R&S®MMHS
STANAG 4406-Based Military Message Handling System

Automatic and reliable exchange of information in radio and wireline communications networks

ROHDE&SCHWARZ

Secure Communications

Product Brochure | 02.01

R&S®MMHS STANAG 4406-Based Military Message Handling System

Introduction

STANAG 4406 – the standard for IP-based military communications

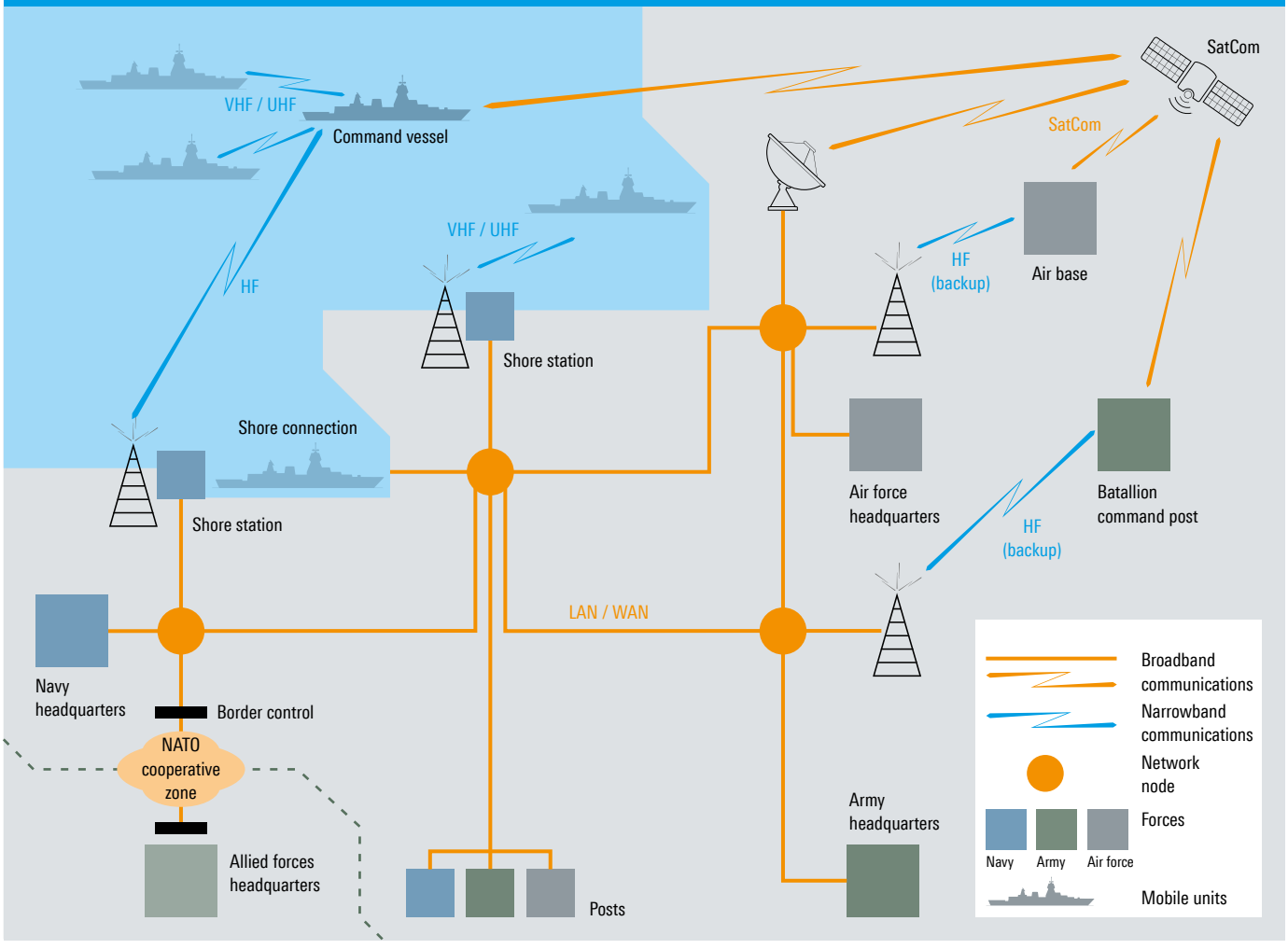
Today's military missions require the secure and fast exchange of information between all forces at sea, on land and in the air. Armed forces increasingly rely on IP technology to use modern network infrastructures.

Besides requiring systems to exchange complex situation awareness information, military command and information technology must also be able to exchange messages between and within organizations.

Wireline LAN/WAN or satellite communications offer stable connections with high data rates. The exchange of information by means of radio networks requires that radio-specific characteristics be taken into account, especially the small bandwidth available.

STANAG 4406 defines a uniform, modern military message handling system based on IP data traffic for radio and wireline communications between all branches of the armed forces (see figure). In comparison with civil e-mail solutions, STANAG 4406 message handling systems fulfill military-specific additional requirements.

Communications between branches of the armed forces in radio and wireline networks



R&S®MMHS STANAG 4406-Based Military Message Handling System

At a glance

R&S®MMHS: military command and control in line with the STANAG 4406 NATO standard.
The R&S®MMHS military message handling system covers broadband communications on land, via satellite and, above all, as one of the first systems on the market, radiocommunications defined in Annex E of STANAG 4406.

R&S®MMHS is an all-in-one solution for communications using wireline LAN/WAN infrastructure as well as radio networks. Especially the implementation of STANAG 4406 Annex E provides significant improvements for data exchange in radiocommunications scenarios.

R&S®MMHS supports the most important military message formats, i.e. STANAG 4406, STANAG 5066 and ACP 127, as well as e-mail, and it provides gateways to ensure message exchange between these format-specific networks. The format of the messages to be transported via different networks is adapted automatically. Independent of message formats, one common mailbox gives an overview of all messages to be handled by the user.

An integrated security framework based on public key infrastructure (PKI) allows messages to be encrypted and to have a digital signature, which ensures confidential handling of messages as well as the authenticity of the user and the message.

Central management makes it possible to administer a nationwide message handling system from a single location with only a minimum of staff. Organizational changes or changes in the communications structure are consistently distributed to all stations via replication mechanisms.

R&S®MMHS meets the requirements for broadcast and ship-shore systems (BRASS) and is ideal as a state-of-the-art addition to or replacement of ACP 127 systems.

R&S®MMHS can be used to complement existing STANAG 4406 solutions from other manufacturers. As a result, an existing land-based, broadband STANAG 4406 system can be enhanced so that mobile units can also benefit from the advantages of STANAG 4406.

Unlike other MMHS manufacturers, Rohde&Schwarz provides both STANAG 4406 MMHS system solutions and communications components, including antennas, radios and encryption.

Key facts

- STANAG 4406 including Annex E for radio and wireline communications
- Automatic message adaptation for different communications networks
- PKI security framework
- Central management of configuration data with little effort
- System solutions from the PC to the antenna

R&S®MMHS STANAG 4406-Based Military Message Handling System

Benefits and key features

R&S®MMHS is a powerful, state-of-the-art message handling system. It offers the following key functions:

More than just e-mail

Numerous enhancements for formal exchange of military messages

R&S®MMHS is a system solution that goes far beyond the capabilities of civil COTS e-mail products. These enhancements make it possible to fulfill the requirements of military command. Similarly to standard e-mail systems, R&S®MMHS provides a user-friendly display of the wide-ranging message handling functions on easy-to-operate user interfaces.

Military message attributes and processes

Military messaging uses special message attributes that classify, for example, the security level of the message or the priority level for the message transmission. R&S®MMHS ensures that classified messages can only be accessed by users who have the required authorization. R&S®MMHS maps conventional military processes, which are still largely paper-based, onto paperless electronic workflows, allowing military workflows to be precisely defined and observed. The workflows are monitored to help ensure that messages are created, processed and released by authorized users in the correct sequence.

Automatic message distribution

Messages received by an organization are automatically delivered to the appropriate post on the basis of distribution criteria, i.e. subject indicator codes (SIC) or defined logical rules such as keywords or message attributes. These criteria can be defined independently by any organization. As a result, all messages are delivered to the correct post in charge without manual intervention and according to an organization-specific, role-oriented scheme. In the case of flash messages, a rule can be defined so that a copy of such a message is, for example, always sent to a permanently staffed, central post. This allows the time-criticality of such a message to be taken into account as well.

On-time message processing

R&S®MMHS monitors the on-time delivery and acknowledgment of messages. If a message is not delivered or processed within a defined period of time, it is automatically forwarded to a deputy. Messages that cannot be delivered or have not been processed are routed to an alternative location, e.g. to a communications center (COMCEN), ensuring on-time message processing.

Comprehensive archiving functions

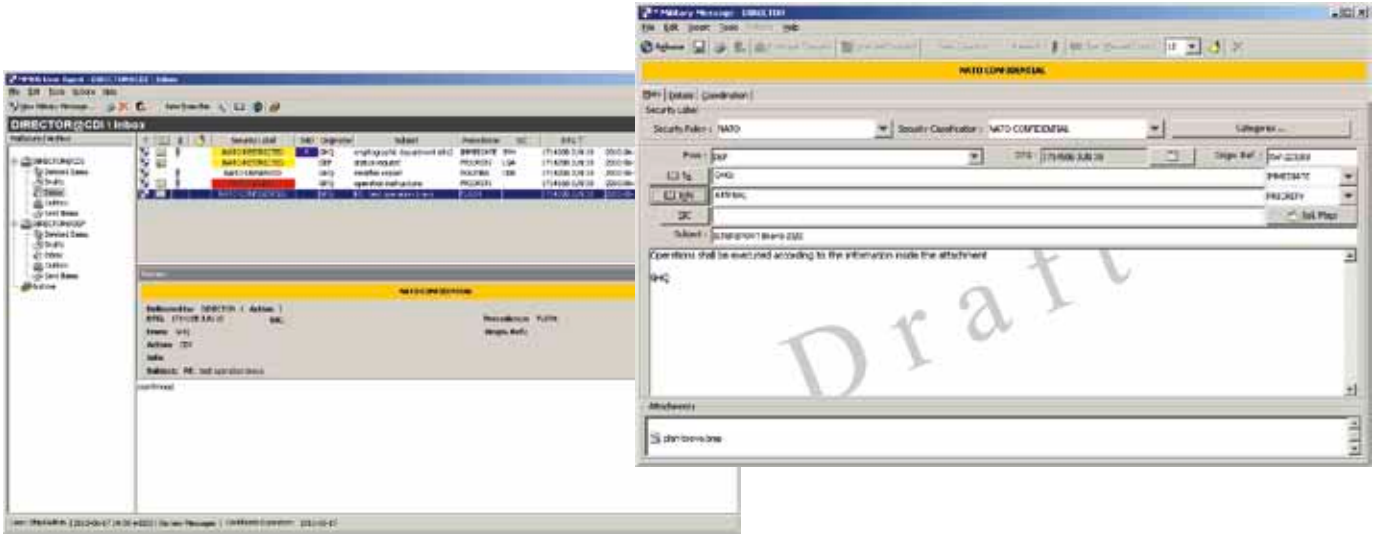
A central archive enables all LAN/WAN-networked organizations to centrally store their messages. Consequently, failsafe backup equipment is only needed at one location nationwide. In addition, R&S®MMHS provides the flexibility to use a local archive and also save messages permanently on storage media such as DVD.

Archives provide an overview of all messages received and transmitted within a defined period of time. Several filter criteria enable the user to search for messages that meet certain criteria of interest.

Support of standardized electronic forms

Standardized electronic forms in military use make it possible to display information in a clear, well-structured manner, which allows processes and actions to be automated and, in turn, cuts down on personnel and eliminates errors. R&S®MMHS is ready for supporting the ADatP-3 format (Allied Data Publication No. 3), which is the NATO standard for formatted messages.

R&S®MMHS: easy-to-visualize functionality.



High-performance radiocommunications

STANAG 4406 Annex E

R&S®MMHS complies with STANAG 4406 Annex E. This standard defines an efficient method for exchanging messages between military units via HF and VHF/UHF radio networks.

Optimization for narrowband radio networks

Currently, wireline communications between units on land run via stable connections using a data transmission bandwidth of several Mbit/s. These high bandwidths are not available in HF and VHF/UHF radio networks. In addition, extremely varying bandwidths and even complete interruption of the data transmission must be taken into account. For this reason, STANAG 4406 Annex E defines a gateway between wireline networks and radiocommunications networks that accommodates different network characteristics. This Annex E is implemented in the R&S®MMHS tactical gateway.

Message handling without STANAG 4406 Annex E

ACP 127: Radiocommunications systems in line with ACP 127 do not feature error correction during the transmission phase and do not support attachments. Broadcasting with continuous repetition of emissions increases the probability of correct message reception, but cannot ensure it.

STANAG 5066: In point-to-point connections, communications based on STANAG 5066 provide an error control method (advanced repeat request, ARQ) that allows the receiving station to automatically re-request incorrect or incomplete data packets from the transmitter. This helps to ensure the correctness of received data, but reduces performance in networks that have multiple communications partners.

Advantages of the R&S®MMHS tactical gateway with integrated STANAG 4406 Annex E

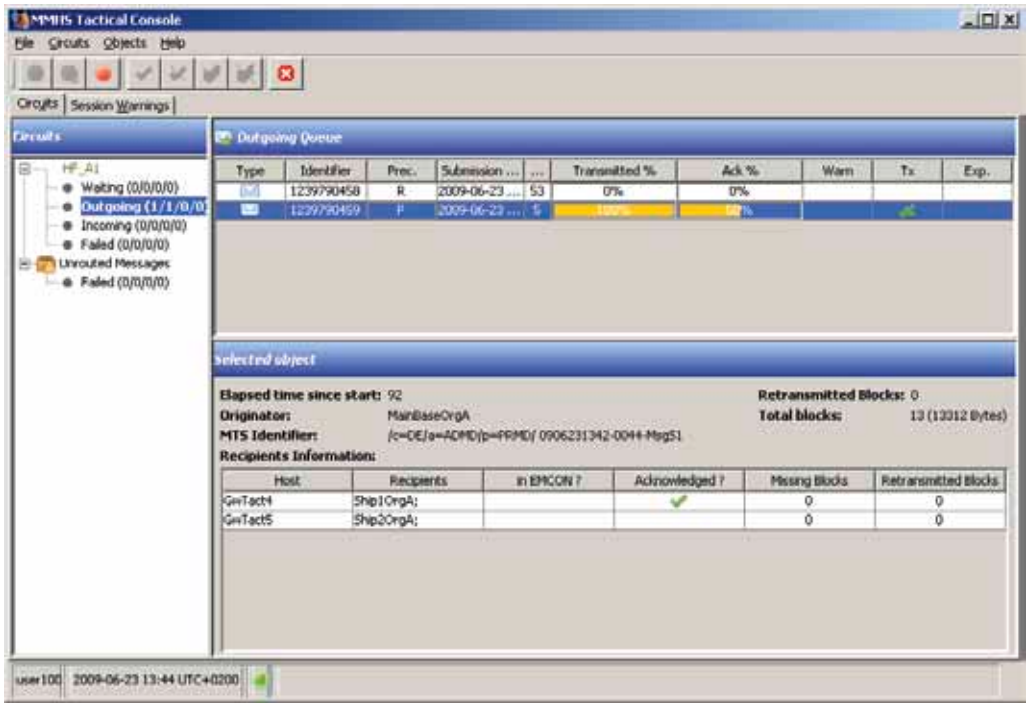
Point-to-multipoint communications with efficient automatic error correction

STANAG 4406 Annex E specifies the use of the P_MUL point-to-multipoint radio protocol, which is defined in ACP 142.

A complete message is sent to all addressees only once. Subsequently, all receiving stations sequentially re-request incorrect or incomplete packets. The transmitter station then resends the sum of all requested packets.

This minimizes radio channel occupancy, makes optimum use of the available bandwidth and ensures the correctness of transmitted data without manual intervention.

R&S®MMHS STANAG 4406 Annex E tactical gateway.



Support of EMCON (radio silence) situations

Emission control (EMCON) defines the status of a unit in which messages may be received via radio, but transmission is strictly prohibited. As a result, the sender receives no information as to whether a message has been successfully transmitted.

For this reason, R&S®MMHS automatically retransmits messages to EMCON units to increase the probability that a message is transmitted completely.

Radio activities at a glance

The user interface of the R&S®MMHS tactical gateway shows all information in an easy-to-read display (see figure, page 6):

- Status of all defined radio circuits
- Activities on the radio circuits
- Data transmission status
- Status of individual messages
- Data transmission errors

Support of legacy and next-generation radios

The Internet protocol (IP) has established itself as the communications standard in civil and increasingly also in military communications. STANAG 4406 including Annex E is therefore based on this standard network protocol.

The R&S®MMHS tactical gateway supports radios that have no IP interface, as well as cutting-edge software defined radios (SDR) that feature an integrated IP protocol stack.

The R&S®MMHS tactical gateway communicates directly with IP-capable radios, whereas radios without an IP interface require an additional layer to the Annex E gateway. This layer is implemented in R&S®MMHS by means of the IP client of the R&S®STANAG 5066 HF radio protocol (see figure).

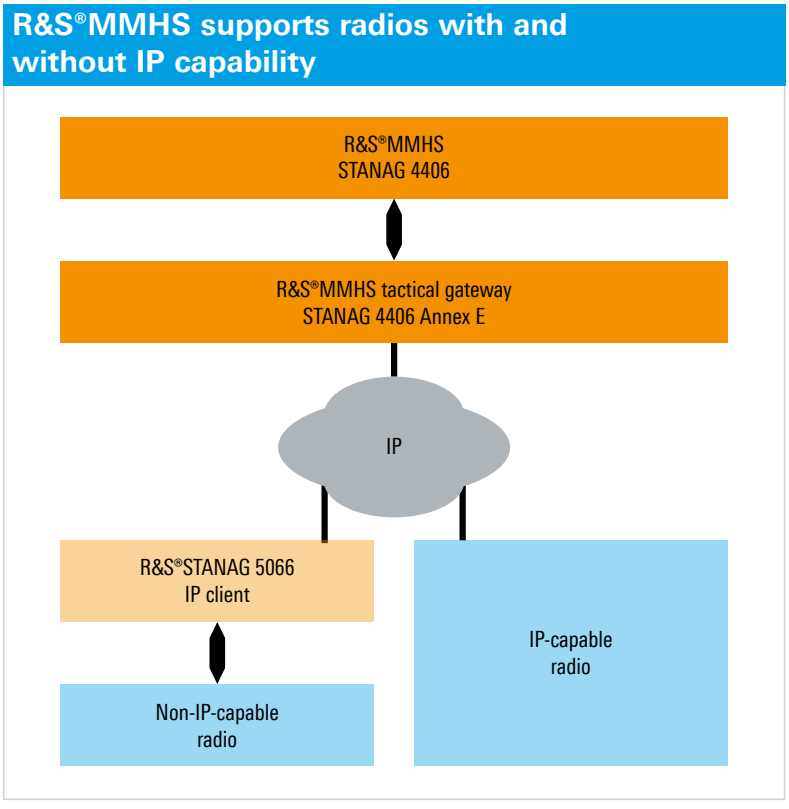
This flexible support of different radio generations allows customers to integrate existing non-IP-capable radios into R&S®MMHS and to add state-of-the-art IP-capable radios in the future.

Despite different radios, R&S®MMHS provides users with a uniform operating concept for their daily operational tasks.

Support of MARLIN

Maritime relayed line-of-sight network (MARLIN) describes a self-organizing network technology for broadband transmission of IP data in tactical line-of-sight radiocommunications for naval use.
R&S®M3SR Series 4400 radios enhanced with MARLIN network components allow wideband data transmission. R&S®MMHS is able to use this technology in a very easy way to send messages with large attachments in a short period of time.

R&S®MMHS supports radios with and without IP capability



Variety of message categories – one application

Reception of messages via different communications paths

Military communications run via various communications paths using different message formats. R&S®MMHS combines the following message categories:

Format	Type	Channel
STANAG 4406	Mil. message	WAN/LAN, satellite
STANAG 4406 Annex E	Mil. message	HF/VHF/UHF radio
ACP 127 SUPP-3	Mil. message	Leased line, satellite
ACP 127 SUPP-1	Mil. message	HF/VHF/UHF radio
STANAG 5066	E-mail	HF radio
SMTP	E-mail	LAN/WAN

Land-based communications in line with STANAG 4406

R&S®MMHS enables communications between stationary land-based units via LAN/WAN infrastructure, as well as broadband communications to mobile units via satellite.

Radiocommunications in line with STANAG 4406

As an essential component of a military message handling system, R&S®MMHS implements Annex E of STANAG 4406, which defines communications in small-bandwidth HF as well as VHF/UHF radio networks on the basis of ACP 142 (P_MUL).

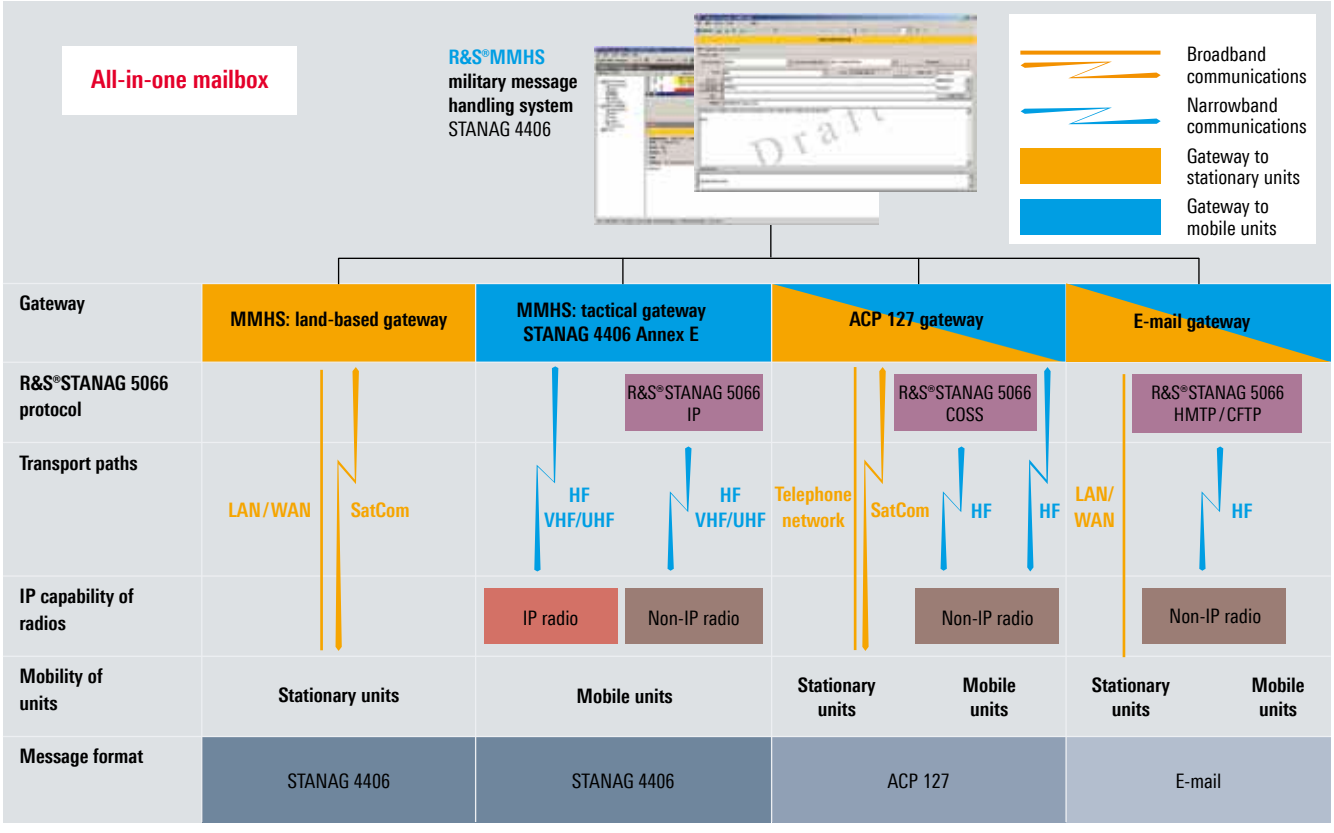
ACP 127 integrated in R&S®MMHS

R&S®MMHS optionally includes a full-featured ACP 127 communications system that allows exchange of messages with ACP 127 systems of other nations and that represents a gateway to existing customer ACP 127 systems.

Land-based communications in line with ACP 127

The R&S®MMHS ACP 127 gateway is based on Annex D of STANAG 4406. Annex D defines interoperability with the ACP 127 SUPP-3 transmission protocol, which utilizes land-based teletype systems using telephone leased lines.

Different message categories combined in R&S®MMHS



Radiocommunications in line with ACP 127
The R&S®MMHS ACP 127 gateway uses the ACP 127 SUPP-1 protocol to support area broadcast, task group broadcast, ship-to-shore and ship-to-ship communications. R&S®MMHS supports interoperability with ACP 127 systems and allows the successive transition to a modern homogeneous STANAG 4406 communications network.

Communications with e-mail systems
The e-mail gateway of R&S®MMHS allows the integration of government organizations using e-mail communications (e.g. Microsoft Exchange/Outlook or Lotus Notes/Domino) instead of military message handling. R&S®MMHS makes it possible to select defined e-mail users directly from the R&S®MMHS address book.

Automatic adaptation of messages in different formats

Different military message categories have different message formats. For this reason, the formats and, if necessary, also the contents of the messages must be adapted to transport messages via different communications channels.

ACP 127 limitations
R&S®MMHS automatically detects whether messages containing attachments will be transmitted via an ACP 127 gateway. Since ACP 127 does not support attachments, it is possible to define whether attachments should be automatically deleted or the message prevented from being sent. If the message is sent, the receiving station is informed that an attachment has been deleted.

E-mails do not support military message attributes
E-mail systems cannot process military attributes. But even if military messages are sent via the R&S®MMHS e-mail gateway, the military message attributes, such as the security classification, are not lost. R&S®MMHS converts this information so that it is displayed in the text area of the e-mail.

Configurable filter criteria help to ensure that beginning with a defined security level, a military message is no longer converted to an e-mail nor sent.

One mailbox for all message formats

All messages to be sent are created in a single editor, regardless of the message category. Message senders do not have to select a special message format to reach a particular post or a civil e-mail addressee. They simply select the addressee from their address book. R&S®MMHS performs all further steps automatically.

All received messages are displayed in a single mailbox, regardless of their message format. As a result, the user can see all messages at a glance on a GUI and does not have to switch between format-specific applications or views.

Military security requirements

Security from login to encryption

Security framework

To ensure that messages can only be processed by authorized users, R&S®MMHS features a security framework. This framework provides the following security:

- Authenticity of sender and message
- Security against message manipulation
- Protection against unauthorized access

In order to fulfill specific military security requirements for the processing of classified messages, additional encryption devices for encrypting wirelines, radio lines and IP networks may be required.

Central management of certificates

R&S®MMHS uses a public key infrastructure (PKI), where certificates for all R&S®MMHS servers, organizations and users are centrally created and managed.

User authenticity

Users log on by first entering their password at a workstation. Then the user's certificate, which is stored on a personal USB token, is checked. Owing to its integrated crypto module, this USB token offers additional security for ensuring user authenticity.

Message authenticity

Messages can be digitally signed in order to ensure the authenticity of the message and of the sender when the message is received. This prevents any manipulation of the message during transport from going unnoticed.

Message encryption

R&S®MMHS allows users to encrypt a message prior to sending it. This safeguards the message against unauthorized access.

Network security

The use of the secure sockets layer (SSL) encryption protocol for secure data transmission between an R&S®MMHS workstation and the R&S®MMHS server is an additional security measure at network level. This prevents unauthorized access to unencrypted messages in the local network.

Central management

Central creation and distribution of complex nationwide configuration

Central configuration

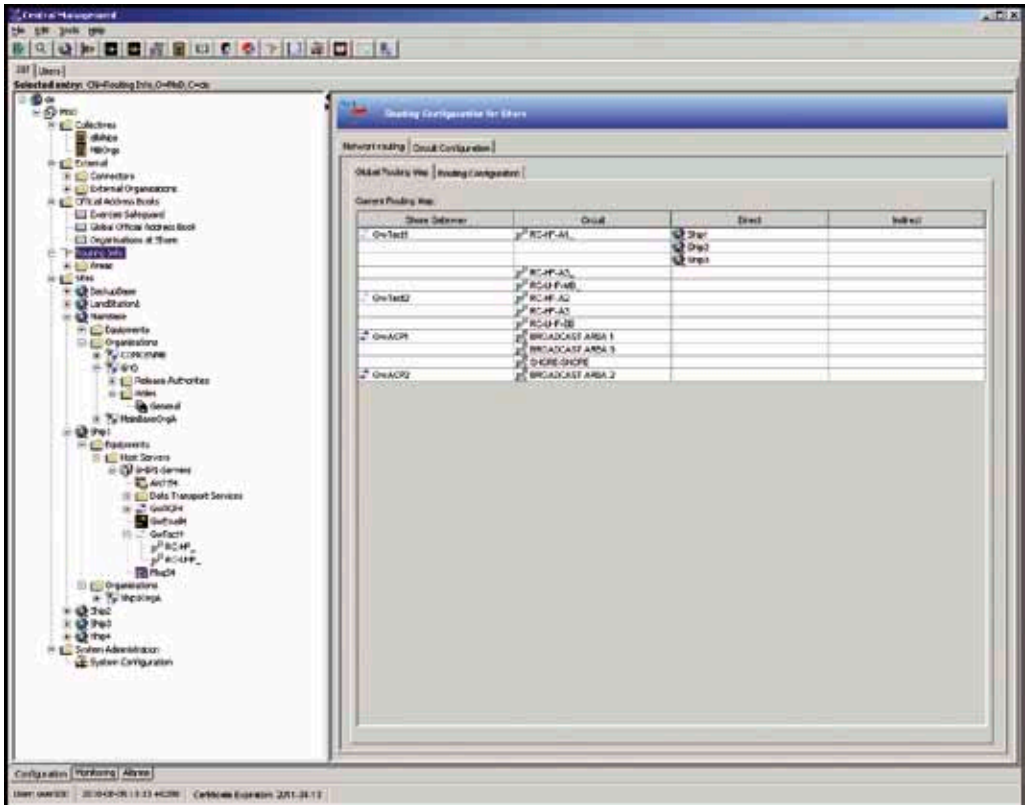
R&S®MMHS provides a unique management component that makes it possible to create a nationwide configuration for all units at a central location. This ensures an initially consistent configuration across all organizations and units with a minimum of staff.

Updating of configuration data

If configuration data is locally changed at a later date, these changes are automatically made available to all wireline-connected units via replication mechanisms. To ensure efficient replication, the changes are replicated on mobile units only if these units have a broadband IP connection to a land-based station, such as a shore connection cable, an IP-based satellite or MARLIN communications equipment. If a broadband IP connection is unavailable, replication is suspended until connection is established, for example, as soon as a ship connects to the land-based network via a shore connection in the harbor.

Configuration data needs to be updated mainly when address information or the validity of security certificates changes. In all cases, only the modified data is transmitted. This incremental update places only a minimal load on the communications network.

R&S®MMHS central management.



Service messages

User support for standard radiocommunications scenarios

R&S®MMHS provides service messages that enable the user to handle frequently recurring tasks in radiocommunications scenarios very easily and, if possible, automatically.

The following services are available:

Free text
Similarly to a chat application, the user can send short text messages to other organizations within one radio area. This feature is needed primarily for service purposes.

Radio circuit tests
A predefined message prompts a remote station to respond. This is used for testing a data radio connection between two stations.

Routing request/acknowledge
If a mobile unit moves into a new radio area, it informs the appropriate radio network coordinating station (in maritime communications, the shore station). After this station has responded with an acknowledge message, the required address information is automatically distributed to all organizations on land by means of directory replication. In addition, all mobile units in this radio area are informed of this new mobile unit.

EMCON report
The “radio silence” status can be defined for a mobile unit. In this case, the appropriate land-based station is informed by the EMCON service message and automatically switches its communications with this unit to EMCON. In this operating mode, acknowledgments from this unit will no longer be expected.

Transmission request/release
To prevent uncoordinated transmission of messages in a radio area, R&S®MMHS allows users to manually release and block radio circuits for radio operation. If messages are to be sent via a radio circuit, their transmission must usually be coordinated by a land-based station. R&S®MMHS provides service messages for occupying and subsequently releasing a radio circuit, which makes it easy for users to coordinate transmission.

Cost-optimized solution

Free-of-charge standards instead of expensive components

STANAG 4406 defines the X.500 standard as the directory service and X.400 as the transmission protocol. To reduce costs significantly, these two components are replaced in R&S®MMHS by standards included in the Microsoft Windows server operating system.

LDAP instead of X.500

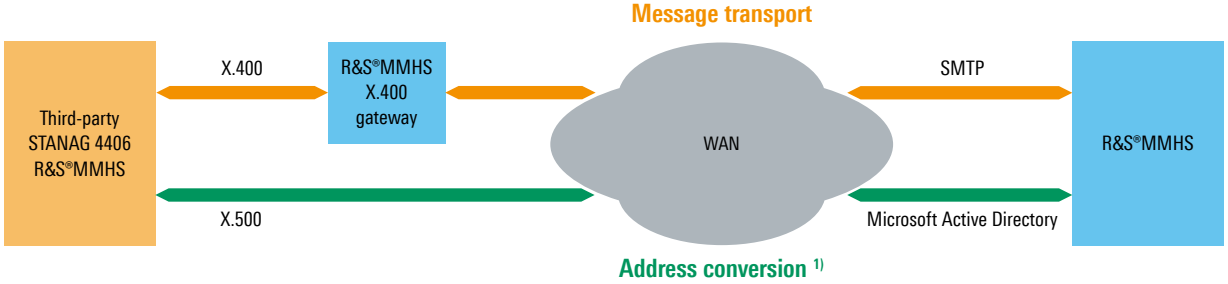
Using the Microsoft Active Directory, R&S®MMHS saves all address data in a directory service based on the light-weight directory access protocol (LDAP).

Interoperability with an X.500 system can be provided on request.

SMTP instead of X.400

In contrast to STANAG 4406 systems from other manufacturers, R&S®MMHS uses the SMTP protocol standard expanded by military message attributes. This solution provides the same operational capabilities as X.400.
For communications with joint or allied forces that use an X.400-based MMHS, R&S®MMHS offers the X.400 border gateway to provide interoperability.

Use of SMTP and AD instead of X.400 and X.500



1) Customer-specific address conversion on request.

Integrated system solution

Ease of operation and management

In advanced complex communications systems, radiocommunications are no longer limited to one radio circuit.

Complex systems consist of various radio components, which have to be switched dynamically to radio lines depending on operational scenarios. To perform these management tasks, Rohde&Schwarz provides R&S®SIMCOS II, a signal management and control system which ideally complements R&S®MMHS.

Automatic information exchange in an integrated communications system together with R&S®SIMCOS II

R&S®SIMCOS II manages radio circuits and continuously provides information about the current status of all remote-controllable radio circuit components. Only the selective exchange of this information with R&S®MMHS and the included radio protocols ensures smooth operation.

Consequently, R&S®MMHS responds immediately to status changes of radio components. If a radio component is defective, the system stops trying to transmit a message and promptly informs the user.

Scalable from laptop to redundant servers

For small mobile units with one radio circuit, R&S®MMHS can be installed on a laptop. In complex systems containing many radio circuits, the required failsafety is ensured by a main/standby server solution. Continuous data synchronization with a standby server automatically enables R&S®MMHS to continue operating without restriction if the main server fails. Server redundancy is provided on request.

All components from Rohde&Schwarz

R&S®MMHS is a state-of-the-art military message handling system that can be ideally complemented by the R&S®SIMCOS II signal management and control system. Moreover, Rohde&Schwarz is able to deliver an all-in-one system solution, including radiocommunications and encryption equipment, in which all components are optimally matched to each other.

Ordering information

Designation	Type	Order No.
Software		
R&S®MMHS Basic Software Package for one server STANAG 4406 message handling system in wireline LAN/WAN IP networks (land-based networks)	R&S®DS3700	6147.1754.0x
Software options		
License for Central Message Archive for land-based network	R&S®DS3701	6147.2180.0x
License for ACP 127 Gateway for exchange of STANAG 4406 messages with ACP 127 networks	R&S®DS3702	6147.2380.0x
License for E-Mail Gateway to provide a gateway to civil SMTP-based e-mail systems	R&S®DS3704	6147.2215.0x
License for Border Gateway to provide a gateway to other STANAG 4406 systems incl. an X.400 message transfer agent (MTA)	R&S®DS3705	6147.2221.0x
License for Central Management Capability to provide countrywide management License for one country	R&S®DS3706	6147.2238.0x
License for User Agent for one workstation	R&S®DS3720	6147.2267.0x
License for One Concurrent STANAG 4406 Annex E Radio Line	R&S®DS3710	6147.2250.0x
Hardware options		
USB Token for secure storage of certificates for one user	R&S®DS3770	6070.8544.00

The radio systems described are hardware- and software-configurable. The system confirmed in the order acknowledgment will be delivered.

Your local Rohde&Schwarz expert will help you determine the optimum solution for your requirements.

Service you can rely on

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

About Rohde&Schwarz

Rohde&Schwarz is an independent group of companies specializing in electronics. It is a leading supplier of solutions in the fields of test and measurement, broadcasting, radiomonitoring and radiolocation, as well as secure communications. Established more than 75 years ago, Rohde&Schwarz has a global presence and a dedicated service network in over 70 countries. Company headquarters are in Munich, Germany.

Environmental commitment

- Energy-efficient products
- Continuous improvement in environmental sustainability
- ISO 14001-certified environmental management system

Certified Quality System ISO 9001

Certified Quality System EN 9100

Certified Quality System AQAP-2110

Certified Quality System EN 9110

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