TSG RAN Meeting #18   **RP-020793**
New Orleans, US, 3 - 6 December, 2002

Title	CRs (Rel-4 and Rel-5 Category A) to TS 25.106 & TS 25.143 on "EVM test: change requirement for the use of HSDPA"
Source	TSG RAN WG4
Agenda Item	7.4.4

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

CR-Form-v7

CHANGE REQUEST

⌘   **25.106** CR **010**   ⌘**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: UICC apps⌘ ☐   ME ☐ Radio Access Network **X** Core Network ☐

Title: ⌘	EVM Test: Change of the requirement for the use of HSDPA
Source: ⌘	RAN WG4

Work item code:⌘ RInImp-REP, HSDPA-RF   ***Date:*** ⌘ 26/11/2002

Category: ⌘ **A**   ***Release:*** ⌘ Rel-5

Use <u>one</u> 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 <u>TR 21.900</u>.

Use <u>one</u> 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)*
Rel-6   *(Release 6)*

Reason for change: ⌘	Introduction of HSDPA for base station. Hence the Repeater does not know whether the base station is used with HSDPA 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 not approved: ⌘	Higher quality signal waveform that is necessary for a satisfactory performance of 16QAM demodulation would not be ensured in HSDPA operation of a base station.

Clauses affected: ⌘	10.1.1

	Y	**N**	
Other specs ⌘		**X**	Other core specifications ⌘
affected:	**X**		Test specifications TS25.143
		X	O&M Specifications

Other comments: ⌘	Equivalent CRs in other Releases: CR019 cat. F to 25.106 v4.3.0

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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 α=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 ~~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.

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CHANGE REQUEST

⌘ **25.106** CR **019** ⌘**rev** ⌘ Current version: **4.3.0** ⌘

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Title: ⌘	EVM Test: Change of the requirement for the use of HSDPA
Source: ⌘	RAN WG4
Work item code:⌘	RInImp-REP, HSDPA-RF *Date:* ⌘ 26/11/2002

Category: ⌘ **F**   *Release:* ⌘ Rel-4

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Consequences if not approved: ⌘	Higher quality signal waveform that is necessary for a satisfactory performance of 16QAM demodulation would not be ensured in HSDPA operation of a base station.

Clauses affected: ⌘	10.1.1

	Y | **N**	
Other specs affected: ⌘	☐ | **X**	Other core specifications ⌘
	X | ☐	Test specifications TS25.143
	☐ | **X**	O&M Specifications

Other comments: ⌘	Equivalent CRs in other Releases: CR010 cat. A to 25.106 v5.2.0

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10.2.1 Minimum requirement

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

CR-Form-v7

CHANGE REQUEST

⌘   **25.143** CR **027**   ⌘**rev**   ⌘   Current version: **4.5.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐   ME ☐ Radio Access Network **X** Core Network ☐

Title: ⌘	EVM Test: Change of the requirement for the use of HSDPA
Source: ⌘	RAN WG4
Work item code:⌘	RInImp-REP, HSDPA-RF ***Date:*** ⌘ 26/11/2002

Category: ⌘ **F**	***Release:*** ⌘ Rel-4

Use one of the following categories:
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Summary of change:⌘	The Repeater EVM requirement is tightend to the value of operation with HSDPA.
Consequences if not approved: ⌘	Higher quality signal waveform that is necessary for a satisfactory performance of 16QAM demodulation would not be ensured in HSDPA operation of a base station.

Clauses affected: ⌘	10.1.2, 10.1.5

	Y	N		
Other specs affected: ⌘	X		Other core specifications ⌘	TS25.106
		X	Test specifications	
		X	O&M Specifications	

Other comments: ⌘	

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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 ~~17,5 %~~ 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 ~~18,2%~~ 13,2%.