### Ruling the Waves

Integrated Naval Communication Systems



## Your world is our world



Advanced communication networks are indispensable for commanding modern naval forces. Today, these networks not only have to meet the operational requirements, but must also ensure interoperability between the partners involved in a scenario of dynamic coalitions and alliances, without affecting the partners' sovereignty and security. To satisfy the requirement for maximum operational benefit, optimum efficiency and great ease of operation, a wide variety of equipment has to be provided for internal and external communication. These facilities must be combined intelligently and with compatible interfaces to form an integrated system. Only the best communication, IT and security solutions available are eligible to become integral parts of such a system.

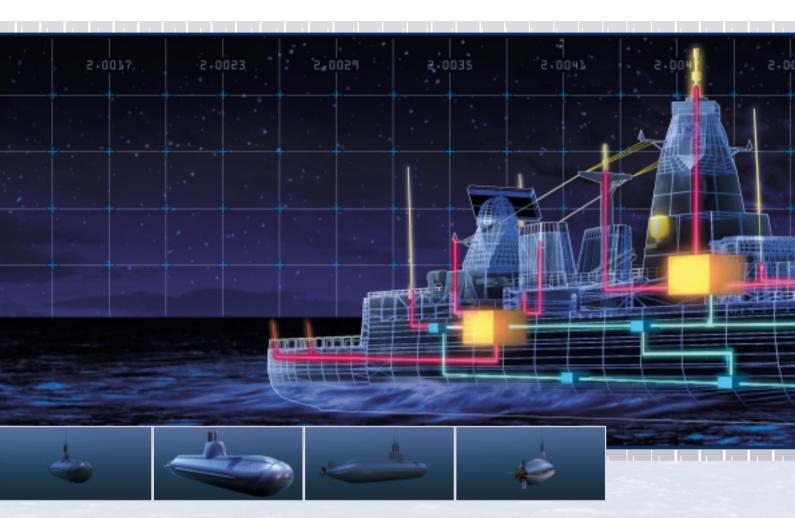
The standard specifications of this system are concise and comprehensive alike: all kinds of information have to be transmitted to defined stations in a secure and protected form over any

distance and using alternative routes (voice, data and video in local, tactical and strategic networks – within a task force, within the three forces or between allies). Modern communication protocols such as wireless TCP/IP are essential prerequisites, as are the relevant NATO standards for tactical data, communication security and protection, and electronic protective measures (EPM) such as frequency hopping (FH) or direct sequence spread spectrum (DSSS). The standard systems used, which besides VHF, UHF and HF links include satellite links (SHF, EHF), Intranet and high-speed LAN, can easily be adapted to customer-specific requirements, usually through software modifications.

Only a system integrator with many years of experience is in a position to design and implement systems of such complexity that not only satisfy the requirements of the navy, but also feature ease of operation and maintenance as well as reasonable prices. For decades, Rohde & Schwarz has been one of the leading suppliers of military radiocommunication equipment for the three forces, and is ideally qualified to implement economical and future-oriented solutions for naval communications.



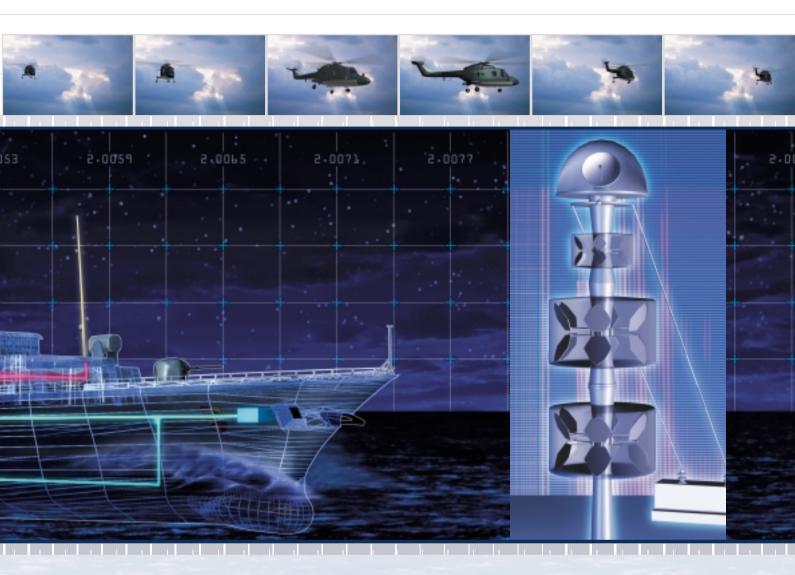
## Flexible response



When you decide in favour of Rohde & Schwarz, you are opting for a partner who will respond to your requirements in an open and constructive manner, and work in close cooperation with you to analyze and develop potential concepts. We do not offer rigid, ready-made solutions, but cater for country- and customer-specific needs. Our solutions are based on an open system architecture and defined, internationally standardized interfaces. This means that they also allow subsequent upgrading or adaptation to new requirements. Rohde & Schwarz takes a leading position worldwide in radiocommunication and IT security. Using the wide range of our own products and products of select subcontractors, we design a system for you that combines the best modules available on the market. In doing so, we adapt the hardware and software components to the overall IT concept of the ship and to the structure of the communication network ashore. With us, you not only have all the benefits of one-stop shopping, but also a responsible partner for the complete integrated communication system. We closely cooperate with the shipyard and the navy in all the details to achieve a technically optimal overall result.

#### Availability, reliability and maintainability (ARM) from the technology leader

State-of-the-art microprocessor and computer technology has made its entry into the world of communications. It automatically establishes and holds connections, handles radio traffic in line with standardized procedures (STANAG, MIL-STD, national standards) and takes the load



off the operator when it comes to selecting suitable lines and antennas (e. g. by means of frequency and antenna management = FAM). High-speed radio modems make data transmission efficient and easy. In addition to the classic voice, data and telex transmission modes, fax, video and e-mail are standard today. TCP/IP-transparent transmission allows radiocommunications to be linked to the World Wide Web. If required, products developed to purely military standards can be combined with COTS systems. The UHF and VHF LOS ranges are complemented by SATCOM (SHF, EHF) for worldwide communications. Despite the global satellite network, shortwave (HF) remains one of the cornerstones of naval communications. It allows global communications without infrastructure and is, therefore, absolutely indispensable in times of crisis. The HF broadband system from Rohde & Schwarz is a technological highlight. Ultramodern transceiver technology in conjunction with radio processors permits simultaneous communication on more than two dozen lines via a single antenna.

#### Communications under control

Working in the radio room is often stressful. Messages have to be composed, sent, simultaneously received and properly distributed over several lines at a time, often under combat conditions. The fully integrated communication system (FICS), the core of the naval communications system, must be robust, capable of withstanding extreme loads and designed with redundancy.

# Matched to mission



Rohde & Schwarz makes communications controllable. The signals management & control system (SiMCoS) takes some of the stress out of critical situations. It supports operators by means of programmed sequences of operation, suggests the line to be selected, provides for secure transmission on alternative routes and stores the information. Handling of radiocommunications can, therefore, be planned and is manageable.

This is supported by the use of digital high-speed data bus systems (e.g. 600 Mbit/s) and application-optimized, state-of-the-art computer technology. The radio room becomes an essential part of an integrated modern command and control center. In addition to the conventional transmission media, modern means of communication are available in the form of fax, video and e-mail as well as connection to the Internet (TCP/IPtransparent).

#### Driven by innovation

As early as the 1970s, the Rohde & Schwarz method of silent tuning throughout the HF range put the company at the cutting edge of naval communications. Microprocessor technology and communication processors soon followed, providing for ease of operation and automatic transfer of messages. As a consequence, information throughput was increased and time required to train the radio operators was reduced. Today, high-speed data modems are used for fast transmission of images and videos, and the TCP/IP-transparent methods allow links to the Internet to be established via radio. Rohde & Schwarz has always played a leading role in technical innovations.

The frequency and antenna management integrated in the message handling software assigns free lines to the operator and optimizes the probability of secure transmission. Special antenna solutions and modern wideband system technology reduce the number of shipboard antennas as well as interference between the radiocommunication and other electronic systems, thus improving the optical and electronic signature of the ships. Innovative solutions provide for operational efficiency as well as secure and reliable command and control of the ships and the task force.



#### Secure and protected

Rohde & Schwarz is at the leading edge of electronic protective measures (EPM) in radiocommunications. A wide variety of methods is available for optimized use under country- and RF-specific conditions. STANAG 4444, SATURN (HQ I/II), SECOS and SECOM are state-of-the-art digital methods that provide excellent protection against interception, deception and jamming. They combine encryption and protection to give security (COMSEC/TRANSEC) and are integrated in our latest radio equipment series.



Further EPM methods can be integrated, such as red/black separation, which are considered in the overall concept of the fully integrated communication system (FICS). As an independent enterprise with a high degree of competence in the field of information security, we supply internationally renowned cuttingedge technology in response to the customers' confidence in our integrity and capabilities.

### Interoperability – an essential requirement

The concept of our M3xR software radio families for navy, army and air force is the key to interoperability. This concept ensures interoperability within a specific task force, with other forces and in international alliances (NATO, partnership for peace = PfP). And this applies to all modes, including COMSEC/TRANSEC.

Due to the free programmability of our multi-band, multi-mode and multi-role (M3) radios for shipborne/stationary (M3SR), airborne (M3AR) and tactical (M3TR) use, the specific procedures of allied nations can be downloaded even on site. This feature also allows subsequent upgrading to newly developed methods and ensures that the radiocommunication system will be state of the art and operational for a long time. Our M3xR concept makes the navy interoperable whenever required.

#### Customer care during and after sales

The Rohde & Schwarz Service Center in Cologne offers a full service package for integrated logistics support (ILS) specifically tailored to the needs of military customers.

The service package accompanies the product or system from its introduction throughout the required lifetime until it is decommissioned, and, in addition to establishing logistic supportability and performing all the tests required (e. g. FAT, HAT and SAT, etc.), includes all materials management and maintenance measures. We support our customers in financing their project within the given possibilities and help to establish contacts with internationally renowned institutions. As an enterprise with worldwide operations and project experience, we comply with international contractual conditions, including bid bonds and guarantees, for example.



### Selection of references

Germany	A They	4 Frigates Type F123	Integrated external/internal comms; supply and integration
	the last	4 Frigates Type F124	Integrated external/internal comms; supply and integration
		4 Submarines Type U212	HF and VHF/UHF communications
Italy		2 Submarines Type U212	HF and VHF/UHF communications
Netherlands	14	ATS (Amphibious Transport Ship Command Ship)	Integrated external/internal comm. system; supply and integration
	nustry.	4 LCF Air Defence Frigates	Integrated external/internal comm. system; supply and integration
Spain		ATS/LPD (Amphibious Transport Ship, Landing Platform Dock)	Integrated external/internal comm. system; supply and integration
	تع لمي	F100 Frigates	Integrated external comms; supply and integration
Thailand	-10	OPHC (Offshore Patrol Helicopter Carrier)	Integrated external comms



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