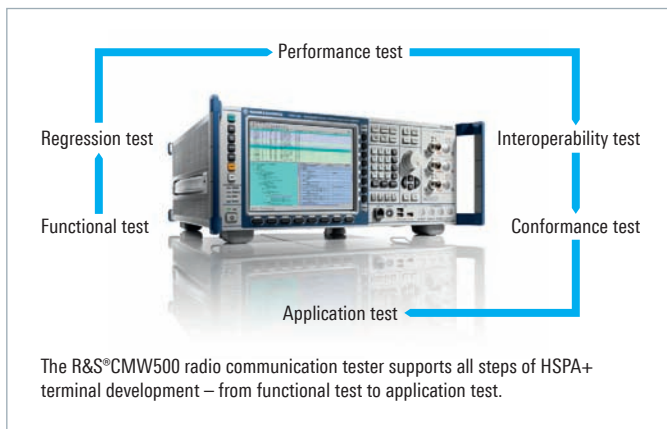


Optimize your HSPA+ design Application

Simultaneous DL throughput verification and UL transmission testing with the R&S®CMW500



Your task

3GPP Release 7 specifies 64QAM modulation in downlink in combination with protocol (Layer 2) enhancements featuring downlink data rates exceeding 21 Mbit/s. The implementation of these two features in a mobile terminal places higher requirements on the design. The maximum possible throughput needs to be achieved while the protocol stack is running according to 3GPP specifications. In the protocol test environment, test scenarios are created to compose and analyze messages and to run test suites in an automated manner, for example for regression testing.

The resulting data throughput of a mobile terminal design is measured in an end-to-end (E2E) environment. This en-

ables you to determine the maximally achievable data rate on the IP layer by running a specific service of interest, for example streaming a video file. Furthermore, mobile terminal designers need to verify that basic RF uplink characteristics such as output power, EVM, occupied bandwidth, etc., are within the 3GPP specification limits, although the 64QAM and Layer 2 enhancement features do not directly affect the UL transmission of the device under test (DUT).

An overall test that includes an HSPA+ data call in the protocol test environment, E2E throughput testing and RF uplink measurements is necessary in order to enhance your HSPA+ design to the maximum. And ideally, a single testing device should be able to measure all of them.

T&M solution

The R&S®CMW500 radio communication tester is a unique multi-purpose tester. It provides designers of UE protocol stacks with a 3GPP specification-compliant reference implementation of the air interface. The comprehensive functions of the programming interfaces and the highly detailed representation in the analysis tools enable quick detection of discrepancies in the DUT protocol stack.

Example scenarios are available for the specific testing of 64QAM modulation in combination with Layer 2 enhancements. The R&S®CMW500 generates internal arbitrary data after setting up the appropriate 64QAM radio bearer with the DUT. When running the test case the throughput is evaluated simply by starting the RLC throughput monitor. By using the logging capabilities of the R&S®CMW500 and its message analyzer, a detailed investigation of the message flow is possible, for example to detect the loss of performance due to incorrect behavior and also protocol errors.

In order to identify the E2E capabilities of the design, an alternative test scenario from the available example scenario set is used. Again, a 64QAM radio bearer is setup, but without internal data provision. The IP data has to be generated by a suitable application, e.g. by using a media player with an appropriate IP address configuration. The throughput performance is accessible on the RLC layer using the RLC throughput monitor and/or on the IP layer using an arbitrary bitmeter application.

75 Years of Driving Innovation



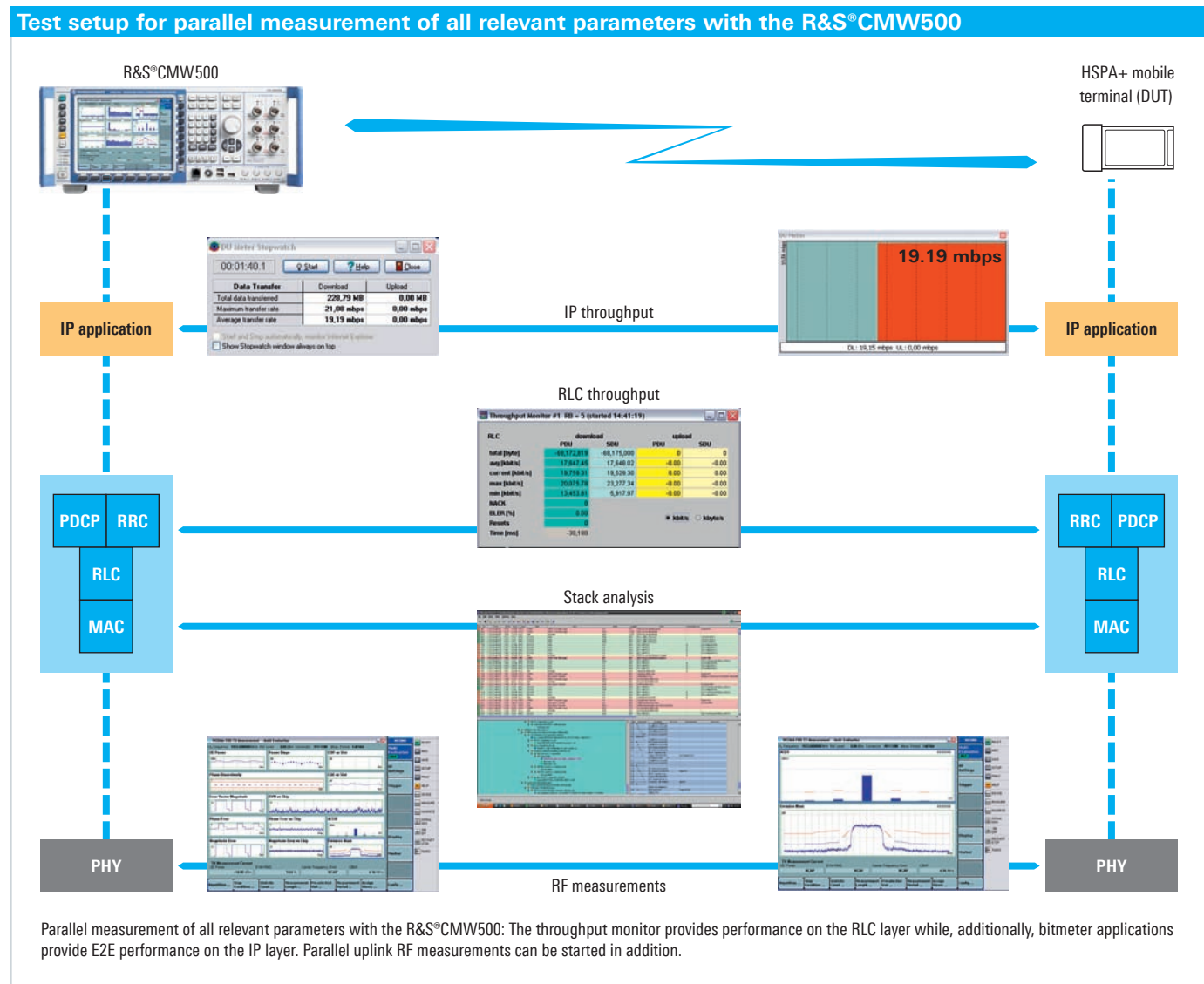
The R&S®CMW500 is equipped with powerful hardware and provides a very modular software concept. Two different software options can be used on the same hardware, enabling test engineers to run RF measurements parallel to a medium-level API (MLAPI) test scenario that was started in the protocol environment.

The RF measurements are provided in multi-evaluation mode. An overview screen provides all measured results and scalar values for the essential measurements including UE power, error vector magnitude (EVM), root mean square (RMS) power, carrier frequency error and occupied bandwidth (OBW). Since only one set of measured data

is used, the individual results relate to each other, which makes troubleshooting and debugging easier. The overview display in multi-evaluation mode can be adapted to the individual testing needs. After reviewing all results to obtain an overview, the test engineer may want to concentrate, for example, on two specific measurements for a detailed analysis.

The R&S®CMW500 is your ideal choice for overall HSPA+ testing, providing comparable and detailed results from design through to production, fulfilling all test needs. Future implementations will reflect the latest 3GPP enhancements, including LTE.

See also: www.rohde-schwarz.com/technology/HSPA



Rohde & Schwarz GmbH & Co. KG

Europe, Africa, Middle East +49 1805 12 42 42* or +49 89 4129 137 74
 customersupport@rohde-schwarz.com
 North America 1 888 TEST RSA (1 888 837 8772)
 customer.support@rsa.rohde-schwarz.com
 Latin America +1 410 910 7988
 customersupport.la@rohde-schwarz.com
 Asia/Pacific +65 65 13 04 88
 customersupport.asia@rohde-schwarz.com
 www.rohde-schwarz.com

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