R&S®CMU200 Universal Radio Communication Tester

Enhanced measurement report for inter-RAT cell changes

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®CMU200 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 TS44018 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 pre-defined WCDMA neighboring cells. The R&S®CMU200 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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FIG 1 Enhanced measurement report of RSCP in CPICH.

FIG 3 Definition of RF channels and primary scrambling codes for 3G neighboring cells.

FIG 2 EMR with $E_c/N_0$ in CPICH.

FIG 4 Configuration of WCDMA FDD evaluation criteria.

Abbreviations

- **CPICH**: Common pilot channel
- **CV_BEP**: Coefficient of variation of bit error probability
- **$E_c$**: Chip energy
- **EMR**: Enhanced measurement report
- **FDD**: Frequency division duplex
- **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