Universal Protocol Tester R&S®CRTU-G

# Fading applications with convenience

**The Universal Protocol Tester R&S®CRTU-G [1] covers various markets, from development through to conformance test and type approval. Its outstanding hardware concept also satisfies users who place the highest of demands on flexibility and configurability. In combination with the Baseband Fading Simulator R&S®ABFS [2], the generation of fading applications becomes child's play without the need for any additional equipment such as RF combiners.**

## Multipath propagation – a permanent interference factor

When it comes to testing a mobile phone and its multipath compensation capabilities, fading applications play a vital role. In the daily use of mobile phones, multipath propagation is a permanent interference factor. It is the result of reflections on surfaces such as streets or buildings and causes a signal travelling over different propagation paths to arrive several times and with time delay at the mobile phone receiver. This can lead to significant interference in reception. The Universal Protocol Tester R&S®CRTU-G is now equipped with an integrated fading solution that, in combination with the Baseband Fading Simulator R&S®ABFS, enables the user to conveniently perform fading measurements.

## Only one optional IQ/IF interface needed

Even in its basic version, the R&S®CRTU-G offers almost all functions required for fading measurements; only the R&S®CRTU-B7 IQ/IF interface card option is additionally required. This two-channel interface card is integrated in the IQ/IF path, thus providing an external interface. Moreover, it is particularly of interest to development engineers who do not yet have a means to connect their mobile telephone module to the R&S®CRTU-G protocol tester via an RF interface.

Before such a module can be connected to the IQ/IF interface, the interface inputs and outputs must be set by means of the configuration manager (FIG 1). This makes it possible, for example, to operate the interface card in bypass mode and to feed and drop IF signals both on the transmit and receive path.

## Connection of the R&S®ABFS fading simulator

Furthermore, the R&S®CRTU-B7 option makes it possible to connect the Baseband Fading Simulator R&S®ABFS with the protocol tester. For measurements under fading conditions, this creates a test setup that is able to fade two channels with up to twelve paths. The R&S®CRTU-G is connected simply by using the supplied cable set (FIG 2).

For this purpose, the IQ/IF interface must be switched to fading mode, which is accomplished either via the configuration manager or, more conveniently, under the control of the applicable test case.

The fading mode permits signals to be coupled or decoupled from the transmit path. When added to the transmit path, the fading simulator receives the signal from the protocol tester, subjects it to fading and couples the signal again into the transmit path of the R&S®CRTU-G. The faded signal is applied to the DUT that is connected to the protocol tester. The receive path of the IQ/IF interface is switched to bypass mode since the signals do not need to be coupled or decoupled.

## Control of the fading simulator

The R&S®ABFS fading simulator is connected to the protocol tester via the supplied IEC/IEEE-bus cable. The simulator is then controlled from the tester. A fading test case that is implemented in the R&S®CRTU-G can now be configured and controlled by means of a single command of the R&S®CRTU-GA05 software option, for example via fading profile and speed. Moreover, the R&S®CRTU-B7 option is automatically switched to fading mode; manual configuration is not necessary.

The combination of the R&S®CRTU-G and R&S®ABFS is also used in the R&S®TS8950G conformance test systems. In addition to validated RF conformance tests, these systems also permit user-defined RF tests that ideally complement the above standalone solutions with regard to complexity and RF accuracy.

Markus Hendeli

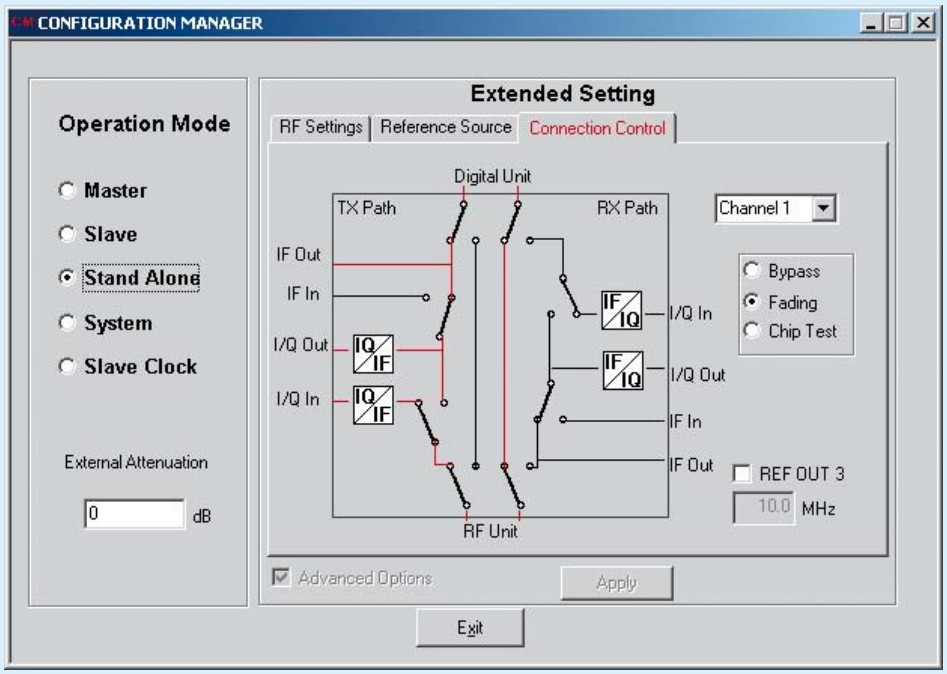
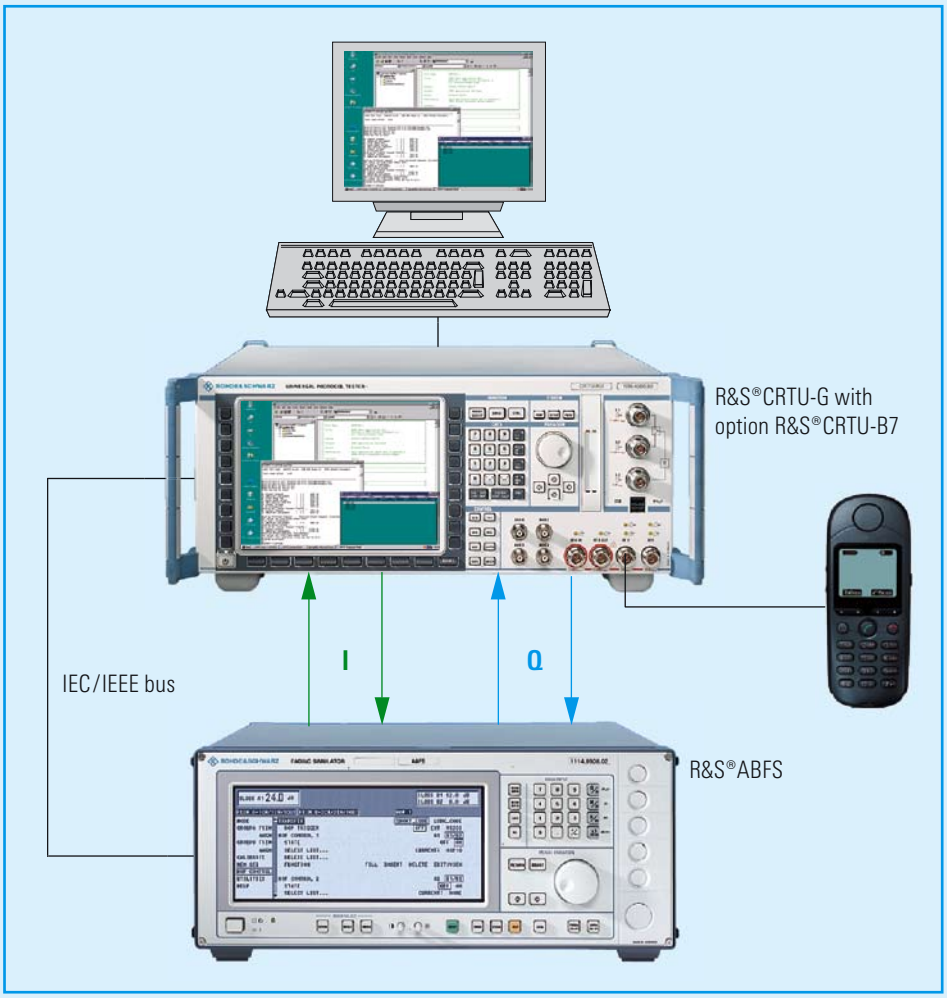
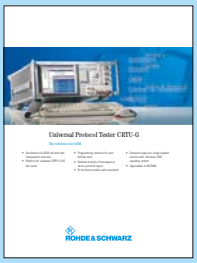



**FIG 1 The configuration manager provides a convenient means of setting the IQ/IF interfaces.**

**FIG 2 Combining the R&S®CRTU-G with the R&S®ABFS provides a powerful minisystem for performing fading measurements.**




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





REFERENCES

[1] GSM Protocol Analyzer R&S CRTU-G – Changing of the guard: after more than 10 years, a new GSM reference system. News from Rohde&Schwarz (2001) No. 171, pp 4–9

[2] Baseband Fading Simulator R&S ABFS – Reduced costs through baseband simulation. News from Rohde&Schwarz (1999) No. 163, pp 11–13