Система тестирования мобильных сетей TS8950

Reliable RF testing all the way from development to conformance testing

- ◆ Platform for RF tests according to 3GPP TS51.010-1
- ◆ Freely configurable RF test methods for R&D

- ◆ Supports GSM Ph2/Ph2+, GPRS, and EDGE
- ◆ Upgradeable to WCDMA
- ◆ Open interfaces for easy integration into individual lab concept

- ◆ Control of custom equipment
- ◆ Full remote access
- ◆ Online measurement accuracy control

Reliable RF testing

Capabilities

The TS 8950 G is designed to do RF tests of the transmitter and receiver of GSM mobiles. These tests cover e.g. measurements of the output spectrum produced by the mobile to evaluate the signal quality and to check possible interference with other services.

For the receiver tests the mobile receiver is stressed by adding interfering signals and by simulating signal propagation conditions with a fading simulator. In this case the TS 8950 G measures the receiver sensitivity for these disturbances by calculating the information loss (BER, FER).

The test functionality of the TS 8950 G is implemented as "test methods". Each test method provides a generic test application and is fully configurable. Test cases are described by parameter sets. This provides significant benefits:

◆ Easy variation of test parameters to test above and below the predefined test limits
◆ Fast definition of new tests (for development)
◆ Consistency between development tests and conformance tests
◆ A clearer view on the real mobile performance

Applications

The TS 8950 G provides three test application packages:

◆ Transmitter tests
◆ Receiver tests
◆ Transceiver tests

Development of GSM mobile phones
Each of these test packages includes a fully configurable test method and example parameter sets.

All parameters can be freely varied through the graphical user interface. The gathered measurement results can be analyzed either with the TS 8950 G control center or with other customer specific software tools.

Conformance testing of GSM mobile phones
Together with the test methods the parameter sets for the relevant test cases in 3GPP TS 51.010-1 are delivered as write protected, frozen files. All test cases will be validated by independent test houses.

Platform concept

The TS 8950 G test system has been developed as a true platform to cover the full range of mobile phone RF tests. The test philosophy of the TS 8950 G is to have one core system for all extension levels.

This core system ensures the measurement accuracy and provides appropriate interfaces on both hardware and software level, allowing comfortable system configuration.

The TS 8950 G is available in different extension levels:

Receiver performance test system
In the smallest extension level the TS 8950 G is equipped with a CMU 200 Universal Radio Communication Tester as signalling unit and BER tester, with one or more signal generators to establish interfering signals and with a baseband fading simulator. The purpose of this minimum configuration is to evaluate the performance of a mobile receiver.

If more detailed protocol functionality is required, a CRTU-G Universal protocol

Test and application parameter editor
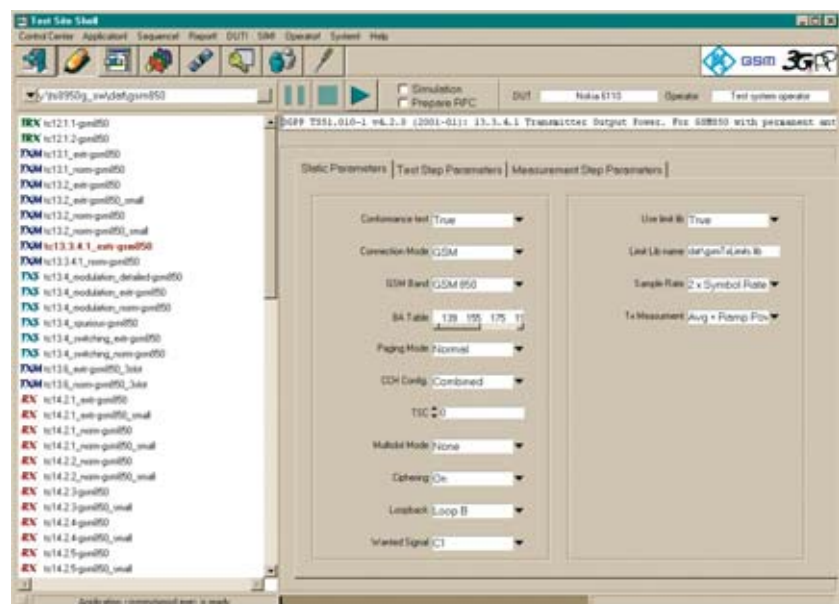
tester for GSM can be installed instead of the CMU 200.

Basic RX/TX test system

This system is equipped with the basic RF equipment including a vector signal analyzer. The Signalling unit in the basic RX/TX test system is either a CMU 200 Universal Radio Communication Tester or a CRTU-G protocol tester.

Full performance RF test system

The full system with CRTU-G protocol tester and band specific signal conditioning units (ASCUs) for each GSM band is the solution for conformance testing. It still maintains full comparability with measurement results gained with one of the smaller versions.

Customizing the system configuration

The TS 8950 G control center allows flexible device handling: Instruments in the system can be easily integrated or removed without down time. The instruments capabilities are abstracted in a logical device layer, making the system widely independent of the individual instruments.

Custom control / analysis

The test methods in the TS 8950 G are single executable files. This allows also the use of other software tools for system control, so that existing lab automation software can be extended to control the TS 8950 G.

Parameter files and result files can be accessed from anywhere within the company network, so test design and analysis can be done off-line allowing optimum utilization of human and test resources.

Access to the signal path

The TS 8950 G switch unit provides access to both transmit and receive signal paths. Multiple RF connectors at the rear of the switch unit allow the introduction of customer specific signal conditioning elements whenever required.
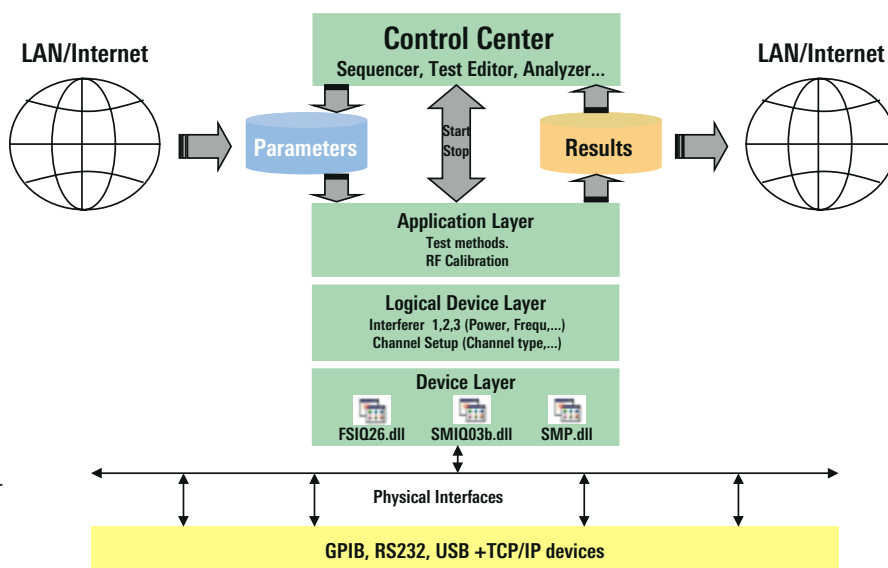
TS 8950 software structure

Measurement Accuracy

A very important parameter of an RF test system is the accuracy of the measurement results, because it determines the reproducibility of these results e.g. at the final conformance test that decides about the market introduction of the mobile.

The signals within the TS 8950 G system are routed through a signal switching and conditioning unit. So no manual changes of the measurement set up, which may introduce unpredictable path losses and phase shifts, are required. The switch unit has been optimized for reliability and accuracy. All signals paths used by the test applications are automatically compensated for frequency dependent losses. This includes connectors and different DUT (device under test) cables. The fixed internal cabling makes the switch unit insensitive to phase shifts.

The TS 8950 G system monitors the performance of the RF paths to ensure optimum consistency and reproducibility of measurement results leading to a maximum confidence level.

Temperature monitoring

To further increase the information of the executed tests, it is possible to monitor the temperature of the test site and the DUT with up to 3 PT 100 probes

Extensions/Upgradeability

The TS 8950 G is designed for RF testing of GSM/GPRS/EDGE mobiles operating in GSM 850/900/1800 or GSM 1900 frequency band. Extensions for other frequencies are easily possible. In the future the TS 8950 G will evolve to a dual mode GSM/WCDMA test system.

Summary

The TS 8950 G test system allows consistent testing from development to conformance level and thus gives the opportunity to improve the confidence level and to reduce time to market.

The flexibility in hardware and software allows adaptive planning of test resources which helps to reduce the overall test time and cost.

Comprehensive testing of 3rd generation mobile communications equipment according to the 3GPP specification

Brief description

The 3G Air Interface Simulator TS 8950 is a test system designed for comprehensive testing of 3rd genera-tion mobile communications equip-ment according to the 3GPP specifica-tion (as far as available at the moment). It consists of standard test instruments from Rohde & Schwarz and additional OEM components.

The overall conceptual guidelines of the system design - flexibility and openness – shall guarantee adherence to the ongoing evolution of the 3G standard. In order to provide the appropriate test functionality right in time, the initial configuration of TS 8950 will be upgradeable in three steps (A, B, C) thus matching with the testing needs in all phases of 3G prod-uct development.

During gradual evolution of TS8950 the range of applications spans from:

- Step A: RF testing without signalling (Tx basic measurements)
- Step B: RF testing with basic L1 sig-nalling (Rx and Tx/Rx advanced meas.)
- Step C : RF testing with L1-L3 signal-ling (Full Tx/Rx conformance test)

Convenient access to any applica-tion range

Because of the ongoing development of the test specifications, defined test cases are not yet available. The test system therefore provides different types of access to the individual layers of the system software for generating customized test sequences. Access is either in the form of a dialog via the graphical user interface AUP (advanced user panel) or on the appli-cation programming interfaces API.

At the device level, a separate dialog is available for each system compo-nent that can be remotely controlled via a defined interface. The instrument dialogs are tailored to 3G require-ments and organized in logical blocks for emulating mobile radios, base sta-tions and services. Entries can also be made for individual device command strings, eg GPIB commands. Every instrument dialog comprises a macro recorder/player for recording and replay of specific device settings (mac-ros).

Rx/Tx measurements and result analy-sis at the system level are also dialog-controlled. The AUP provides a defined script for each measurement which can be edited and extended. This plain command file (PCF) allows direct addressing of the device layer and thus direct access to the individual instruments including the switching

and conditioning unit. With the aid of a macro sequence manager, individual macros can be combined into sequences permitting complex meas-urements.

User management ensures that simul-taneous access by different users does not cause a configuration conflict. Of course this restriction does not apply to simultaneous access of test results for analysis. A logging mechanism stores all the settings made.

The AUP also supports service dialogs that perform fully automatic RF path compensation, for instance, or sim-plify system maintenance and configu-ration by selftest and diagnostic rou-tines of individual components. The RF compensation routines of Signal Switching and Conditioning Unit SSCU need not follow fixed test-case patterns but can be started in compli-ance with user specifications.

Available and planned configura-tion levels of TS8950

The application range of the presently available TS8950A system covers basic Rx/Tx tests without signalling. This includes the following measure-ments at the transmitter end:

- frequency stability,
- occupied bandwidth,
- maximum output power,
- adjacent-channel leakage power,
- spurious emissions,
- transmitter intermodulation,
- transmitter on/off ratio,
- modulation accuracy, (EVM, rho factor),
- code domain power analysis (offline).

The following can be measured at the receiver end:

- sensitivity,
- selectivity (eg adjacent-channel selectivity, blocking).

The subsequent model TS8950B extends the application spectrum especially by performance tests requir-ing coding/decoding. The transmitter measurements of this system include:

- code domain power analysis,
- output power control (inner loop, outer loop).

Additional measurements at the receiver end:

- spurious emission,
- receiver intermodulation,
- spurious response and blocking,
- receiver dynamic range.

Model TS8950C finally performs all conformance measurements including complete layer 1 to layer 3 signalling.