



Part of a world on the move

Test and measurement solutions for mobile radio



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Keeping the mobile radio market turning

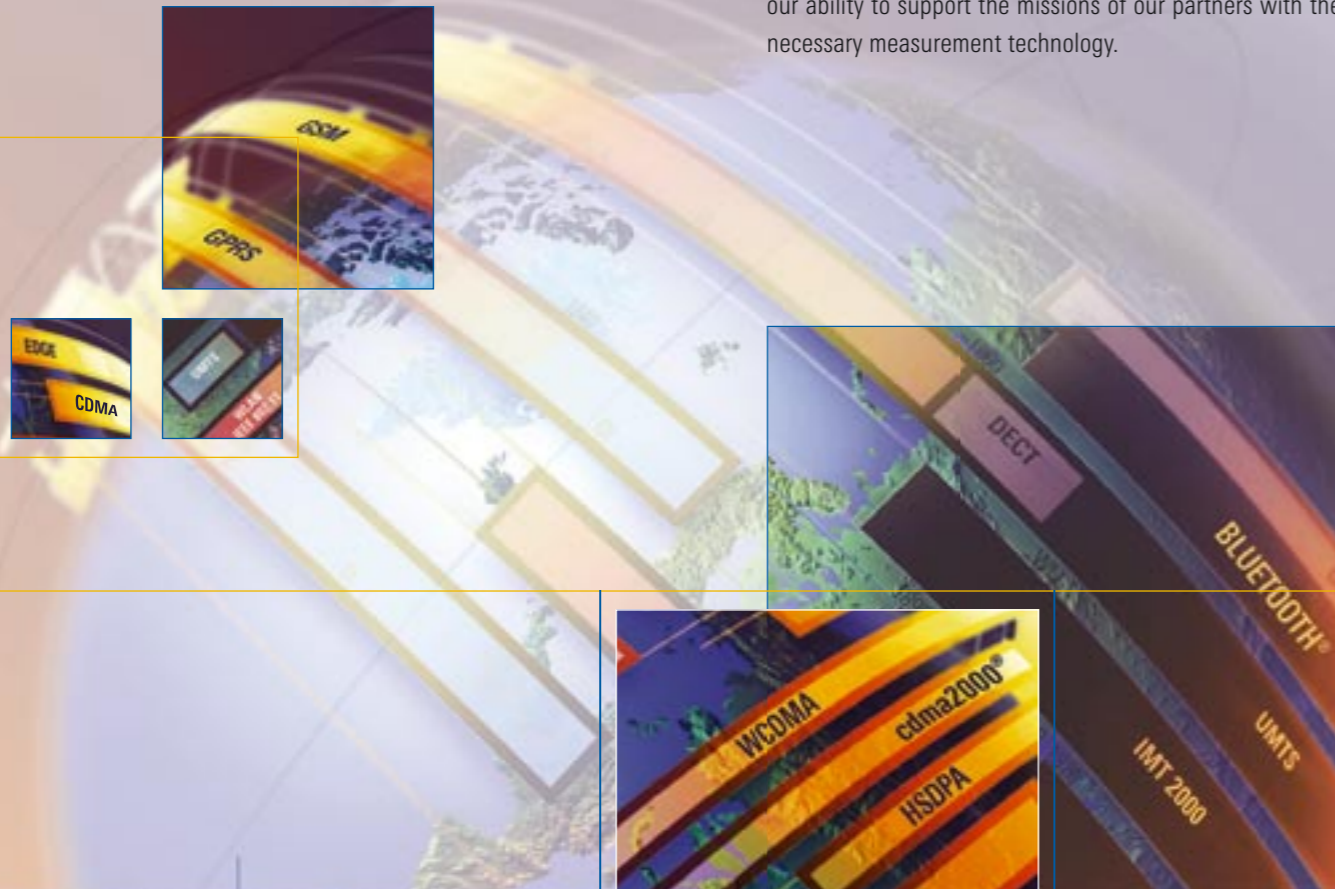
The digital revolution has transformed mobile radio into one of the most dynamic technologies of our time, and one of the fastest growing markets. The daunting rate of innovation places high demands with regard to flexibility, creativity, and efficiency on every company taking part. Each new generation of technology requires extremely specialized, high-performance test and measurement equipment every step of the way. From the earliest days of mobile radio, Rohde & Schwarz has been at the leading edge of development. We provide the test and measurement equipment that manufacturers and network operators need to successfully meet their goals.

The race is to the swift

The number of mobile radio standards already introduced or under discussion is permanently on the increase worldwide. This is compounded by the continual integration of new services such as local area connectivity, navigation or multimedia capabilities which transform mobile radio products

into complex high technology. Furthermore, the market structure is undergoing constant change. Any test and measurement provider hoping to enjoy long-term success under these conditions must do many things well. Above all, such a provider must be a reliable partner for its customers. Rohde & Schwarz is such a partner.

Technologies come and technologies go. Success depends on how quickly and cost-effectively companies can launch, market and further develop new products. We stand by our ability to support the missions of our partners with the necessary measurement technology.



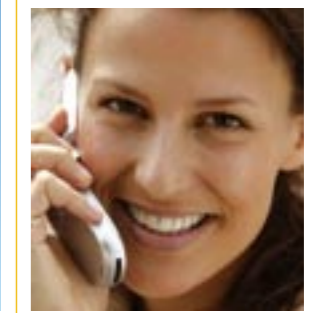
Your requirements – our commitment

1. Understanding the market

If you want to take part in the ongoing development of mobile radio, you have to know where the technology is headed, understand the dynamics of the market, and be able to keep up. This means recognizing the challenges presented by the explosive growth in data volume and by new technologies, and providing solutions to these challenges. Rohde & Schwarz always keeps one eye on the market and the other on the horizon. This not only allows us to help our customers in their day-to-day business but also makes us a receptive and knowledgeable partner for discussing tomorrow's market.

2. Understanding technology

Digital mobile radio stands at the frontier of technology. The stream of new ideas constantly pushes the technology to its limits and repeatedly demands a developer's full ingenuity. The increasingly high-density integration of modules and the introduction of components with new technologies make the testing of products more and more difficult. In addition, there is the ever-increasing complexity and range of functions. Yet, these are the conditions that enable Rohde & Schwarz to showcase its strengths. True to our motto of "pushing limits", we strive to provide pioneering



solutions as benchmarks for the market. These solutions allow our customers to achieve significant advances, no matter which technology is currently required.

3. Focused on costs

Manufacturers and network providers make immense investments in new technologies and expect to see a return within a reasonable time. Rohde & Schwarz helps them achieve this goal in several ways. We stay ahead of market shifts with universal platform-based measurement concepts offering high security of investment and high flexibility. Additionally, we support high productivity with the shortest possible measurement times. Manufacturers can save money by performing extremely precise measurements, which in turn allows them to take full advantage of production tolerances, without wastage due to uncertainty.

4. Long-term relationships

The closer the partnership and the better the understanding between the customer and the vendor, the more smoothly things work. The customer and the vendor must be able to depend on each other.

Rohde & Schwarz has been an innovator in mobile radio measurement technology from the very outset. Our GSM System Simulator was the basis for measurement technology at the beginning of the digital era. Many product generations later, we are more successful than ever, supplying the third generation mobile radio market with test and measurement technology that sets international standards.

5. Global presence

Just as important as the products themselves are local application support and a knowledgeable staff. Rohde & Schwarz maintains its own sales and service network around the world, with centers in all regions as well as high-quality, on-site support in many countries. Wherever you need us, we are right there.

We support you at every step of the value chain

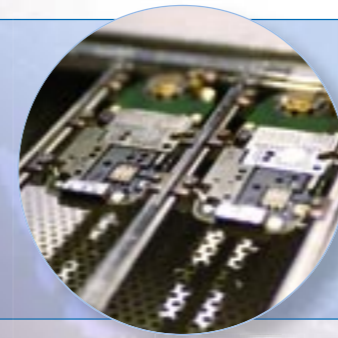
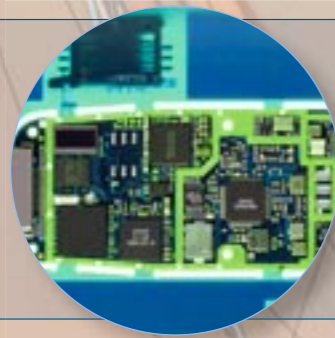
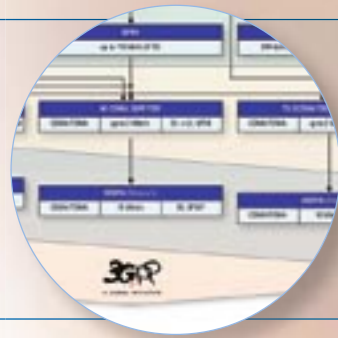
Mobile phones and base stations are manufactured in a series of steps. These steps are typically carried out by different companies or different parts of the same company, working in parallel or in sequence. Rohde & Schwarz supplies measurement technology, software, and applications for all steps in the chain, and offers intensive support with specialized knowledge. Infrastructure suppliers and network providers also look to us for complete test and measurement solutions at the highest level.

Production

Our modular production testing solutions are designed for maximum speed and continuous operation. They monitor function and quality during production, from individual instruments to complete systems. In close cooperation with the customer, we develop time- and cost-optimized test solutions specific to each production line.

Service

The same test platforms used in development and production are invaluable for service requirements as well. This hardware and software compatibility ensures reliable diagnostics and effective servicing.



Definition of technologies and standards

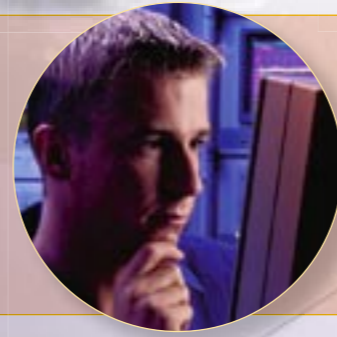
As a member of standards committees and boards, we help define test specifications for standards. We can therefore ensure from the start that the underlying concepts of a new standard set the basis for realistic and cost-effective testing, before major investments are made.

Chipset and reference design

The development of baseband and RF chips, and of the reference designs derived from them, pushes the limits of what is physically possible. Testing has to cover the entire spectrum, from elementary RF parameters and integrated circuit performance to signalling and protocol stacks. Our measurement technology accompanies the entire process, from the first stage to the last.

Product-specific design and verification

In the subsequent development of a reference design into a market-ready product, the full range of our RF and protocol measurement technology comes into use. At the end of development, our certified conformance testers guarantee adherence to mobile radio requirements as well as EMC standards.



Network planning

Network operators require a wide range of measurement and simulation tools for laboratory technology studies and preliminary analyses. Network planning software must be calibrated and network equipment must be tested for function and reliability before rollout can take place. We provide a wide range of hardware and software support, even for proprietary technologies.

Network rollout and commissioning

Given the immense investment burden, network rollout costs must be kept as low as possible. We help keep expenses down with efficient measurement tools for installing and commissioning base stations, from the base station itself to the antenna equipment.

Optimization / Quality of service

Quality of service determines consumer acceptance of a network. Permanent monitoring with drive-test systems for coverage and end-to-end test concepts provide a basis for cost-optimized network operation. Network capacity adjustments require precise coverage measurement, which makes it possible to achieve the target network load with the minimum number of base stations.



Uncover what's inside mobile radio

Rohde & Schwarz makes outstanding contributions to all categories of test and measurement products involved in mobile radio. Over the decades, we have built up unrivalled expertise in all fields of wireless telecommunication. This expertise is evident in our unprecedented product range, meeting the most demanding of technical requirements.

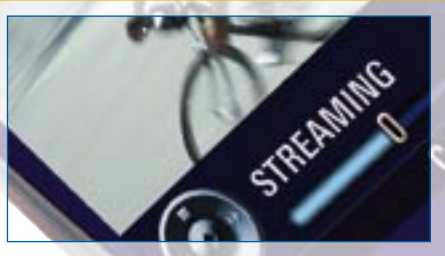
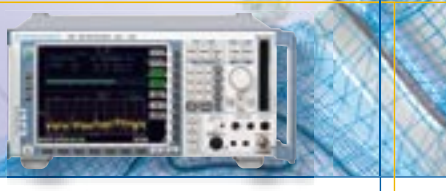
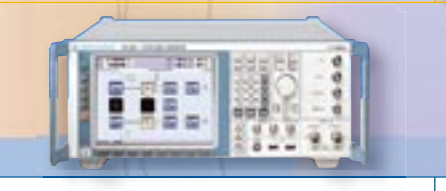
Application
Drive Tests

Radiocommunications Testing

Power Measurement

Conformance

Signal Generation



Radiocommunications testing
Flexible testers for development, production, quality assurance and service for mobile phones (plus all other user equipment) and base stations
Trailblazing product design covering all important standards cost-effectively with a single test platform
Transmitter tests, receiver tests, signalling tests

Protocol and conformance testing
Self-calibrating precompliance and full-compliance conformance test systems for verifying mobile radio components and mobile phones based on standardized test cases
Extreme test depth and accuracy
Up-to-date test cases complying with the latest decisions of standards bodies
Combinable protocol and RF test solutions
Test solutions that are adaptable to customer-specific test scenarios

Production testing
High-performance multistandard systems for maximum test throughput
Scalable and flexible configuration, from low-cost standard systems to customized, turnkey function test solutions
Universally configurable, PXI-based test platforms
Systems for testing wireless components under environmental stress

Spectrum and signal analysis
Standards-setting, comprehensive product portfolio encompassing all performance classes
Extensive range of options and software packages for mobile radio applications
Compact units for outdoor use, such as installation and maintenance of base stations
Analysis of digitally modulated signals with unprecedented demodulation bandwidth

Signal generation
Full range of RF generators, from high-end instruments for R&D to favourably priced service equipment
Generation of any type of digitally modulated signal
Realtime signal generation for TDMA and CDMA systems
Generation of realistic signals including noise and dynamic fading
Outstanding signal quality

EMC testing
Solutions for precompliance and compliance testing
Extensive range of instruments, systems, and software for EMI and EMS measurements, meeting all relevant standards

Network analysis
Extremely high accuracy even at maximum measurement speed, ideal for production and development applications alike
Outstanding receiver design for optimum RF performance
Simultaneous measurements on up to 16 ports

Power measurement
High-precision broadband instruments with wide dynamic range – handy, robust and easy to operate
Innovative multipath sensor technology
Accurate measurement of average power regardless of bandwidth
Sensor operation direct from PC
Multislot measurements for common time division systems

Audio analysis
Universal instruments for all audio measurement tasks
The only certified test solution for acoustic 3GPP and 3GPP2 conformance measurements on WCDMA, GSM and cdma2000 mobile phones

Power supplies
Power supplies with burst capability and integrated analysis functions.
Units specially designed for mobile radio and ideal for use in development, production and service

Drive tests
High-performance vehicle-mounted systems for calibrating planning tools and detailed network quality analysis
Portable systems for indoor and outdoor coverage measurements
Powerful software packages for planning and evaluating coverage measurements

End-to-end and application testing during network operation
End-to-end tests of all network services (e.g. video telephony) and customer profiles
Tests for correctness of call routing and toll ticketing



In-depth support

The close interlinkage of the technical processes in the value chain, the long service life of high-investment measurement equipment, and the never-ending need to keep test equipment up to date all demand continuous cooperation between the customer and the measurement equipment supplier. Rohde & Schwarz is proud of its longstanding business relationships with many customers, which we view as confirmation of our policy of cooperative partnerships. An integral part of this policy is our commitment to provide a comprehensive package of support and service.



At the roots of the rules

Our experts play an active role in all important organizations responsible for the standards for technologies such as GSM/GPRS, WCDMA, or WLAN, discussed and governed by bodies that include 3GPP, 3GPP2, CDG, or GCF. By participating in these bodies, we make certain that an exchange of information with our customers takes place at the highest technical level. We discuss the practicality of planned technologies and put forth suggestions for solutions based on real-world experience. Our involvement in these working groups gives us invaluable advance knowledge of the planned direction of mobile radio. This knowledge flows into preliminary analyses and the development of new measurement technologies. As a result, when our customers start out in a new technology, we are ready to support them with knowledge and products.

We train your staff worldwide

Mobile radio technologies are developing at a tremendous pace which shows no sign of abating. To keep up, you must constantly update your technical knowledge. We assist you with a comprehensive education and training program. Our experts can quickly bring your staff up to speed on our

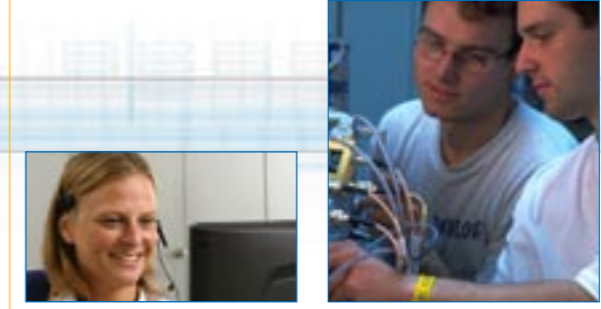
equipment, basic theory, and the very latest state-of-the-art developments. We custom-develop training programs to match the desired outcome and the existing knowledge level. Courses are held either at one of our training centers or at the location of your choice.

Application support where you need it, when you need it

Product support is an integral part of the solution for the customer. We are always available to our customers for any questions about our products. Our hotlines and support centers are staffed by highly qualified Rohde & Schwarz employees, who can answer many questions immediately. Our numerous product and application experts are constantly on the road to support our customers on-site, to optimize test equipment for specific customer needs, or to meet changed requirements. Our application engineers remain busy preparing new solutions for typical measurement tasks as they arise, and we post the resulting application notes on our homepage free of charge. We want to earn the trust of our customers, not just with first class equipment, but with in-depth support as well.

Service is just around the corner

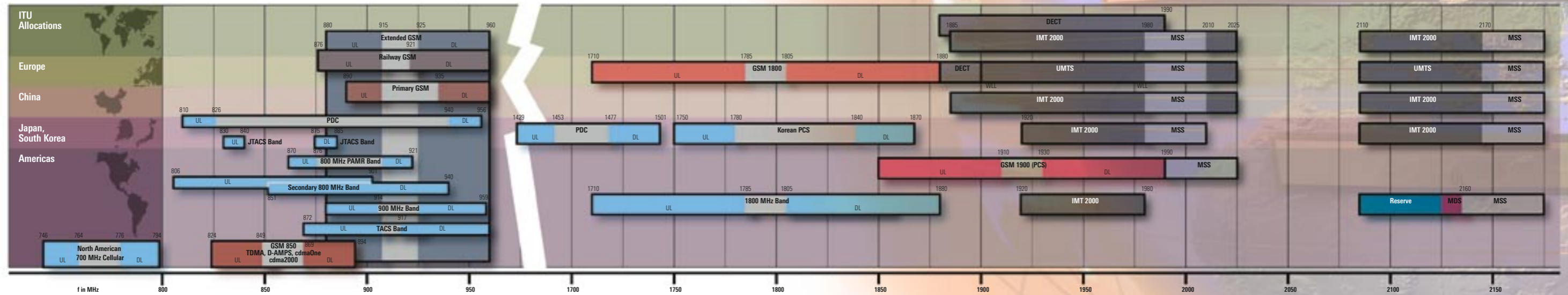
Rohde & Schwarz maintains a service network throughout the world, with regional centers and local offices that can meet your every need. To make it quick and easy for you to get service when you need it, your nearest Rohde & Schwarz service location will generally be the same as the point of sale. That location can take care of all primary service needs such as calibration, maintenance, updates and repair, so that your test equipment will be productive again after only minimal downtime. If you require, our mobile calibration team can always come to your location to provide the quickest possible on-site instrument calibration.



Mobile radio on the move

No matter which mobile radio standards you work with, we can support you with measurement equipment, application software, and hardware options designed to meet your test requirements, standard by standard. Only one thing is certain about mobile radio – it will continue to develop and change significantly over the years. We will remain fully committed to developing the best in test and measurement equipment so that you can reach your destination quickly and reliably, no matter where that may be in the world of mobile radio.

2G and 3G spectrum



Evolution of mobile radio standards

