R&S®CMU 200 Universal Radio Communication Tester

Enhanced measurement report for inter-RAT cell changes

With firmware version 4.20, the R&S®CMU 200 universal radio communication tester can request the mobile phone to send the reception quality of neighboring cells of other mobile radio networks now also in the GSM standard and evaluate the information returned. The reception quality of neighboring cells is a decisive criterion in the cell reselection procedure.

How good is reception in neighboring cells?

Mobile phones with multi-RAT capability must measure not only the reception quality of the current cell, but also that of the neighboring cells of other mobile radio networks (radio access technologies or RAT) during an active call. The evaluation of this measurement is necessary in order to perform an inter-RAT cell change, e.g. from GSM to UMTS.

With the new HSDPA and HSUPA transmission methods developed for the WCDMA standard, the number of GSM/ WCDMA-compatible mobile phones put on the market will steadily increase. Such mobile phones must be capable, for example, of measuring the reception quality of WCDMA neighboring cells and report the results to the base station during a GSM connection.

The R&S[®]CMU 200 is preconfigured for all measurements required on such mobile phones. It can request the mobile phone to send the results of the measurement of up to six WCDMA FDD neighboring cells, and display and evaluate the information returned.

Detailed quality report to base station

The TS 44018 3GPP specification stipulates that the mobile phone should signal the reception quality of the current cell and the neighboring cells to the base station using either a measurement report (MR) or an enhanced measurement report (EMR). The MR includes the measurement of the current GSM cell and the six best valid GSM neighboring cells. The EMR additionally includes three criteria for characterizing the current GSM cell:

- MEAN_BEP (mean bit error probability)
- CV_BEP (coefficients for the variation of the bit error probability)
- NBR_RCVE_BLOCKS (number of correctly decoded data blocks during a measurement period)

The base station can in addition request the measurement of several predefined WCDMA neighboring cells. The R&S®CMU 200 tests the performance of mobile phones with respect to these characteristics. FIGs 1 and 2 show the evaluation of the EMR of a GSM cell and three WCDMA FDD neighboring cells.

Definition of neighboring cells and evaluation criteria

The user can define the WCDMA FDD neighboring cells of which the receive quality is to be evaluated by selecting the RF channel and the primary scrambling code (FIG 3). Moreover, the WCDMA FDD evaluation criteria can be configured (FIG 4). The mobile phone performs the measurements on the WCDMA FDD neighboring cells during a GSM connection.

Shuhua Wang

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🚯 GSMs	00 Receiver (Quality	Circuit (« ») Switched Single Slot	Connect Control
Current Cell :	20 (-		Measurem Report
RX Level	3U (-81 to -80 dBm)			
RX Quality	U (0.0 to 0.2 %)			Appli-
Mean BEP	31 (< -3.60)			cation
CV BEP	7 (0.00 to 0.25)			turn turn
C Value				Analyzer
Nr. of Received Blocks	24			Level Trg.
Neighbor Cells :				MS Signal
GSM:				into olginar
Channel / BSIC	36 0			
RX Level	34 (-77 to -76 dBm)			BS Signal
Channel / BSIC				i
RX Level				Network
UTRA FDD :				
Channel / SCR Code	10562 2	10562 6	10562 9	
CPICH RSCP	27 (-89 to -88 dBm)	35 (-81 to -80 dBm)	48 (-68 to -67 dBm)	
UTRA Carrier RSSI				
Overview Powe	er Modulation S	pectrum	Receiver Audi	Menus

- FIG 1 Enhanced measurement report of RSCP in CPICH.
- FIG 3 Definition of RF channels and primary scrambling codes for 3G neighboring cells.



GSM900 Receiver Quality			Connect Control				
Current Cell :							Measurem.
RX Level	30 (-81 to -	-80 dBm)					Keport
RX Quality	0 (0.0 to 0	2%)					Appli-
Mean BEP	31(<	-3.60)					cation
CV BEP	6 (0.25 to (0.50)					
C Value							Analyzer
Nr. of Received Blocks	24						Level Trg.
Neighbor Cells :							MS Signal
GSM:							ino olyriar
Channel / BSIC	36	0					
RX Level	34 (-77 to -	-76 dBm)					BS Signal
Channel / BSIC							
RX Level							Network
UTRA FDD :							
Channel / SCR Code	10562	2	10562	6	10562	9	
CPICH Ec/No	1 (-24.0 to	-23.5 dB)	20 (-14.5 t	o-14.0 dB)	43 (-3.0 to -	2.5 dB)	
UTRA Carrier RSSI							
							Menus

- FIG 2 EMR with E_C/N_0 in CPICH.
- FIG 4 Configuration of WCDMA FDD evaluation criteria.

K GS	SM900 Receiver Qu	ality	Circuit Switched Single Slot	1	Connect Control
Current Ce	Receiver Quality Configu Control	ration Limits		GSM900 🛔	Measurem. Report
RX Quality Mean BEP CV BEP C Value Nr. of Receiv	- Setup	Measurement Re	port		Appli- cation Analyzer Level _{Trg.}
Neighbor C GSM : Channel / BS RX Level Channel / BS	Measurement report Default Settings Q Search C 3G Search Prio FDD REP Quant R EP	7 On RSCP		(Compress)	MS Signal BS Signal
RX Level UTRA FDD : Channel / SC CPICH RSCF UTRA Carrie	FER/FACCH Repeated DL SACCH OMR Performance				Network
	Control Lir	nits			Menus

Abbreviations

	CPICH	Common pilot channel			
	CV_BEP	Coefficient of variation of bit error probability			
	Ec	Chip energy			
	EMR	Enhanced measurement report			
	FDD	Frequency division duplex			
	HSPA	High-speed packet access			
	HSUPA	High speed uplink packet access			
	MEAN_BEP	Mean bit error probability			
	NBR_RCVE_BLOCKS	Number of correctly decoded blocks			
	MR	Measurement report			
N ₀		Noise power density			
	RAT	Radio access technology			
	RSCP	Received signal code power			



9

