

**ROHDE & SCHWARZ**

Make ideas real



# PROTECTING THE ELECTROMAGNETIC SPECTRUM



# FOR A SAFER AND CONNECTED WORLD



Strong economies and increasing prosperity around the globe are built on advanced technologies that demand unhindered communications capabilities and easy access to information. To secure these capabilities, governments the world over support the expansion of innovative communications technologies and infrastructure.

Government agencies enforce legislation aimed at safeguarding competitive markets to provide a solid basis for this progress and prevent unfair market practices. In addition to ensuring a level playing field, regulatory bodies protect consumers. By monitoring the technological and commercial environment, authorities supervise the market and shield end users from unfair trade practices.

The rising need for communications capacity stimulates demand for landline and wireless services and networks. Because radiocommunications use the increasingly scarce electromagnetic spectrum, regulatory bodies generally pay more attention to wireless services, which is why authorities carefully regulate the radio spectrum while accommodating numerous radio technologies and standards. The authorities' main focus is on ensuring fair competition among suppliers to satisfy the countless end users of wireless services.



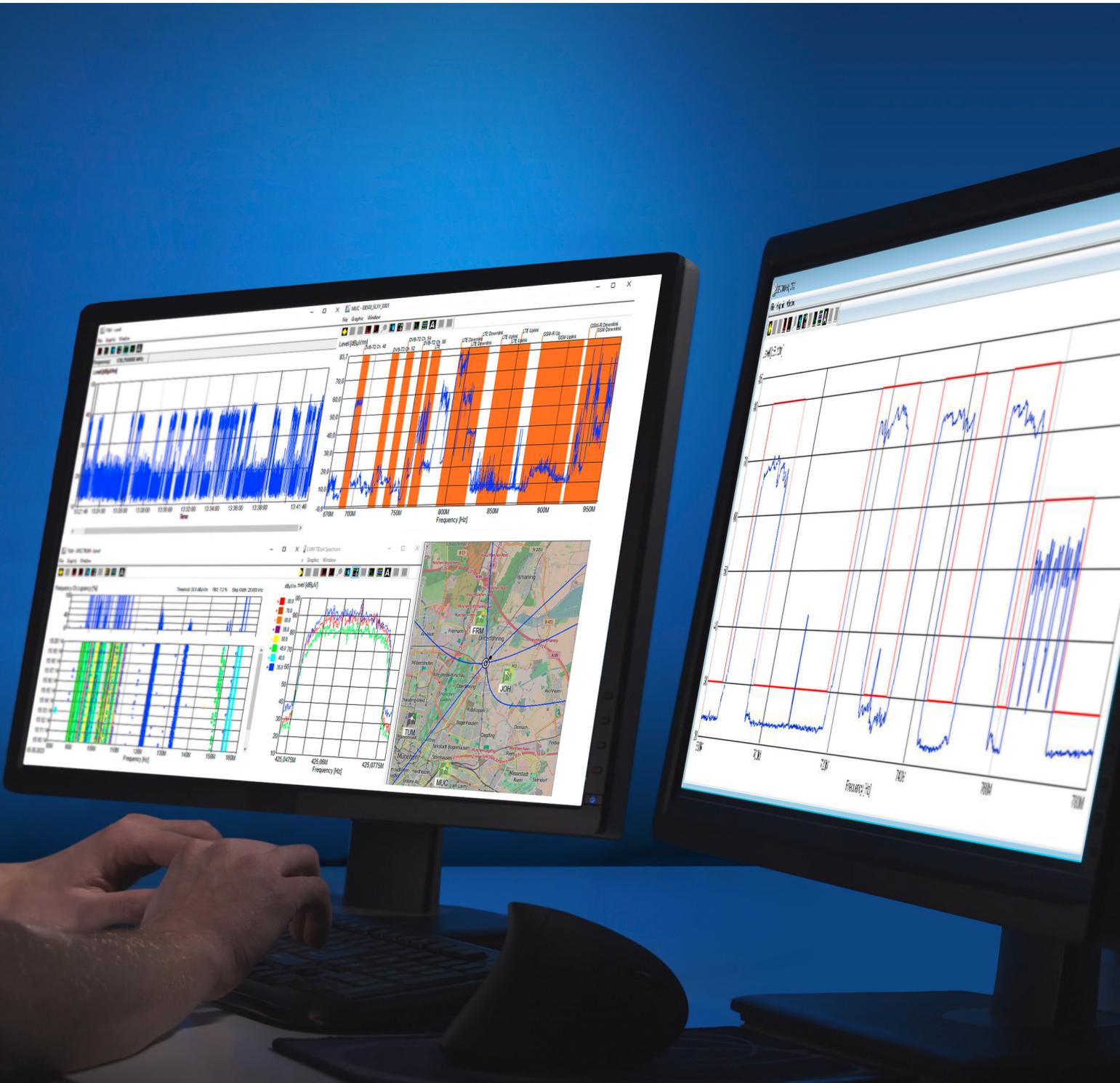
# SPECTRUM COMPLIANCE

To harmonize and coordinate the use of the electromagnetic spectrum, the ITU's World Radiocommunication Conferences have adopted the Radio Regulations (RR). In the ITU's member states, the Radio Regulations are the framework for national legislation and frequency spectrum management.

Optimizing the use of the radio spectrum is one common objective of regulatory authorities everywhere. Generally, this involves maximizing radio communications capacity while minimizing interference. To achieve these apparently contradictory aims, authorities need to plan, manage and monitor the radio spectrum prudently. Along with frequency allocation and assignment, licensing and billing, a significant part of spectrum management involves testing, measurement and spectrum monitoring. These tasks range from EMC measurements, tests and calibration procedures in the lab to various field operations aimed at optimizing spectrum planning, interference hunting and collecting evidence for law enforcement.

To ensure a regulated use of the radio spectrum, authorities need to have a range of equipment at their disposal, from individual test and measurement instruments to a nationwide radiomonitoring system. For all of this equipment, Rohde & Schwarz offers a comprehensive state-of-the-art portfolio. It includes individual devices for laboratory and field use and extends to a range of radiomonitoring stations capable of remote control and data evaluation over a nationwide network.





# DOCUMENTED PRECISION

## Conforming to standards

Regulatory authorities need to conduct certified measurements that can be used as evidence in court. This requires equipment that is maintained on a regular basis and calibrated according to international standards. In order to allow traceability, records on procedures must be kept. In its own calibration laboratory, Rohde & Schwarz offers various calibration services that are accredited by DAkkS, the German accreditation body. Rohde & Schwarz also offers an extensive portfolio of certified test and measurement solutions, enabling authorities to perform calibration tasks on their own premises.



# SAFETY AND COMPLIANCE FOR END-USER EQUIPMENT

## Admission of hazard-free devices

Every region of the world has its own requirements for user equipment with regard to safety, health protection and electromagnetic compatibility (EMC). Regulatory bodies monitor equipment stocks and check individual products for compliance with legal requirements. These checks prevent harmful interference with other devices and especially radio services. Test solutions from Rohde & Schwarz cover all of the relevant standards from ETSI and other organizations.

## End-user equipment verification

A safer and connected world needs wireless devices. Wherever these devices are sold on global markets, they must conform to certain regional regulatory compliance requirements like those stipulated by the CE RED, the FCC and others. Regulatory tests are a crucial step during assessment procedures in the regulatory compliance process.

As a reliable T&M vendor, we support regulatory testing facilities (third-party and in-house labs) with test solutions, service and expertise. We are impactful by supporting all test requirements in line with ETSI EN, FCC 47CFR/ANSI C63 and other standards. To make ideas real, we continuously improve our solutions to enable EMF, EMC, RF and other tests.



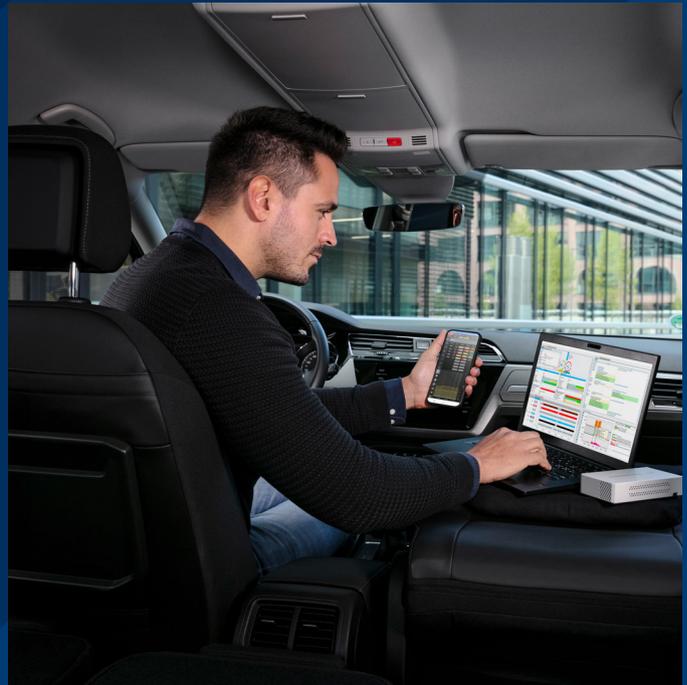
# SUPPORT FOR SPECTRUM PLANNING

## Occupancy measurements

Spectrum managers rely on occupancy measurements, which reveal the actual use of individual frequencies and entire frequency bands. They show white spaces and bottlenecks in the spectrum and are a basis for frequency planning and assignment. Rohde & Schwarz systems offer comprehensive occupancy measurements to provide data about the actual used capacity of single channels and entire frequency bands. These systems provide a solid basis for effective spectrum sharing across all frequency bands.

## Coverage and QoS analysis

Coverage measurements can deliver valuable information for a range of purposes. Network planners can verify predictions and gain important feedback on the actual availability of radio services. In addition, coverage analysis can provide confirmation that network operators are meeting coverage obligations in line with the terms of their licenses. Coverage data can simply be limited to field strength, but it can also yield more detailed information, such as the RF quality and quality of service (QoS) within a specified area. Rohde & Schwarz systems can measure coverage parameters for analog and digital broadcasts as well as mobile phone networks and efficiently analyze the results.



# ENSURING AVAILABILITY OF THE RADIO SPECTRUM

## Verification of license-compliant operation

Operators who use transmitters outside their licensed parameters, whether intentionally or not, risk causing harmful interference to other radio services. To mitigate this risk, authorities have to detect license violations and follow up on them. Rohde & Schwarz spectrum monitoring systems can verify all of the parameters specified in a license. During on-site inspections or using remote measurements, the solutions help to ensure use of assigned radio frequencies in conformity with regulations.

## Detection of illegal transmitters

Unauthorized transmitters are not only a potential source of interference; their operators are also in violation of public regulations. To take unlicensed transmitters out of service, authorities use Rohde & Schwarz spectrum monitoring systems, which compare the detected signals with database entries of licensed transmitters. Once an unlicensed transmitter is detected, the authorities can analyze its emissions and geolocate the source to track it down.

## Assistance at major events

A well regulated, interference-free spectrum is often critical to the success and security of political summit meetings and large sporting events. Such occasions frequently involve a large number of staff from the event organizer, broadcasters and other organizations from different countries gathered in a limited area. All of the participants use their own radio devices and transmission equipment and expect certain channels to be available. Rohde & Schwarz systems can monitor radio frequencies prior to and during events to help coordinate spectrum use and immediately mitigate harmful interference.

## Interference hunting

The increase in electronic devices and wireless services in our daily lives means that there are ever more potential sources of interference. Rohde & Schwarz offers a wide range of equipment to detect, analyze and locate sources of interference. Fixed monitoring stations can be controlled remotely to detect and verify suspicious emissions. Transportable systems can be deployed to locations where interference appears only sporadically, while mobile monitoring stations can home in on emissions close to their source. Finally, portable equipment is the solution of choice when it comes to pinpointing a source in the final meters of interference hunting, even indoors and at locations where vehicles have no access.



# YOUR RELIABLE PARTNER: ROHDE & SCHWARZ

Rohde & Schwarz develops, produces and markets a wide range of electronic capital goods for industry, infrastructure operators and government customers. The independent group is among the technology and market leaders in all of its business fields. In order to satisfy the evolving demand of modern regulatory authorities, Rohde & Schwarz offers a wide range of innovative spectrum monitoring systems and advanced RF test and measurement technology.

In the field of test and measurement, Rohde & Schwarz offers a broad selection of wideband signal generation and analysis solutions. The wide portfolio covers full 5G bandwidth and frequencies, specialized TV analyzers and test systems for mobile network infrastructures. The solutions address new communication standards and cover even next generation frequency bands. The Rohde & Schwarz spectrum monitoring solutions cover individual systems for various tasks. For managing the integration of fixed and mobile stations, the company offers extensive experience. Internal company

standards ensuring comprehensive quality management and efficient organizational structure, as well as project teams with many years of experience in spectrum monitoring technologies, provide a strong basis for successful projects:

Training programs prepare customers for test and measurement and spectrum monitoring system operations. The operational training courses combine formal classroom instruction with hands-on training on the systems. Trainers teach well-prepared educational material adapted to the individual knowledge level of the operators. Once the systems are put into operation, Rohde & Schwarz provides comprehensive lifecycle support and full lifecycle service. This includes software updates and hardware upgrades – e.g. to expand frequency ranges, enhance system functions or extend the number of monitoring stations. Customers benefit from additional training and maintenance services to ensure successful operation of their test and measurement and spectrum monitoring systems over the long term.

## Service at Rohde & Schwarz You're in great hands

- ▶ Worldwide
- ▶ Local and personalized
- ▶ Customized and flexible
- ▶ Uncompromising quality
- ▶ Long-term dependability

## Rohde & Schwarz

The Rohde & Schwarz electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, monitoring and network testing. Founded 90 years ago, the independent company which is headquartered in Munich, Germany, has an extensive sales and service network with locations in more than 70 countries.

[www.rohde-schwarz.com](http://www.rohde-schwarz.com)

## Sustainable product design

- ▶ Environmental compatibility and eco-footprint
- ▶ Energy efficiency and low emissions
- ▶ Longevity and optimized total cost of ownership

Certified Quality Management

**ISO 9001**

Certified Environmental Management

**ISO 14001**

Information Security Management System

**ISO/IEC 27001**

Certified Quality Management

**AQAP-2110**

## Rohde & Schwarz training

[www.training.rohde-schwarz.com](http://www.training.rohde-schwarz.com)

## Rohde & Schwarz customer support

[www.rohde-schwarz.com/support](http://www.rohde-schwarz.com/support)

