Third-generation mobile radio – universal test concepts pave the way

The world of mobile radiocommunication is undergoing dramatic changes as far as technology, services and type approval test regulations are concerned: the third mobile radio generation (3G) is on its way (FIG 1). Pioneering measurement technology has to come up with solutions for increasingly complex test requirements at an early stage and should be instrumental in launching the new generation on the road to success. Rohde & Schwarz, the world’s market leader in the field of mobile radio test technology, takes up this enormous challenge with a flexible and future-oriented test concept.

While today’s mobile phones are mostly used for voice communication, those of the third generation (3G) will open up the entire multimedia spectrum (FIG 2). While today’s mobile phones are mostly used as terminals for voice communication, mobiles of the third generation will open up the entire multimedia spectrum from voice telephony through video applications to data services based on the Internet protocol (IP) and integrated by the wireless application protocol (WAP).

It is conceivable that dedicated terminals like personal digital assistants (PDA) will provide access to the different services, so that a mobile acts like a mobile switching station. Transmission in the local area between the terminal and the mobile station will be based on standards optimized for this framework of the international 3GPP (3rd generation partnership project) body. Signal generators and analyzers from Rohde & Schwarz have set standards in this field from the very beginning [3], [4], [5]. There is also a growing demand for more complex test systems as 3G activities progress beyond the research stage and turn into ambitious development projects. Requirements go far beyond mere RF measurements at the air interface or signalling tests at layers 1 to 3. Testing overlaid applications at a higher protocol level (> layer 3) is gaining in importance.
Early elimination of errors in product design

The principle test objective in research and development is to minimize design costs and time to market while maximizing product quality. This means that faults during the product development process must be eliminated at the earliest possible stage. This process can be divided into four phases of increasing complexity, for which different test requirements can be identified (FIG 3).

During the research phase the main emphasis is initially on the investigation of RF parameters and coding algorithms under varying conditions like interference and fading. Realtime signal processing is not required at this stage as finite signal sequences are sufficient. The largest saving potential is in the module test phase. For example previously, when the air interface was the only access medium, signalling software could not be thoroughly tested until after complete inte-

purpose, like Bluetooth™, whereas mobile-to-network linkup will be via W-CDMA or GSM.

At the network end, too, it is becoming obvious that IP-transparent structures are about to experience a breakthrough. Protocol tests will gain enormously in importance in a scenario of this kind with its large number of multimode handover processes and the growing orientation towards data applications.
The next issue of News from Rohde & Schwarz will contain more details of the TS8950 test system.

Holger Jauch

REFERENCES


Universal test concept covering each product design phase

Rohde & Schwarz satisfies the different requirements of the four phases with an extremely flexible test concept. The basis of this is a modular, upgradable 3G Air Interface Simulator TS8950 with integrated components for protocol tests (FIG 4). Instead of rigid test cases, this highly advanced test system provides individually parameterized test methods that can be combined to form any desired test scenario. Thanks to this strategy, TS8950 is not only able to respond flexibly to the still changing specifications resulting from 3GPP standardization but also supports manufacturer- and network-specific test sequences.

As a consequence of the R&TTE directive of the European Commission, taking effect on 1 January 2000, mandatory type-approval tests will be replaced by binding manufacturers’ declarations of compliance, so this flexible test concept will gain enormously in importance. This approach also ensures compliance even with the stringent requirements of operators like the Japanese NTT DoCoMo, which will be putting the first 3G network into operation at the beginning of 2001.

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