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<sup>®</sup>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.

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🚯 GSMs	00 Receiver (	Quality	Circuit ≪ →») Switched Single Slot	Connect Control
Current Cell :	20 (	-		Measurem Report
RX Level	<b>30</b> (-81 to -80 dBm)			
RX Quality	<b>0</b> (0.0 to 0.2 %)			Appli-
Mean BEP	<b>31</b> (< -3.60)			cation
CV BEP	7 (0.00 to 0.25)			turali men
C Value				Analyzer
Nr. of Received Blocks	24			Level Trg.
Neighbor Cells :				MS Signal
GSM:				into olginar
Channel / BSIC	36 0			-
RX Level	<b>34</b> (-77 to -76 dBm)			BS Signal
Channel / BSIC				-
RX Level				Network
UTRA FDD :				
Channel / SCR Code	10562 2	10562 6	10562 9	9
CPICH RSCP	27 (-89 to -88 dBm)	<b>35</b> (-81 to -80 dBm)	48 (-68 to -67 dBm)	
UTRA Carrier RSSI				
Overview Powe	er Modulation S	pectrum	Receiver Au	dio Menus

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



🚯 GSM	00 Red	eiver C	uality		Circuit Switched Single Slot	"P" <b>L</b>	Connect Control
Current Cell :							Measurem
RX Level	<b>30</b> (-81 to	-80 dBm)					Report
RX Quality	<b>0</b> (0.0 to (	).2 %)					Appli-
Mean BEP	31(-	: -3.60)					cation
CV BEP	<b>6</b> (0.25 to	0.50)					
C Value							Analyzer
Nr. of Received Blocks	24						Level Trg.
Neighbor Cells :							10.011
GSM :							MS Signal
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	<b>1</b> (-24.0 t	o -23.5 dB)	<b>20</b> (-14.5 d	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.

Current Ce	Receiver Quality Configu	uration		GSM900 🛔	Measurem.
RX Level	Control	Limits			Report
RX Quality	-Setup	Measuremer	nt Report		Appli-
Mean BEP CV BEP	▶ Common Settings				cation
C Value	<ul> <li>BER</li> <li>BER Average</li> </ul>				Analyzer
Nr. of Receiv	Measurement Report				Level Trg.
Neighbor C GSM :	Default Settings	1		Compress	MS Signal
Channel / BS	Q Search C 3G Search Prio	7 On			<u> </u>
RX Level	FDD REP Quant	RSCP			BS Signal
Channel / BS	▶BLER				<u> </u>
RX Level	▶ FER/FACCH				Network
Channel / SC	Repeated DL SACCH     CMR Performance				
CPICH RSCF					
UTRA Carrie	L				

#### 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 <sub>0</sub>	Noise power density
RAT	Radio access technology
RSCP	Received signal code power

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