

External triggers

The new trigger capabilities of the R&S®CMU 200 are not restricted solely to the internal transmitter measurements; the R&S®CMU 200 also offers a number of external trigger signals:

- ◆ Frame clock trigger
- ◆ Ctrl ACK main slot trigger
- ◆ Ctrl ACK other slots trigger
- ◆ Hopping trigger
- ◆ 26, 52, 104 multiframe trigger

The tried-and-tested frame clock trigger is particularly useful for controlling external spectrum analyzers. It blanks out idle frames and control ACKs.

The control ACK triggers enable you to filter all TDMA frames with corresponding bursts and analyze them on the spectrum analyzer, for example. As described above, the control ACKs on the main timeslot are not generated at the same time as on the other timeslots. The two trigger signals allow them to be specifically selected.

The R&S®CMU 200 can synchronize an external signal generator such as the R&S®SMU or the R&S®SMIQ to its own frequency hopping method by means of the hopping trigger. This makes it possible to also simulate an interferer with this method, not just with stationary frequencies.

The multiframe triggers make synchronizing to the BCCH unnecessary. In an active traffic channel (the R&S®CMU 200 also allows connection setup without signaling), a multiframe trigger establishes synchronization with the GSM time grid and thus permits the measurement of the bit error ratio (BER), for example. Triggers for multiframe with 26, 52 and 104 TDMA frames are available.

All external triggers can be delayed on a timeslot basis and thus be adapted to your own needs. The simultaneous output of two different triggers supports parallel measurements.

Jörg Fülle

Universal Radio Communication Tester R&S®CMU 200

Innovative enhancement of GSM functionality

The Universal Radio Communication Tester R&S®CMU 200 is one of the most successful mobile radio testers. The latest GSM software adds numerous innovative functions to its scope of capabilities.

Dual transfer mode

Mobile phones are evolving more and more into communications centers: In the beginning, you simply used them to make phone calls. Today, mobile data communications via e-mail and Internet are gaining increasing importance. At work, for example, you want to use the time and make a call while data is being downloaded. Until now, however, you could not do both simultaneously with GSM; you had to choose between making a call and setting up a data link.

The standardization committees have now remedied this problem by specifying the dual transfer mode (DTM). This mode allows you to make a call via a circuit-switched connection while simultaneously transmitting data via a packet data connection (GPRS or EGPRS). Leading mobile radio manufacturers are currently implementing the dual transfer mode in their mobile phones. The R&S®CMU 200 will be able to support this undertaking, since the R&S®CMU-K44 option expands the R&S®CMU 200 into a full-fledged DTM tester.

► Complex transmitter measurements

Mobile phone development may confront you with very difficult problems – for example, how to measure the transmission quality of a control ACK burst, which is sometimes transmitted instead of the usual data packets. You can do this only if a trigger signal is generated at the exact time of this burst. However, the comprehensive trigger capabilities of the R&S®CMU 200 make this difficult task mere child's play (see article on page 25).

Enhanced measurement report

Each GSM phone has to evaluate the quality of a circuit-switched connection and report it to the base station via a measurement report. The standardization committees have since defined three additional performance criteria, expanding the measurement report into the enhanced measurement report (EMR).

The mobile phone needs to determine the mean bit error probability (MEAN_BEP), the coefficient for the variance of the bit error probability (CV_BEP) and the number of data blocks correctly decoded during the measurement period (NBR_RCVD_BLOCKS). The R&S®CMU 200 can request an enhanced measurement report from the mobile phone, evaluate the response and then display it.

Display of demodulated symbols

The display of the demodulated symbols helps evaluate modulation quality. If you combine the display of the demodulated symbols with a peak search function – via the EVM trace of an 8PSK signal, for example – you will soon identify the critical symbols of the 8PSK modulator of a

mobile phone (FIG 1). Both the display of the demodulated signals and the peak search function are implemented in the R&S®CMU 200, allowing conclusive and convenient evaluation of the modulation quality.

I/Q analyzer

An I/Q analyzer helps evaluate modulation quality, too. The analyzer in the R&S®CMU 200 can be configured for versatile purposes. It can display a constellation diagram or an eye diagram versus the I or Q signal, or versus both signals. Removing the $3\pi/8$ rotation of 8PSK signals is user-selectable, as is the ISI filtering (FIGs 2a to 2e).

Adjusting the polar modulator

Polar modulators are often used in modern mobile phones. Adjusting these modulators is a difficult and time-consuming task if you use conventional measuring equipment. Again, the R&S®CMU 200 comes up with a solution, the R&S®CMU-K48 option. If a special algorithm is implemented in the mobile phone, the tester can quickly adjust the polar modulator.

Power-versus-slot measurement with retrigger function

The fast power-versus-slot measurement offered by the R&S®CMU 200 has been expanded by a retrigger function, making it easier to adjust transmitter power in production. As a result, the transmitter no longer needs to transmit its bursts synchronously with the GSM time grid, i.e. it no longer needs to synchronize to the BCCH of the tester to perform the adjustment.

You can also define measurement specifications in this mode. The power of the

burst with the maximum power can be specified, as can a reduced power for subsequent bursts, for example. The measurement determines the power of each individual burst versus a settable number of bursts. If you need to quickly terminate the measurement because bursts are missing (e.g. if the phone is faulty), you can specify a point in time after which the measurement will be cancelled if bursts are missing.

Summary

In addition to these major expansions, the Universal Radio Communication Tester R&S®CMU 200 features a large number of smaller add-ons, which facilitate routine measurement tasks. With these new functions, the R&S®CMU 200 is once again able to prove its leading role in all areas of mobile radio measurement.

Rudolf Schindlmeier

More information and data sheet at
www.rohde-schwarz.com
 (search term: CMU200)

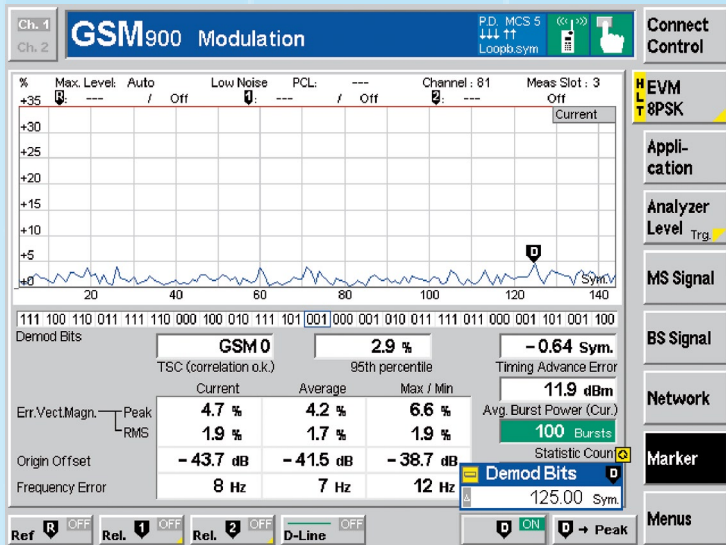


FIG 1 The R&S®CMU200 can also output the demodulated symbols in the modulation measurement. The blue symbol corresponds to the symbol at the marker position in the burst. You can change the marker position via the menu or the rotary knob. The peak search function is particularly useful. It automatically sets the marker to the position of the maximum value of the selected trace, allowing you to quickly find the critical symbols of a modulator.

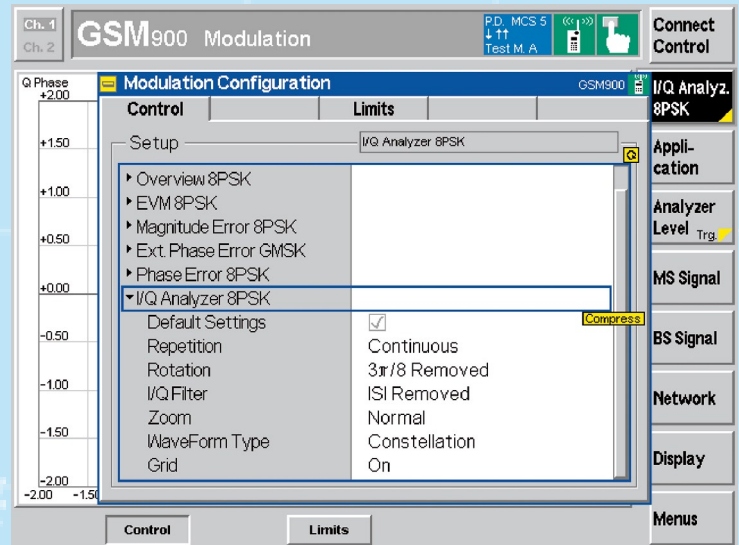


FIG 2a The I/Q analyzer of the R&S®CMU200 allows versatile configuration. The values can be displayed in a constellation diagram (2b) or an eye diagram, either separately for the I and Q signals or for both signals together (2c). If required, the I/Q analyzer can also reverse the 3π/8 rotation of 8PSK signals (2d) or perform ISI filtering (2e), or both (2b).

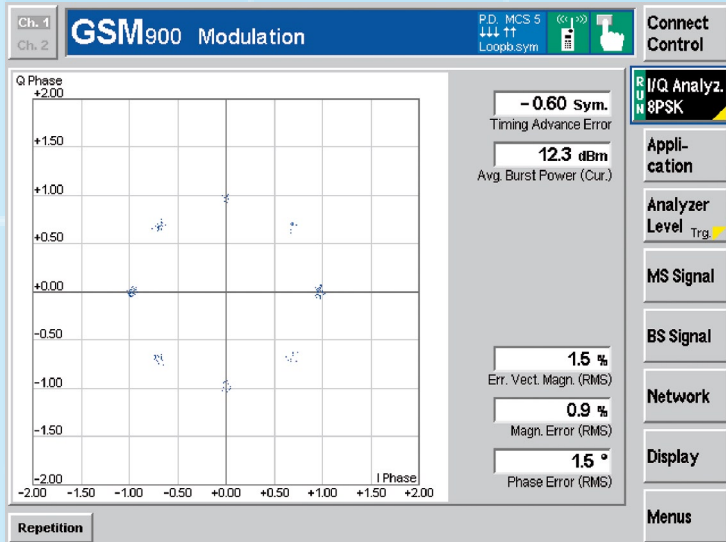


FIG 2b

FIG 2d

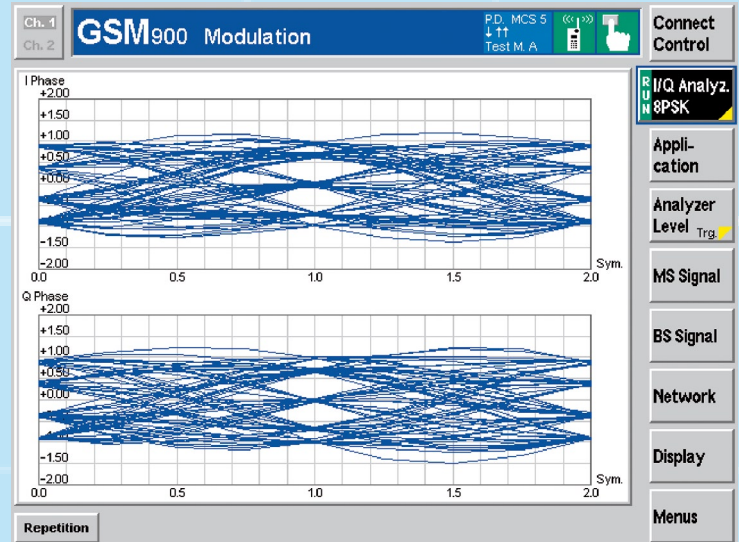


FIG 2c

FIG 2e

