

Information superiority on missions

Secure communications solutions
for the air force



ROHDE & SCHWARZ





Nowadays threats are constantly changing the tasks that armed forces are required to accomplish. In particular, peacebuilding and peacekeeping missions at hotspots all over the globe are posing new challenges for air forces and their commanders. Reliable communications equipment plays a fundamental role in helping these missions succeed.

Command and control is communications

Effective command and control requires reliable, secure communications structures from the operations center all the way to the individual aircraft. Particularly in current operations, information superiority is vital to the effectiveness and survivability during missions.

The reliability, security, flexibility and future-readiness of the communications equipment are key to the success of a mission. Optimized waveforms as well as voice and encryption technologies ensure that radio transmission is robust, jam-resistant and tap-proof in near realtime.

Interoperability on missions

Interoperability—intra or joint, combined or interagency—is and will continue to be necessary for the efficient exchange of information during missions. In the long term, this is only possible if flexible software defined radio (SDR) structures are deployed to ensure the continued viability of investments over time. Units can communicate via systems that are adapted to the platform used and to the command and control structures in place.

For more than seven decades, customers have trusted Rohde & Schwarz to develop and produce innovative, sophisticated, high-quality solutions to challenging problems.

- These Rohde & Schwarz solutions include the following:
- Mobile and highly mobile airborne radiocommunications
 - Secure information transmission
 - Stationary and mobile ground communications
 - Test and measurement equipment for radiocommunications

This unique mix of key competencies enables Rohde & Schwarz to offer customers single-source, compatible and reliable systems that can be deployed by military units and government agencies alike.

Through its close cooperation with armed forces, procurement agencies, public safety organizations, system integrators and international security agencies as well as through its active participation in standardization bodies, Rohde & Schwarz is able to deliver coordinated system solutions that can be tailored to meet customers' high expectations.

Communications—
reliable, flexible,
secure, future-ready



R&S®M3AR

The R&S®M3AR was designed specifically for use in air-borne platforms. It has already been successfully deployed by the air forces, armies and navies of numerous countries around the world. Available in various form factors, it is ideal for use in fixed-wing and rotary-wing aircraft and as an air traffic control (ATC) radio in unmanned aerial vehicles. The R&S®M3AR is the right solution for interconnecting the various branches of the armed forces during mobile operations. It features outstanding voice quality and is easy to use.

R&S®M3SR

The R&S®M3SR is an outstanding and proven performer in stationary, shipborne and airborne applications worldwide. The HF model supports frequency hopping, link establishment and data transmission in line with the NATO HF house standard as well as IP over HF. The VHF/UHF version is also capable of frequency hopping and can provide broadband capabilities for additional modems when equipped with a 70 MHz interface.

R&S®Series4200

The R&S®Series4200 is the latest generation of digital software defined radios for stationary use in civil and military air traffic control. The possible applications range from small emergency radio systems with only a few channels all the way to nationwide radiocommunications systems with several hundred channels.

R&S®MMRS (mobile multirole radio system)

The R&S®MMRS is a management system that allows fast startup of ground-to-air communications. Due to its modular design, it can be adapted to meet diverse mission requirements.

R&S®MX400 mobile ATC tower

The R&S®MX400 mobile tower consists of a control room in a standardized container, a scissor-type lifting mechanism and a trailer. The control room includes the controller working positions and all of the equipment required for operation. The antennas and the meteorological sensors are set up on the roof of the cabin.

R&S®VCS-4G IP-based VCS

The R&S®VCS-4G supports the full range of civil and military ATC capabilities and already complies with the EUROCAE ED137 standard. Due to its rugged design and high tolerance to ambient conditions, the system can even be deployed in harsh environments. Additional control commands support dynamic reconfiguration of operational parameters to match rapidly changing situational requirements. The R&S®VCS-4G and the R&S®Series4200 and R&S®M3SR Series4400 radios are monitored using a single, central remote control and monitoring system, the R&S®RCMS II.

R&S®M3TR

The R&S®M3TR is now used successfully by air force forward air controllers (FAC), in land vehicles, in dismounted operation and on ships. It features exceptional frequency bandwidth and a wide variety of waveforms and comes equipped with a state-of-the-art IP interface as standard. It also offers high data rates and an embedded crypto solution.

R&S®RADIO ACCESS POINT (RAP)

The mobile R&S®RADIO ACCESS POINT (RAP) easily interconnects the various radio networks of the military and civil forces cooperating in a mission. The RAP serves as a gateway and router between different networks such as TETRA, Tetrapol, tactical VHF networks, SatCom, GSM and ISDN, allowing direct communications between end users throughout the network. This allows the interoperable use of various communications techniques within a field air base.

ACCESSNET®-T

ACCESSNET®-T is the ideal mobile TETRA solution for ground and naval forces, airports and public safety organizations in today's and tomorrow's operational scenarios. TETRA is an established communications standard in more than 100 countries worldwide and therefore ensures interoperability and cost-effectiveness.

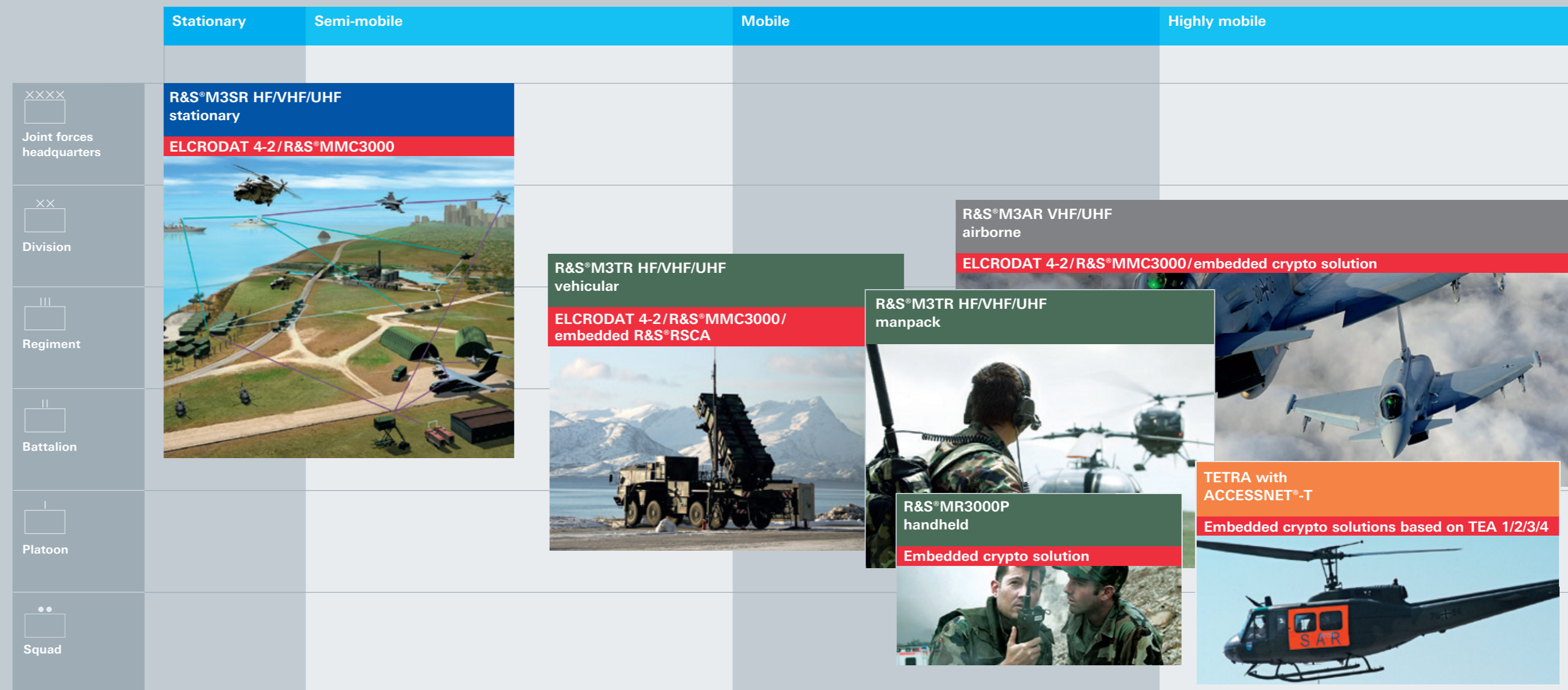
ELCRODAT 4-2/R&S®MMC3000/ embedded security solutions

The ELCRODAT 4-2 encryption device has the highest national and NATO security clearances. It is interoperable with a number of internationally used encryption devices and is well suited for use with radio equipment operating in the military frequency bands. Like the R&S®M3xR radios, it has multirole capabilities and is therefore deployed in all mobile applications in ground, air and sea vehicles. For non-NATO territories, Rohde&Schwarz has developed the R&S®MMC3000.

Test and measurement equipment

System integrators and users require innovative test and measurement solutions for startup and maintenance in order to maximize the availability of secure communications solutions and ensure the operational readiness of armed forces. For these applications, Rohde&Schwarz offers a large portfolio of market-leading RF and communications test and measurement equipment.

Rohde&Schwarz was quick to embrace software defined radio (SDR) technology and developed the R&S®M3xR product family. Rohde&Schwarz SDR products—from stationary to highly mobile—are deployed in all areas of operation, from the division level to the individual soldier. The R&S®M3AR, R&S®M3SR and R&S®M3TR SDR family members can interoperate using a number of different waveforms.



Communications equipment for all scenarios

Rohde&Schwarz provides secure mobile voice and data communications for all command and control levels and branches of the armed forces.

- In the stationary segment, Rohde&Schwarz has HF solutions for strategic communications which can be used, for example, as an economical and independent fallback option for SatCom. HF/VHF/UHF solutions are used to communicate with deployable and stationary units

- Rohde&Schwarz equips vehicular command and control stations with stationary, manpack, handheld and TETRA solutions to enable communications with mobile and highly mobile units—typically via VHF and UHF links
- Rohde&Schwarz combines military and civil technologies to optimize interoperability and reduce costs
- Rohde&Schwarz provides consistent security solutions using external encryption devices or embedded crypto
- Test and measurement equipment from Rohde&Schwarz ensures system availability during the entire life cycle of the products

Key capabilities for air forces

Voice communications during missions

A protected, secure voice communications link is essential for pilots during missions and training. The primary focus is on a high-availability and high-quality link in order to prevent communications problems and loss of efficiency—even at a speed of Mach 2.

The R&S®M3AR airborne radios with the SATURN and R&S®SECOS waveforms deliver optimal audio quality. Important prerequisites for ATC communications over long distances include outstanding sensitivity, selectivity and immunity to interference as well as low distortion and high signal-to-noise ratio.

Secure data exchange

An up-to-date level-specific operational picture is critical to the success of today's missions. Rohde&Schwarz offers advanced data transmission techniques such as the R&S®SECOS system to enable fast responses to situational changes. The system's time division multiple access (TDMA) structure allows air forces to establish intelligent as well as realtime-enabled data links with multiple users for air-to-ground or air-to-air communications. Based on robust frequency hopping technology and integrated COMSEC, the system offers protection against jamming and tapping by third parties.

Maximum data rates

Radiocommunications solutions from Rohde&Schwarz offer the same data rates for both encrypted and plain communications. As a result, it is no longer necessary to choose between speed and security. This applies when switching from fixed-frequency operation to frequency hopping and when using NATO algorithms or special, national encryption techniques.

Ready to meet tomorrow's interoperability requirements

Rohde&Schwarz is a leading global provider of interoperable radiocommunications solutions, especially for combined and joint missions. This is where airborne radios from the R&S®M3xR family are used. This family of radios meets a wide range of mission requirements and provides future-readiness.

Multiband: The R&S®M3AR is a radio with multiband capability. Covering the frequency range from 30 MHz to 400 MHz, it supports tactical VHF from 30 MHz to 88 MHz, ATC VHF from 118 MHz to 137 MHz, maritime VHF from 156 MHz to 174 MHz and the military UHF aeronautical radio band from 225 MHz to 400 MHz.

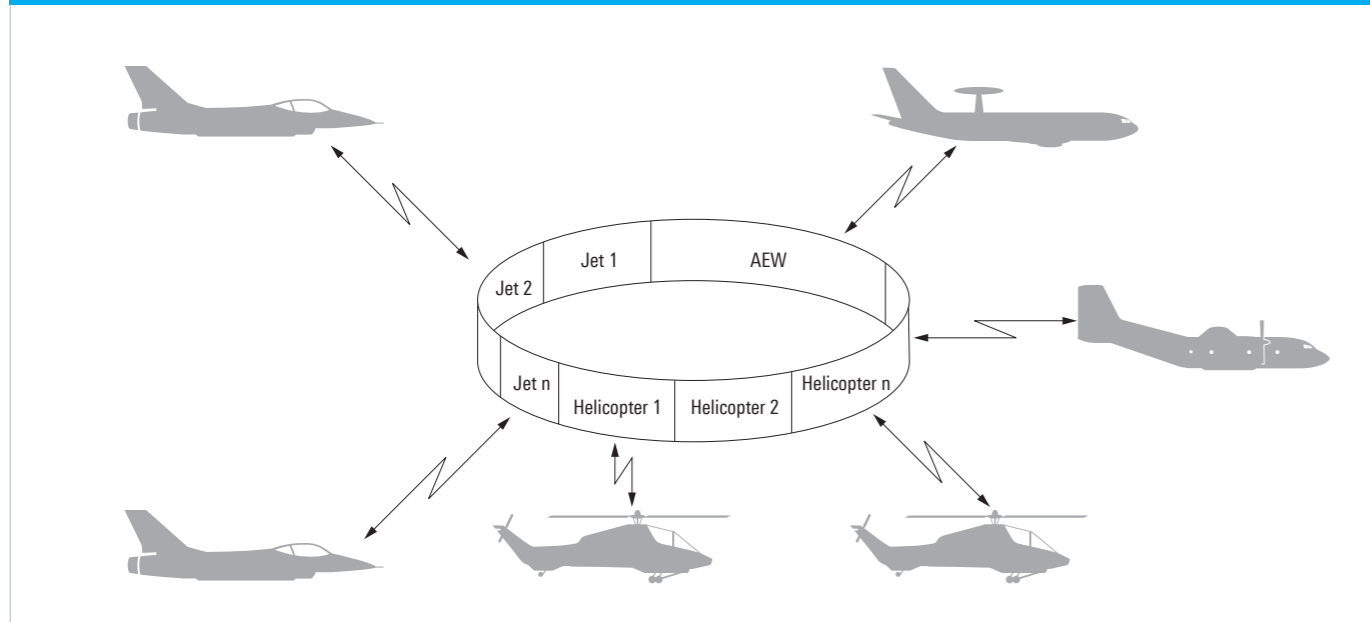
Multimode: The R&S®M3AR already offers a selection of diverse waveforms, including NATO HAVE QUICK I/II, SATURN and R&S®SECOS or fixed frequency, e.g. ATC VHF 8.33 kHz channel spacing according to EUROCAE / ICAO.

Multirole: The R&S®M3AR can be used in fighter aircraft, helicopters, transport aircraft, trainers and unmanned aerial systems (UAS).

Stationary infrastructure for air forces

TETRA is a secure complement to mobile communications systems, e.g. for patrols or for mobile communications within an airfield or camp perimeter. ACCESSNET®-T IP from Rohde&Schwarz is a highly scalable, digital TETRA mobile radio system that has already proven itself in numerous deployments by armed forces from various countries. It can be used as a nationwide solution or as an ad hoc network—even under challenging climatic conditions.

Reliable, secure communications in TDMA data mode with R&S®SECOS



Successful missions

Military commanders must do whatever it takes to effectively accomplish missions while ensuring the safety of their troops. Access to the right information at the right time and place is crucial for achieving sustained information superiority.

For many years, Rohde & Schwarz has provided numerous air forces with radiocommunications solutions for a mobile environment:

- Voice and data communications with application-oriented data rate
- Data network for tactical situational information with TDMA structure
- Highly jam-resistant radio transmission
- Adaptable encryption

From complete systems to individual products

Military users require systems that match their current needs and requirements. Of particular importance is the optimal integration of the equipment in order to create lightweight, space-saving system solutions.

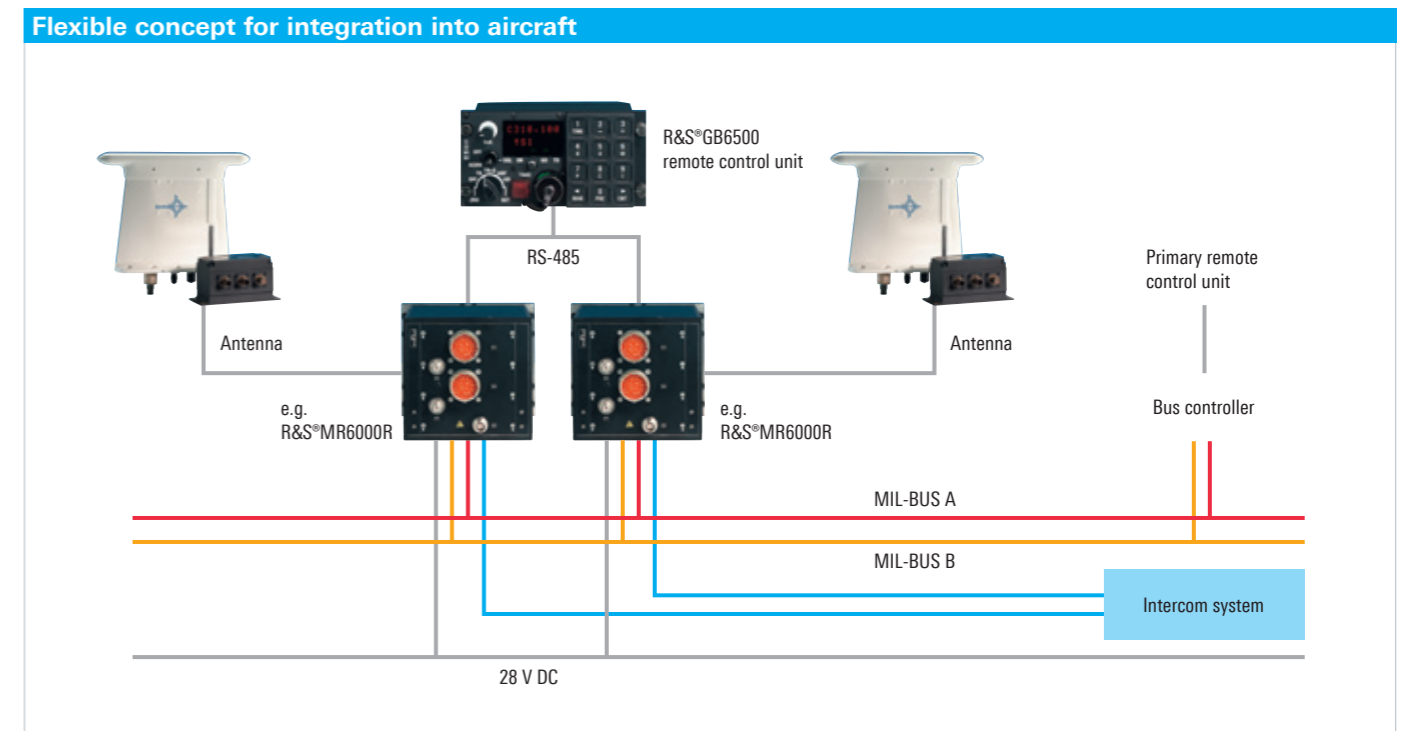
Good networking

Nowadays, the capabilities and the quality of networked command and control processes play a central role in the armed forces' ability to operate effectively. Time-efficient planning and configuration are the key factors for setting up a reliable, robust, networked radiocommunications system.

The modular R&S®RNMS3000 management system supports both central and decentralized mission planning as well as secure overland key distribution. This user-friendly, cross-band solution is a result of the company's many years of experience and close cooperation with users.

Integration into existing airborne platforms

When retrofitting new radio components into existing airborne platforms, the capacity to flexibly respond to specific platform requirements is crucial. This applies to both the mechanical dimensions of the equipment and the electrical interfaces available on board. The R&S®M3AR a solution is available in many internationally standardized housing formats with a variety of interfaces. Using the serial interface, the radio can be remotely operated from the cockpit with the R&S®GB6500, making integration much easier.



Tap-proof encryption

Encryption devices for military use must feature the most powerful encryption algorithms and also support diverse applications. Based on these requirements, Rohde&Schwarz SIT GmbH developed the ELCRODAT 4-2 multifunction encryption device that replaces a number of legacy devices and offers compatibility modes for the most important devices currently in international use. The device with BSI and SECAN clearance performs encryption based on standardized NATO algorithms so that voice and data communications are absolutely tap-proof. It is interoperable with numerous existing voice and data encryption devices and can be used in both mobile and stationary applications for encrypting and decrypting analog and digital messages of all relevant levels of classified information.

This highly secure device is not only deployed by the German Armed Forces: More than half of all NATO countries use the crypto platform in numerous national and international projects. For example, the UH TIGER and NH90 helicopters, the K130 corvette and the U 212 submarine are equipped with this encryption device. In the future, the ED 4-2 will also be used by NATO to encrypt HF communications in the A400M military transport aircraft.

Efficient integration

The R&S®MR6000A VHF/UHF radio is an embedded COMSEC solution that is used, for example, in the A400M military transport aircraft. The integrated solution comprises a radio and a crypto module in a single package. Compared to two separate devices, it saves valuable installation space and reduces weight, cabling and logistics effort.

Ease of use

Soldiers on missions must be completely familiar with their equipment so that they can operate it correctly and effectively even when under stress. When combined with the R&S®RNMS3000, the R&S®M3AR makes it possible to completely plan and prepare the parameters for many radio nets and to later transmit them via fill devices. In flight, the crew can switch between different modes quickly and precisely. Robust waveforms, built-in encryption and a choice of frequency hopping modes provide the pilot and the weapon systems officer with the security, reliability and flexibility they need to accomplish their mission.



Airborne platforms such as the Eurofighter, Tiger, NH90 and F-16 already use the R&S®M3AR software defined VHF/UHF airborne radios for communications. The A400M transport aircraft was also equipped with these radios from the very start.



The A400M military transport aircraft is equipped with software defined radios from Rohde & Schwarz.

System availability

Integrating new radios into helicopters or aircraft is a challenging project for customers. They have to clarify the mechanical and electrical interfaces with the aircraft manufacturers and require authorizations and certifications for the installation and final approval of the radios. In recent years, Rohde&Schwarz customers have increasingly taken advantage of the company's system integration service.

In prototype installations for many different makes of helicopters and fighter aircraft as well as in series production, Rohde&Schwarz has accumulated a wealth of experience and documentation. Everything is covered, including site survey, system documentation and system diagrams for airborne segments, pilot instruction cards, certification documents and installation instructions for series production.

Professional test and measurement solutions

To ensure optimal functioning of the radiocommunications equipment for the planned mission, calibration and testing are performed as part of the platform integration process. Thanks to its comprehensive expertise, Rohde&Schwarz meets all test requirements, from conventional analog communications systems to the very latest SDR equipment. Rohde&Schwarz is also a leading supplier of test and measurement equipment for sophisticated modulation modes such as PFDM as well as for MIMO technologies which are part of today's advanced digital radiocommunications standards. In a high-energy environment, electromagnetic compatibility (EMC) is critical. The German Armed Forces, for example, operate the largest EMC test laboratory in Europe where they use test and measurement equipment from Rohde&Schwarz. Featuring additional capabilities, Rohde&Schwarz measuring instruments can be used for military applications. For example, the mass memory for setup and measurement data can be easily removed from many models. Special programs are available to irretrievably delete memory contents. Most of the instruments can also emulate legacy command sets, making it easy to replace out-of-date equipment and ensure the long-term upgradeability of existing systems.

The comprehensive Rohde&Schwarz test and measurement portfolio includes the following:

- Signal generators and analyzers to generate and analyze many types of unmodulated and modulated signals: from CW to analog or pulse modulation, from simple digital modulation such as BPSK and QPSK to highly complex OFDM modulation modes. Wide modulation (up to 528 MHz) and demodulation bandwidths (up to 120 MHz) allow reliable tests even on wideband multi-carrier systems
- Flexible fading solutions for signal generators to allow testing of military communications equipment under real-world conditions such as moving transmitters and receivers or multipath signal propagation

Mobile field test equipment:

- Wide range of portable spectrum and network analyzers for field use
- Precise, easy-to-use power sensors that can also be operated directly from a laptop via USB



The UCS 226x radio test system is already in use around the globe.

Product portfolio

Secure radiocommunications



R&S®M3AR Series6000R and Series6000L

Software defined radios

The R&S®MR6000L/R radios are an established generation of VHF/UHF SDRs for all airborne platforms in the area of tactical army communications and ATC voice and data radio.

- ▮ Frequency range from 30 MHz to 400 MHz
- ▮ Frequency hopping capability in line with HQ I/II, SATURN, R&S®SECOS 5/16 TDMA
- ▮ Interfaces for NATO and non-NATO encryption devices
- ▮ Power classes of 10 W AM / 15 W FM
- ▮ Data rates up to 16 kbit/s
- ▮ MTBF > 3000 hours; reliable operation even in extreme environmental conditions

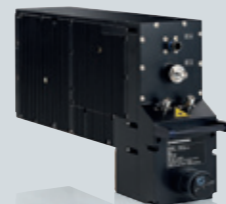


R&S®M3AR Series6000A

Software defined radios

This powerful radio family comes with an embedded encryption module with NATO crypto algorithms.

- ▮ Frequency range from 30 MHz to 400 MHz
- ▮ HQ I/II, SATURN, R&S®SECOS 5/16 TDMA Frequency hopping capability
- ▮ Built-in pre-/postselector (transmit/receive filter) to minimize susceptibility to interference
- ▮ Allows simultaneous use of multiple radios on board
- ▮ Eliminates the need for external filters
- ▮ RF output power: 20W in AM mode and 30W in FM mode
- ▮ Minimizes cabling, space requirements and weight for aircraft integrator
- ▮ Data rates up to 16 kbit/s



R&S®M3AR Series6000E for Eurofighter Typhoon

Software defined radios

The Eurofighter Typhoon is the result of multinational European cooperation. Over the coming decades, it will form the backbone of many air forces.

- ▮ Developed especially to meet Eurofighter requirements
- ▮ Frequency range from 100 MHz to 400 MHz
- ▮ Embedded NATO encryption
- ▮ Encrypted air-to-air and air-to-ground voice communications as well as plain communications with air traffic control
- ▮ HQ I/II and SATURN frequency hopping modes
- ▮ Housing in Eurofighter-specific L-form in cooperation with Indra (Spain) and Selex (Italy)



R&S®M3SR Series4400

VHF/UHF software defined radios

The R&S®M3SR Series4400 radios are VHF/UHF SDRs for civil and military air traffic control, air defense and navy applications.

- ▮ Frequency range from 100 MHz to 512 MHz
- ▮ Designed for extreme simultaneous operation requirements
- ▮ Frequency hopping capability in line with HAVE QUICK I/II, SATURN, R&S®SECOS
- ▮ Interfaces for NATO and non-NATO encryption devices
- ▮ IP-based remote control protocols (with external modem)
- ▮ Data rates up to 1.2 Mbit/s
- ▮ MTBF > 20 000 hours



R&S®M3SR Series4100

HF software defined radios

The R&S®M3SR Series4100 radios are HF SDRs for stationary ATC/AD, navy and army applications.

- ▮ Frequency range from 1.5 MHz to 30 MHz
- ▮ Designed for extreme simultaneous operating requirements
- ▮ NATO HF House as embedded software
- ▮ ALE 2G and ALE 3G
- ▮ Frequency hopping capability in line with R&S®SECOM-H
- ▮ Interfaces for NATO and non-NATO encryption devices
- ▮ IP data transmission
- ▮ Data rates up to 19.2 kbit/s
- ▮ MTBF > 9000 hours



R&S®Series4200

Software defined radios

R&S®Series4200 for stationary use in civil and military air traffic control.

- Application areas: small emergency radio systems (few channels), nationwide radiocommunications systems (several hundred channels).
- ▮ VHF frequency range from 112 MHz to 156 MHz
 - ▮ UHF frequency range from 225 MHz to 400 MHz
 - ▮ 50 W transmission power in VHF and UHF range
 - ▮ Automatic main/standby switchover
 - ▮ USB service interface
 - ▮ Remote control and remote monitoring via Ethernet interface
 - ▮ Suitable for data transmission in VDL mode 2
 - ▮ Connection possible via E1 and VoIP

Crypto solutions



ELCRODAT 4-2

Multimode, multirole high-security encryption device for mobile platforms.

- ▮ Deployed by the German Armed Forces as common mobile encryption device
- ▮ Approved for security classifications up to cosmic top secret/"streng geheim"
- ▮ Ruggedized in line with MIL standards
- ▮ Interoperable with R&S®M3xR and numerous other radios
- ▮ Interoperable with established national and international voice and data encryption devices
- ▮ R&S®MMC3000 for non-NATO countries



ELCRODAT 5-4

Voice and data encryption device for analog and digital networks.

- ▮ Deployed by the German Armed Forces as a device for commanders
- ▮ Interoperable with existing encryption devices (ELCROVOX 1-4D, STU-IIB, ELCRODAT 6-1)
- ▮ Manual or automatic loading of keys via key distribution center
- ▮ Approved for security classifications up to cosmic top secret/"streng geheim"
- ▮ SatCom-compatible
- ▮ Upgradeable for use in IP networks



SITLink

Leased-line encryption device up to 2 Mbit/s.

- ▮ Approved by the German Federal Office for Information Security (BSI), application-independent
- ▮ Cascading with high-security devices
- ▮ Transparent integration
- ▮ Minimal administration and operating costs
- ▮ For wired, microwave and satellite links

**R&S®M3TR****Series MR3000U/H**

R&S®MR3000U/H radios are HF/VHF/UHF software defined radios (SDR) that support all types of tactical communications in an army environment.

- ▮ Frequency range from 1.5 MHz to 512 MHz
- ▮ NATO HF House as embedded software including ALE 2G and ALE 3G
- ▮ Frequency hopping capability in line with R&S®SECOM-H, -P, -V, HQ I/II, R&S®SECOS 5/16 TDMA
- ▮ Embedded encryption, interfaces for NATO and non-NATO encryption devices
- ▮ IP data transmission
- ▮ 10 W, 50 W, 150 W and 500 W power classes
- ▮ Data rates up to 72 kbit/s including GPS reporting, message service
- ▮ MTBF > 8000 hours

**R&S®RCMS II****Remote control and monitoring system**

The R&S®RCMS II allows operators of civil and military air traffic control and air defense systems to remotely operate and monitor Rohde & Schwarz radios from one or more locations in a country.

- ▮ No additional devices required at individual radio sites for remote control and monitoring
- ▮ Remote control and monitoring of civil and military radios using frequency hopping
- ▮ Redundant system for continuous remote control and monitoring
- ▮ Transmission of status reports to a primary monitoring system via SNMP

**ACCESSNET®-T Cube**

ACCESSNET®-T Cube is a TETRA communications system for mobile deployment. It allows the transport of network elements to the operation area by air, vehicle, railway or sea, their fast on-site startup and networking as well as secure radio-communications.

- ▮ Frequency ranges: TX 390 MHz to 470 MHz and 851 MHz to 921 MHz, RX 380 MHz to 460 MHz and 806 MHz to 876 MHz
- ▮ Single-cell and multicell autonomous operation with line, ring or mixed topology
- ▮ Connection to existing ACCESSNET®-T networks (including handover) as well as to other radio and data networks

R&S®GB4000T**Control unit for R&S®Series4200**

The R&S®GB4000T control unit was developed with extreme operating convenience in mind. It is used for remote control of R&S®Series4200 radios.

- ▮ Control of up to nine user-configurable R&S®Series4200 radios via LAN
- ▮ Display of the radio status (Go/NoGo, carrier, squelch)
- ▮ Selection of six user-configurable channels per radio
- ▮ Input and configuration via color display and touch panel
- ▮ Three user levels: operator, supervisor, administrator

**R&S®M3TR****Series MR3000P**

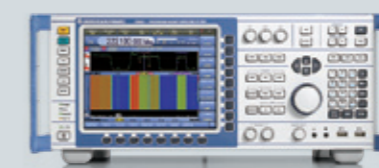
The R&S®MR3000P radios are ideal handhelds for use in R&S®MR3000U/H radio networks.

- ▮ Frequency range from 25 MHz to 146 MHz
- ▮ Frequency hopping capability in line with R&S®SECOM-P
- ▮ Embedded encryption
- ▮ 5 W power class
- ▮ GPS reporting/SMS
- ▮ MTBF > 10 000 hours

**R&S®DDF04E****Digital direction finder for traffic control**

Radio direction finding for air and maritime traffic control is performed simultaneously on multiple frequency channels using only one direction finder.

- ▮ Parallel direction finding on up to 32 frequency channels
- ▮ Seamless coverage of a wide frequency range from 100 MHz to 450 MHz with only one DF antenna
- ▮ Easy modification of receive frequency and number of channels via control software and due to integrated 8.33kHz channel spacing
- ▮ Flexible networking of direction finder, data server and display units via Ethernet

**R&S®ESMD****Wideband monitoring receiver**

The R&S®ESMD is designed especially for signal searching, radiomonitoring and spectrum monitoring in line with ITU recommendations. It is equally well suited for mobile and stationary applications.

- ▮ Frequency range from 20 MHz to 3.6 GHz, optionally from 9 kHz to 26.5 GHz
- ▮ 20 MHz realtime bandwidth, optionally 80 MHz
- ▮ RF spectrum with scan rates of up to 100GHz/s (300 GHz/s with 80MHz option)
- ▮ IF spectrum from 1 kHz to 20 MHz (optionally 80 MHz)
- ▮ Polychrome IF spectrum for reliable detection of pulsed signals
- ▮ DDCs for analysis and recording of individual communications channels (up to 1 MHz bandwidth)

**R&S®PR100****Portable monitoring receiver**

The R&S®PR100 has been designed specifically for radiomonitoring applications in the field.

- ▮ Fast panorama scan across entire frequency range from 9 kHz to 7.5 GHz
- ▮ 10 MHz IF spectrum and demodulation with bandwidths from 150 Hz to 500 kHz
- ▮ Display of spectrum and spectrogram (waterfall) on 6.5" color screen
- ▮ Storage of measurement data to SD card in receiver
- ▮ LAN interface for remote control and data output
- ▮ Low weight of only 3.5 kg
- ▮ Location of emissions using the R&S®HE300 active directional antenna

**R&S®FSU****High-end spectrum analyzer**

- ▮ Frequency range from 20 Hz to 67 GHz
- ▮ Outstanding RF performance
- ▮ Low phase noise of -128 dBc
- ▮ Resolution bandwidths from 1 Hz to 50 MHz
- ▮ Many application-specific firmware packages
- ▮ Extremely large dynamic range
- ▮ Highly linear display < 0.1 dB
- ▮ Complete selection of detectors

**R&S®SMA100A****Analog premium signal generator**

- ▮ Frequency range from 960 MHz to 1215 MHz
- ▮ Level range from -120 dBm to +18 dBm
- ▮ DME channels X, Y
- ▮ User-selectable pulse parameters
- ▮ Squitter pulses in line with EUROCAE ED-54
- ▮ 0 % to 100 % efficiency
- ▮ User-definable identification pulses

**R&S®ZVA****High-performance network analyzer**

- ▮ Frequency range from 300 kHz to 80 GHz
- ▮ Pulsed measurements, including pulse profile measurements with wide bandwidth and high time resolution
- ▮ Measurements on frequency-converting DUTs
- ▮ Removable mass memory for use in secure areas
- ▮ Simple high-precision power measurements

Tried and tested in the field

In many countries, airborne equipment must be able to withstand harsh operating conditions such as temperature fluctuations, dust, saltwater, humidity and vibrations. The R&S®M3AR was designed from the start with the ruggedness and reliability needed to overcome these challenges. Flying units of the air force, army and navy of more than 40 countries around the world have come to depend on radio solutions from Rohde&Schwarz to support their missions.

R&S®M3AR radios from Rohde & Schwarz are deployed on the following platforms (examples):

- | A109 LHU
- | A400M
- | EMB-145 AEM&C
- | Eurofighter Typhoon
- | F-16
- | F-4 Phantom
- | FENNEC
- | JAS-39 GRIPEN
- | MI-8, MI-17, MI-24
- | MIRAGE III, MIRAGE V
- | SEAKING
- | SOKOL W-3A
- | SU-30 MKM
- | SUPER LYNX
- | TIGER and NH 90 helicopters
- | TORNADO

Rohde & Schwarz—leading radio solutions for air force helicopters

The R&S®M3AR interoperable radiocommunications solutions from Rohde & Schwarz have proven their worth in numerous helicopter platforms. They are available with embedded as well as external encryption, and support both NATO and national algorithms.

Selected reference helicopter platforms:

- _____ A109
- _____ FENNEC
- _____ Super Puma
- _____ UH TIGER
- _____ Mi-17/Mi-8
- _____ NH90
- _____ SOKOL W-3A
- _____ SUPER LYNX



Radio with external crypto solution



Radio with embedded crypto solution



Future mobile communications capabilities for air forces

Rohde&Schwarz is working intensively on the next generation of radios. The company is currently collaborating closely with the German Armed Forces on the development of their future joint radio system known as SVFuA. This system will be the basis for the future generations of software defined radios of the German Armed Forces. "SVFuA is the key technology for future command and control of modern armed forces", says Wolfgang Stolp, President of the Federal Office of the German Armed Forces for Information Management and Information Technology. "This system will contribute decisively to the German Armed Forces participation in an interoperable information and communications network of joint and combined armed forces." SVFuA and other development initiatives will help ensure that forthcoming radio families and solutions from Rohde&Schwarz will meet the growing communications needs and expectations of military commanders.

Rohde&Schwarz has been and remains an active participant in numerous international projects and standardization bodies.

This includes the following:

European studies

- WINTSEC (basis for an SDR architecture from a civil and military perspective)
- SCORED (assessment of initial cognitive radio capabilities from a military perspective)
- EULER (demonstrator-based extension of WINTSEC)
- ESSAC (European SDR standardization and certification feasibility study)
- EDA Joint Investment Program / Force Protection, Call 2 (protection of forces in an urban environment)
- UWGT (universal waveform generation tool) study

European Union working groups

- SDR Certification Working Group (certification structures in Europe for SCA-based military radios)

NATO working groups

- VHF/UHF Ad hoc Working Group
- BLOS Working Group
- SDR User Group
- IICWG Secure Communications Interoperability Protocol (SCIP) Working Group

- NIAG SG 101/140 for standardization of the C2 data link for STANAG 4660

Participation in the Wireless Innovation Forum (WInnF; previously SDR Forum)

- Chair of the SCA Test and Evaluation Working Group
- Member of the Board of Directors and Vice-Chair of the WInnF

Professional mobile radio

- Member of the TETRA Association
- Member of the Board of Directors of the German Association of Professional Mobile Radio (PMeV)

Other national and international telecommunications standardization bodies

- Information Technology and Selected IT Applications Standards Committee (NIA) of the German Institute for Standardization (DIN)
- European Telecommunications Standards Institute (ETSI), a European standardization body for information and communications technologies
- International Telecommunication Union (ITU), the United Nations body responsible for coordinating international telecommunications
- Institute of Electrical and Electronics Engineers (IEEE), a worldwide organization for advancing and standardizing electronics and information technology
- Security Techniques Subcommittee of the International Organization for Standardization and International Electrotechnical Commission's Joint Technical Committee 1 on Information Technology (ISO/IEC JTC 1/SC 27)
- Object Management Group (OMG), a computer industry consortium responsible for the Model Driven Architecture® (MDA) standard



Service, logistics and support

For military and civil radio users, the operational readiness and availability of their radiocommunications systems are of central importance. Rohde&Schwarz has a global service, logistics and support network with offices in more than 70 countries to provide local, on-site customer care.

Rohde&Schwarz offers customers flexible, individually tailored service packages spanning a product's entire life cycle and operating life to ensure high system availability at minimum cost. Services include:

- Definition and optimization of maintenance strategies aligned to customer-specific requirements
- Spare parts service including inventory quantity proposal and optimization of inventory locations
- Detailed system and equipment documentation
- Spare parts data and catalogs
- User and maintenance training including computer-based training (CBT) programs
- On-site repair, calibration and customer support services
- Test equipment for customers who perform first line service
- Configuration and obsolescence management

Rohde&Schwarz has considerable experience in these areas of logistics and can adapt its services flexibly to meet customer requirements and deliver the kind of optimized support needed to safeguard maximum system availability at minimum cost.

Rohde & Schwarz minimizes life cycle costs

Featuring multiband, multimode and multirole capabilities, the R&S®M3xR radios can be used flexibly in a variety of frequency bands, with different waveforms and in numerous scenarios. Instead of having several types of radios for different tasks, users can rely on one radio, which considerably simplifies logistics. At the same time, identically structured HMIs and CBT applications reduce the training effort for soldiers.

The Rohde & Schwarz advantage

- High-reliability, high-availability radiocommunications solutions that support the operational effectiveness and security of the armed forces
- Long-term trusted partnerships
- Transparent, low life cycle costs and logistics costs

Rohde&Schwarz is your partner for communications solutions for land-based, airborne and sea-based operations.



Service you can rely on

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

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