

## Universal Radio Communication Tester R&amp;S®CMU 200

## Solutions not only for (E)GPRS mobile radio development

Modern mobile radio systems have become so complex that even development departments have difficulty keeping track of all system details. A mobile radio tester is therefore expected not only to provide universal and highly accurate test technology but also to support development engineers in their challenging tasks.

## Timeslot configuration

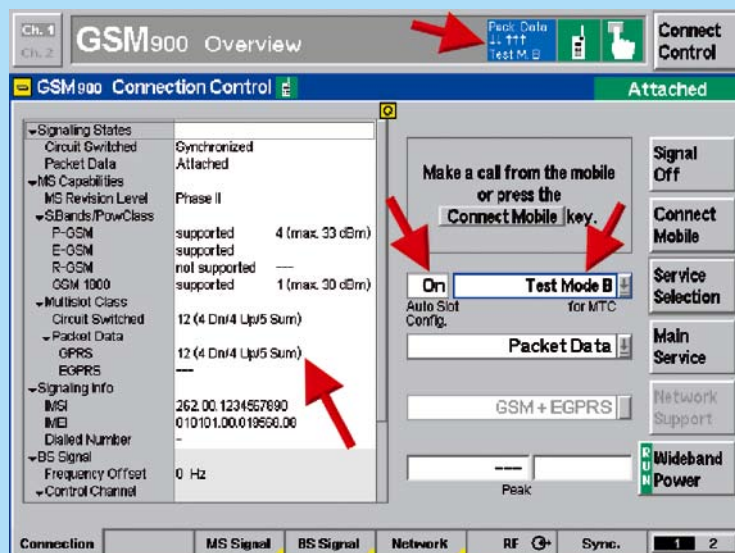
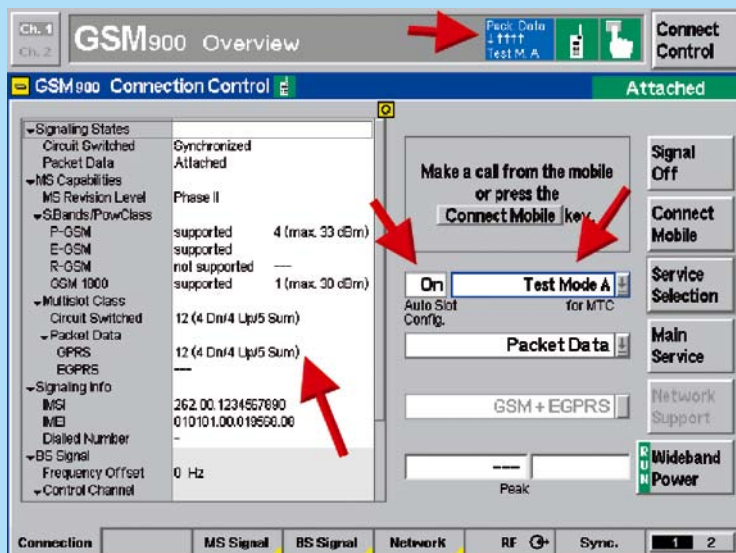
Some system details are hard to monitor – for example, the timeslot configuration of a packet data link. Depending on the multislot class of the mobile phone, only specific timeslot combinations can be used for connection setup. All in all, there are 45 different multislot classes. Timeslot distribution among uplink and downlink also determines which timeslots can be used. It is virtually impossible to handle these diverse combinations without assistance of some kind, which is where the Universal Radio Communication Tester R&S®CMU 200 comes in: As soon as a mobile phone registers on it, the R&S®CMU 200 determines the phone's multislot class and automatically sets the optimum timeslot combination for each connection setup on the basis of the type of connection. For example, in test mode A the R&S®CMU 200 sets the maximum number of uplink timeslots, whereas in test mode B it uses a distribution

that is as even as possible across the uplink and downlink. With BLER measurements, it sets the maximum possible number of downlinks (FIG 1). Users need not concern themselves with the optimum timeslot combination for each test because the instrument takes care of this.

But sometimes problems still occur, e.g. the mobile phone may not have correctly signalled the multislot class yet. In this case, simply correct the automatic selection of the tester or switch off the automatic function completely.

## Measuring GMSK and 8PSK bursts simultaneously

EGPRS phones generate both 8PSK- as well as GMSK-modulated signals. For example, with a packet data link at the appropriate data rate, the useful data must be transmitted in 8PSK-modulated data bursts. In contrast, the bursts the



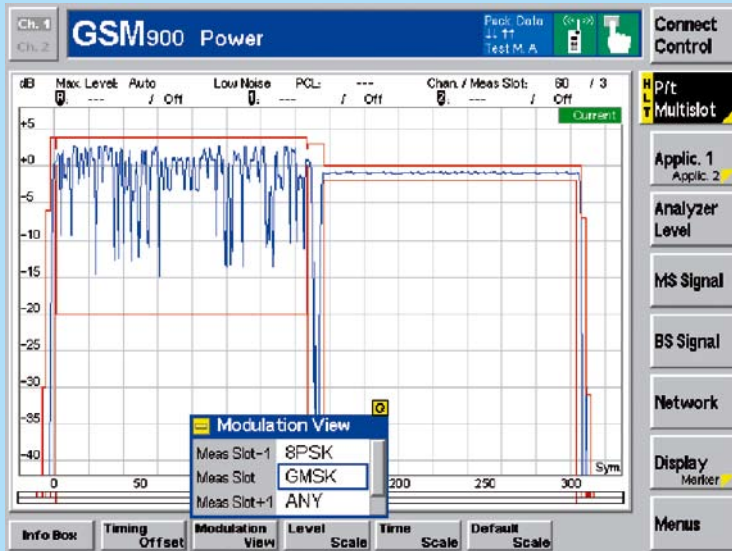


FIG 2 By means of the comprehensive timeslot-dependent trigger functionalities, the multislot power ramp measurement of the R&S®CMU 200 picks out differently modulated bursts from the data stream of the mobile phone for the measurement.

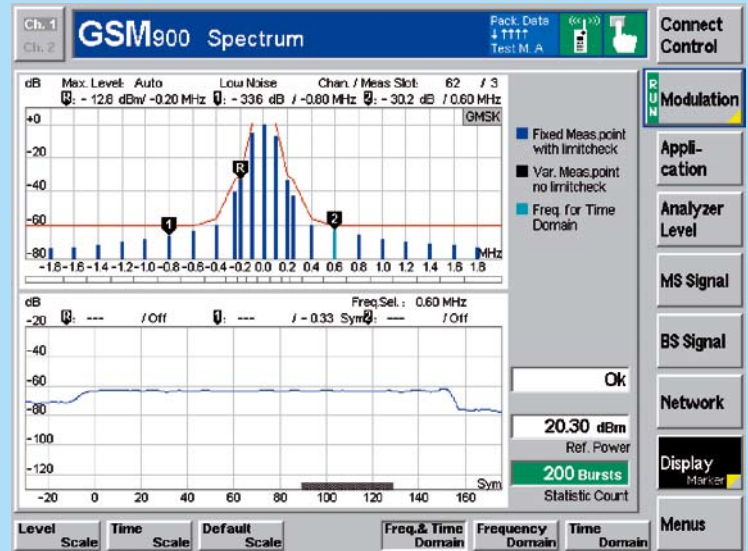


FIG 3 The GSM spectrum measurement of the R&S®CMU 200 not only provides the usual display in the frequency domain but also outputs the measurement results at the selected offset frequency in the time domain.

phone uses to acknowledge received data are transmitted as GMSK data bursts.

It is quite a challenge to separate the two differently modulated data bursts during the measurement. But here again, the R&S®CMU 200 provides excellent support due to its integrated multislot power ramp measurement and its ver-

satile timeslot-dependent trigger functionalities. The development engineer simply changes the modulation mode to be evaluated in this timeslot. If ANY is selected, the tester automatically determines the received modulation mode and activates the correct power/time template. If GMSK is selected, only GMSK signals are evaluated, and with 8PSK, of course, only 8PSK signals

(FIG 2). In the same convenient manner, the tester also selects the access bursts from the data stream.

### Spectrum measurement with frequency and time domain display

In development, it is often necessary to view a measured spectrum not just in the frequency domain but also in the time domain, which provides many valuable clues about the cause of poor spectral behaviour. The GSM spectrum measurements of the R&S®CMU 200 were therefore expanded by a time display. Operation is child's play. After the user selects the required offset frequency in the frequency domain display, the timing of this offset frequency in the time domain is output in the lower display (FIG 3). Versatile zoom functionality makes it possible to enlarge the display of sections of interest.

Rudolf Schindlmeier

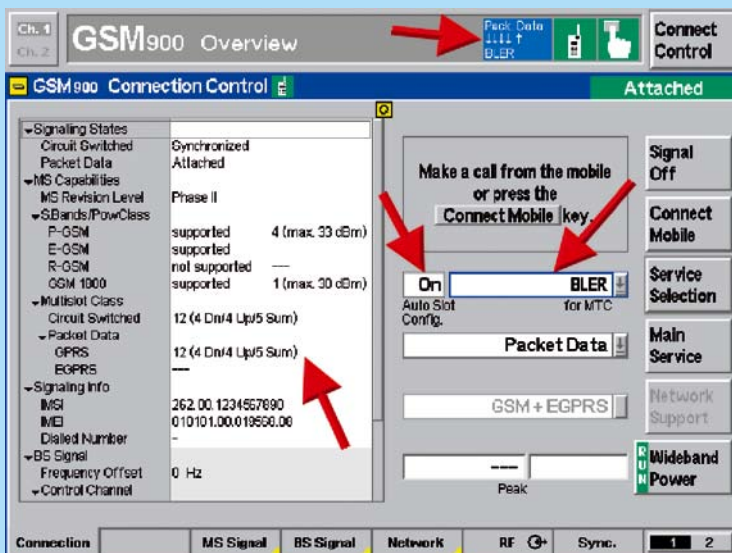


FIG 1 The R&S®CMU 200 determines the multislot class of the connected mobile phone and automatically sets the ideal timeslot combination based on the type of connection.