Signal Analyzer R&S®FSQ

New functions in the WLAN application firmware

The R&S®FSQ-K91 firmware option has now been on the very vital WLAN market for more than two successful years. During this time, users have provided valuable feedback, the standard has been developed further, and the Vector Signal Analyzer R&S®FSQ has been enhanced. To keep pace, Rohde & Schwarz has developed a number of new functions for the WLAN application firmware that make measurements on OFDM signals even easier and more convenient.

Optimized measurement of rise/fall time

The 802.11b standard requires the measurement of the rise and fall times on the modulated signal. The purpose is to ensure that the burst power rises to and falls from the rated value within a defined time. In GSM, for example, a limit value mask is defined that is based on the logarithmized power (in dBm). The 802.11b standard, however, stipulates that the time between 10% and 90% of the non-logarithmized power be measured.

The maximum power (in watts) occurring in the WLAN burst is defined as the 100% reference value. Such a parameterized measurement leads to data-dependent results with modulated signals. Both the 100% reference value and the 10% and 90% values vary significantly. This, in turn, causes the measurement to fail since the rise and fall times are so high. Therefore, the measurement has been optimized in the WLAN application firmware as follows:

- It is now possible to switch between the maximum and average burst power (as a 100% reference value). This makes determining the reference value almost data-independent.
- The firmware offers a sliding averaging filter of variable length, which allows you to determine the average power for the entire WLAN burst. Thus, determining the 10% and 90% reference values becomes less data-dependent as the filter length increases (FIG 1).

Signal bandwidths up to 120 MHz

A WLAN signal currently occupies max. 20 MHz. However, future standards (802.11n) will use higher bandwidths. For users of the Signal Analyzer R&S®FSQ, this is no problem. By installing the R&S®FSQ-B72 hardware option (I/Q bandwidth extension), users can already develop the modules for such signals, since this option can demodulate signals with RF bandwidths up to 120 MHz.

The WLAN application firmware supports both the R&S®FSQ-B72 option and an adjustable sample rate, so that you can analyze signals with bandwidths up to 120 MHz and sample rates up to 81.6 MHz.

Full dynamic range up to 32 MHz signal bandwidth

The High Dynamic mode has been added for users who need to analyze bandwidths up to 32 MHz. This feature allows you to analyze signals up to 32 MHz with the full dynamic range of the analyzer (previously up to 28 MHz) even without the R&S®FSQ-B72 bandwidth extension. You can thus perform measurements on turbo mode signals without any restrictions.

More information and data sheet at www.rohde-schwarz.com (search term: FSQ-K91)

Importing and exporting I/Q data

The latest release allows you to store the recorded I/Q data in a file at the press of a button (and via a remote control command) either on the R&S®FSQ or externally. Conversely, you can also load self-generated I/Q data into the WLAN firmware option and analyze it. This allows you to analyze data recorded in an earlier measurement session. It also simplifies interaction with simulation tools (e.g. with MATLAB®) since models that have been generated can be verified with the WLAN firmware in the simulation and can later be compared with the real WLAN instrument.

Measuring phase and frequency errors

In WLAN, power is present only during data transmission, not at any other time. When the WLAN transmitter is switched on, its power requirements jump dramatically. This can affect its PLL module via the power supply and can cause frequency or phase errors at the beginning of a burst. This makes receiver synchronization more difficult and thus impairs the sensitivity of the entire transmission path.

To enable you to check this behavior, a special frequency/phase error measurement has been implemented that displays the frequency and phase characteristic at the beginning of the burst (in the preamble; FIG 2).

Signals with high I/Q offsets

Especially in the initial phase of development, measurement values sometimes clearly exceed the permissible limit values. The WLAN application firmware has been expanded so that you can now synchronize even signals with high levels of interference (for example, with an I/Q offset exceeding –3 dB) without any problem. This makes the R&S®FSQ the WLAN development tool of choice – even at the beginning of development.

Starting with version 3.60 SP1, option R&S®FSQ-K91 supports all these features; you can download it from the Rohde & Schwarz website (license key required).

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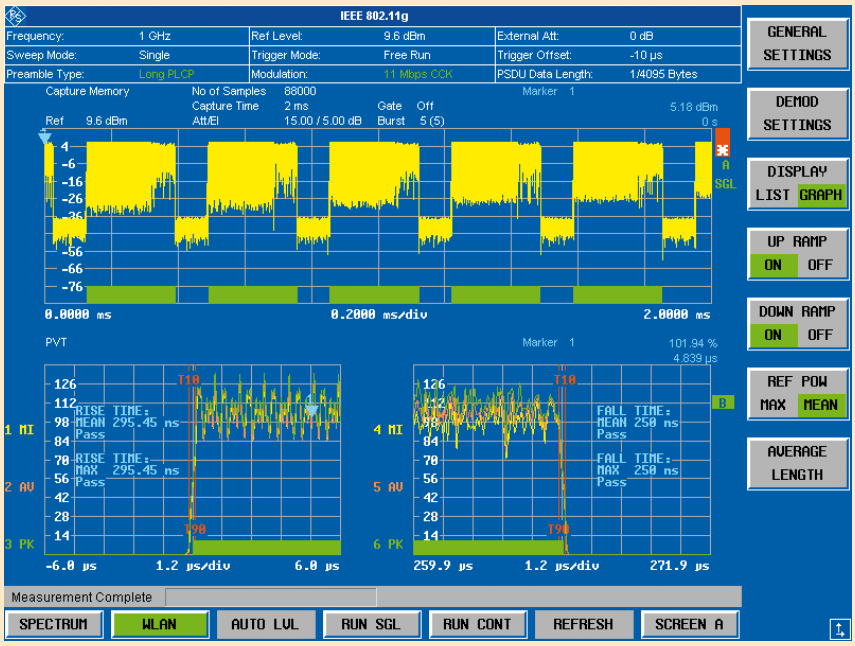

FIG 1 Power characteristic measurement of a WLAN burst with sliding averaging filter.

FIG 2 A special frequency/phase error measurement displays the frequency and phase characteristic at the beginning of the burst (in the preamble).