM Test: Change requirement for the use of HSDPA.	RInImp-REP, HSDPA-RF
R4-021518	25.106	010		A	Rel-5	5.2.0	EVM Test: Change requirement for the use of HSDPA.	RInImp-REP, HSDPA-RF
R4-021682	25.143	027		F	Rel-4	4.5.0	EVM Test: Change requirement for the use of HSDPA.	RInImp-REP, HSDPA-RF

# 3GPP TSG RAN WG4 (Radio) Meeting #25

R4-021518

Secaucus	, NJ,	USA	11 -	- 15	November, 2002	
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		CHANG	E REQ	UEST	-		CR-Form-v7
¥	25.106	CR <mark>010</mark>	ж rev	Ħ	Current vers	<sup>ion:</sup> <b>5.2.0</b>	ж
For <u>HELP</u> on usi	ng this forn	n, see bottom of t	his page or i	look at th	e pop-up text	over the 🛱 syı	mbols.
Proposed change af	f <b>ects:</b> U	ICC apps#	ME	Radio A	ccess Networ	k 🗙 Core Ne	etwork
Title: ដ	EVM Test:	Change of the re	quirement for	or the use	e of HSDPA		
Source: ೫	RAN WG4						
Work item code: #	RInImp-RE	P, HSDPA-RF			Date: ೫	26/11/2002	
<b>Category:</b> ະ ບ ມ D	A Jse <u>one</u> of th F (corre A (corre B (addi C (func D (edito Detailed expl be found in 3	ne following categor ection) esponds to a correction of feature), tional modification of prial modification) anations of the abo GPP <u>TR 21.900</u> .	ries: ction in an ear of feature) ove categories	<i>lier releas</i> s can	Release: ₩ Use <u>one</u> of 2 e) R96 R97 R98 R99 Rel-4 Rel-5 Rel-6	Rel-5 the following rele (GSM Phase 2) (Release 1996) (Release 1997) (Release 1998) (Release 1999) (Release 4) (Release 5) (Release 6)	eases:
Reason for change:	# Introd wheth for E\	uction of HSDPA ler the base static /M needs to be ch	for base sta on is used wi nanged.	ition. Her	nce the Repea A or not the R	ter does not kr Repeater requir	now ement
Summary of change:	: # The F HSDF	epeater EVM req PA.	uirement is	tightend	to the value of	operation with	ı
Consequences if not approved:	Highe of 160 station	r quality signal wa QAM demodulatio n.	aveform that n would not	is neces be ensur	sary for a sati red in HSDPA	sfactory perfor operation of a	mance base
Clauses affected:	¥ 1011						
Other specs affected:	Y     N       X     X       X     X	Other core specif Test specificatior O&M Specificatio	ications as ons	ж ТS2	25.143		
Other comments:	ж Equiv	alent CRs in othe	r Releases:	CR019 c	at. F to 25.10	6 v4.3.0	

#### How to create CRs using this form:

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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 <u>ftp://ftp.3gpp.org/specs/</u> 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.

# 10 Modulation accuracy

# 10.1 Error Vector Magnitude

The modulation accuracy is defined by the Error Vector Magnitude (EVM), which is a measure of the difference between the theoretical waveform and a modified version of the measured waveform. This difference is called the error vector. The measured waveform is modified by first passing it through a matched root raised cosine filter with bandwidth 3.84 MHz and roll-off  $\alpha$ =0.22. The waveform is then further modified by selecting the frequency, absolute phase, absolute amplitude and chip clock timing so as to minimise the error vector. The EVM result is defined as root of the ratio of the mean error vector power to the mean reference signal power expressed as a %.

The measurement interval is one power control group (timeslot). The repeater shall operate with an ideal WCDMA signal in the operating band of the repeater at a level, which produce the maximum rated output power per channel, as specified by the manufacturer.

### 10.1.1 Minimum requirement

The Error Vector Magnitude shall not be worse than  $\frac{17,5 \%}{12.5\%}$ .

# 10.2 Peak code domain error

The peak code domain error is computed by projecting the power of the error vector (as defined in subclause 10.1) onto the code domain at a specified spreading factor. The code domain error for every code in the domain is defined as the ratio of the mean power of the projection onto that code, to the mean power of the composite reference waveform. This ratio is expressed in dB. The peak code domain error is defined as the maximum value for the code domain error for all codes. The measurement interval is one power control group (timeslot).

### 10.2.1 Minimum requirement

The peak code domain error shall not exceed -35 dB at spreading factor 256.

# 3GPP TSG RAN WG4 (Radio) Meeting #25

R4-021677

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		CHANG	SE REQ	UEST			CR-Form-v7
<sup>ж</sup> 2	<mark>5.106</mark>	CR <mark>019</mark>	ж <b>rev</b>	ж	Current vers	<sup>ion:</sup> <b>4.3.0</b>	ж
For <u>HELP</u> on usin	g this forr	n, see bottom of	this page or	look at the	e pop-up text	over the X syr	nbols.
Proposed change affe	ects: U	ICC apps# 🦲	ME	Radio Ad	ccess Networ	k 🗶 Core Ne	etwork
Title: ೫ E	VM Test:	Change of the r	equirement fo	or the use	of HSDPA		
Source: ೫ F	RAN WG4						
Work item code: 🕷 🦷	Rinimp-RE	EP, HSDPA-RF			Date: ೫	26/11/2002	
Category: ೫ F Us De be	F (corre	the following catego ection) esponds to a corre tion of feature), tional modification orial modification) lanations of the ab GPP <u>TR 21.900</u> .	ories: ction in an ear of feature) ove categories	<i>lier release</i> can	Release: % Use <u>one</u> of 2 2 9) R96 R97 R98 R99 Rel-4 Rel-5 Rel-6	Rel-4 (GSM Phase 2) (Release 1996) (Release 1997) (Release 1998) (Release 1999) (Release 4) (Release 5) (Release 6)	eases:
Reason for change:	# Introd wheth for E\	uction of HSDPA her the base stati /M needs to be c	for base sta on is used wi hanged.	tion. Hen th HSDP/	ce the Repea A or not the R	ter does not kr epeater requir	ement
Summary of change:	# The F HSDF	Repeater EVM re PA.	quirement is	tightend to	o the value of	operation with	1
Consequences if not approved:	Highe of 160 statio	r quality signal w QAM demodulation.	vaveform that	is neces be ensure	sary for a sati	sfactory perfor operation of a	mance base
Clauses affected:	₩ <mark>10.1.1</mark>	1					
Other specs affected:	¥ N X X X	Other core spec Test specificatio O&M Specificati	ifications ns ons	# TS2	5.143		
Other comments:	ж Equiv	alent CRs in othe	er Releases:	CR010 ca	at. A to 25.106	6 v5.2.0	

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# 10 Modulation accuracy

# 10.1 Error Vector Magnitude

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The measurement interval is one power control group (timeslot). The repeater shall operate with an ideal WCDMA signal in the operating band of the repeater at a level, which produce the maximum rated output power per channel, as specified by the manufacturer.

#### 10.1.1 Minimum requirement

The Error Vector Magnitude shall not be worse than <u>17,5 % 12,5%</u>.

## 10.2 Peak code domain error

The peak code domain error is computed by projecting the power of the error vector (as defined in subclause 10.1) onto the code domain at a specified spreading factor. The code domain error for every code in the domain is defined as the ratio of the mean power of the projection onto that code, to the mean power of the composite reference waveform. This ratio is expressed in dB. The peak code domain error is defined as the maximum value for the code domain error for all codes. The measurement interval is one power control group (timeslot).

#### 10.2.1 Minimum requirement

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CR-Form-v7

3GPP TSG RA	N WG4 (Radio) Meeti	ng #25		R4-021682
Secaucus, NJ	, USA 11 - 15 Novemb	er, 2002		
	CHANGE		EST	CR-Forn
¥	25.143 CR 027	жrev	# Current ve	<sup>rsion:</sup> 4.5.0 <sup>#</sup>
For <u>HELP</u> on u	sing this form, see bottom of this	s page or look	at the pop-up te	kt over the ¥ symbols.
Proposed change a	affects: UICC apps#	ME 🔜 Ra	dio Access Netwo	ork X Core Network
Title: ೫	EVM Test: Change of the requ	irement for th	e use of HSDPA	
Source: #	RAN WG4			
Work item code: #	RInImp-REP, HSDPA-RF		Date: 8	£ 26/11/2002
Category: ⊮	<ul> <li>F</li> <li>Use <u>one</u> of the following categories</li> <li>F (correction)</li> <li>A (corresponds to a correction</li> <li>B (addition of feature),</li> <li>C (functional modification of feature),</li> <li>D (editorial modification)</li> <li>Detailed explanations of the above be found in 3GPP <u>TR 21.900</u>.</li> </ul>	s: n in an earlier r ceature) categories car	<b>Release:</b> Use <u>one</u> 2 release) R96 R97 R98 R99 n Rel-4 Rel-5 Rel-6	<b>K</b> Rel-4 of the following releases: (GSM Phase 2) (Release 1996) (Release 1997) (Release 1998) (Release 1999) (Release 4) (Release 5) (Release 6)
Reason for change	: # Introduction of HSDPA for	r base station	. Hence the Repe	ater does not know
	for EVM needs to be char	is used with F nged.	ISDPA or not the	Repeater requirement

	for EVM needs to be changed.
Summary of change: #	The Repeater EVM requirement is tightend to the value of operation with HSDPA.
Consequences if %	Higher quality signal waveform that is necessary for a satisfactory performance of 160AM demodulation would not be ensured in HSDRA operation of a base
	station.
Clauses affected: #	10.1.2, 10.1.5

		Y	Ν			
Other specs	ж	Х		Other core specifications	B	TS25.106
affected:			X	Test specifications		
			Χ	O&M Specifications		
Other comments:	ж					

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# 10 Modulation accuracy

In this section the procedure for testing the modulation accuracy of Repeaters is defined. This test includes EVM and peak code domain error.

# 10.1 Error vector magnitude

In this section the procedure for testing the Error Vector Magnitude (EVM) of Repeaters is defined.

### 10.1.1 Definition and applicability

The Error Vector Magnitude is a measure of the difference between the theoretical waveform and a modified version of the measured waveform. The modification is done according to annex E of TS25.141. This difference is called the error vector. The EVM result is defined as the square root of the ratio of the mean error vector power to the modified mean reference signal power expressed as a %. The measurement interval is one power control group (timeslot).

#### 10.1.2 Minimum Requirements

In normal conditions as specified in section 5.4.1 the Error Vector Magnitude shall not be worse than  $\frac{17,5 \ \% - 12,5\%}{12,5\%}$  as defined in TS25.106.

#### 10.1.3 Test purpose

To verify that the EVM is within the limit specified in 10.1.2 after the signal passed through the Repeater..

#### 10.1.4 Method of test

#### 10.1.4.1 Initial conditions

Set-up the equipment as shown in annex A.

The test is based upon the test for the base station. Test model 4 as described in TS25.141 is used for the definition of the signal to test on. A signal generator providing the required signals is connected to the input of the Repeater. The Repeater is set to operate at full gain. The signal level is adjusted to the equivalent level to obtain the nominal output power as declared by the manufacturer. A signal analyser connected to the output is used to measure the EVM value.

#### 10.1.4.2 Procedure

The test has to be performed in the uplink and the downlink path of the Repeater. The EVM has to be measured according to Annex E of TS25.141

#### 10.1.4.3 Stimulus EVM effect

The stimulus signal generator EVM will RSS with the tested repeater EVM. The target for the recorded value is adjusted accordingly in the test requirements.

#### 10.1.5 Test requirements

In normal conditions as specified in section 5.4.1, the Error Vector Magnitude, as defined in TS25.106, shall not exceed  $\frac{18,2\%13,2\%}{13,2\%}$ .