R&S®RCMS II
Remote Control &
Monitoring System
For civil ATC and
air defense applications

ROHDE & SCHWARZ

R&S®RCMS II
Remote Control &
Monitoring System
At a glance

R&S®RCMS II is a software solution for the remote control and monitoring of Rohde & Schwarz radios.
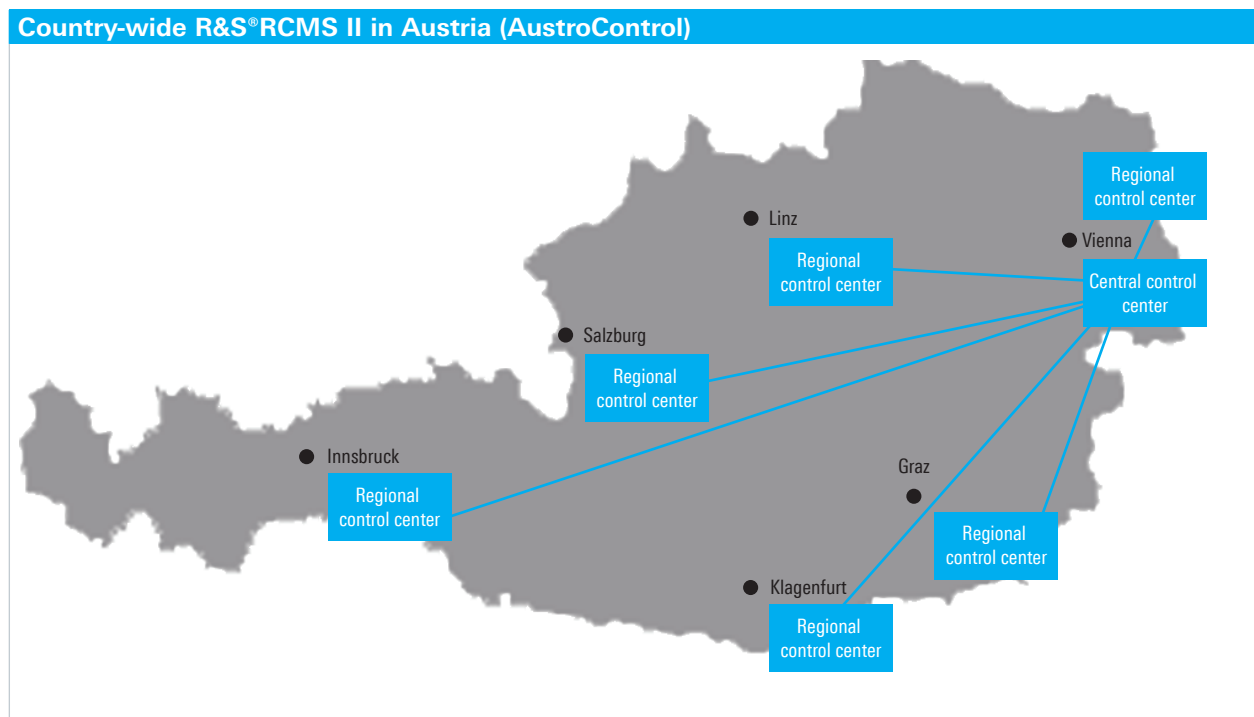
R&S®RCMS II enables operators of civil air traffic control (ATC) and air defense systems to monitor and control Rohde & Schwarz radios from one or more locations. This allows a cost-effective quick response to error conditions and provides the ability to set operational parameters for various ATC scenarios.

R&S®RCMS II is designed for monitoring scenarios ranging from individual airports to country-wide radio systems. The radios are shown in both a tree view and a map view. The map view shows the location and basic configuration of each radio. Individual radios can be selected and managed quickly and easily. The system data is recorded for customer-specific statistical analysis using third party applications.

The R&S®RCMS II software can easily be configured for customer-specific ATC systems. By using off-the-shelf computer hardware and existing network infrastructure, the required capital expenditures and operational costs can be kept to a minimum. Additional Rohde & Schwarz radios can be brought into the R&S®RCMS II system quickly and easily, including new radios in existing sites or completely new sites.

Key facts
- No additional hardware required for monitoring and controlling radios at the individual sites
- Support for Rohde & Schwarz radios with EPM capabilities for military applications
- Redundant system for continuous monitoring and control
- Overall status report sent to higher-level monitoring system via SNMP
- Complete situational overview of the radio sites through monitoring of SNMP-capable devices

Country-wide R&S®RCMS II in Austria (AustroControl)

- Linz — Regional control center
- Vienna — Central control center
- Regional control center
- Salzburg — Regional control center
- Innsbruck — Regional control center
- Graz
- Klagenfurt — Regional control center
- Regional control center

R&S®RCMS II Remote Control & Monitoring System Benefits and key features

Optimum operational efficiency
ı Remote monitoring of radios
ı Remote control of radios

Wide range of analysis features
ı Recording and analysis of system events
ı Data stored for customer-specific statistical analysis

Customized system solutions
ı High level of scalability
ı Expandability of existing R&S®RCMS II systems

State-of-the-art technology with off-the-shelf hardware
ı Windows platform
ı IP technology
ı Time synchronization via network time protocol (NTP)

Secure and reliable operation
ı Flexible user management
ı High availability

Interoperation with other components in the ATC system
ı Integration of SNMP-capable devices
ı Status information for higher-level monitoring center

Optimum operational efficiency

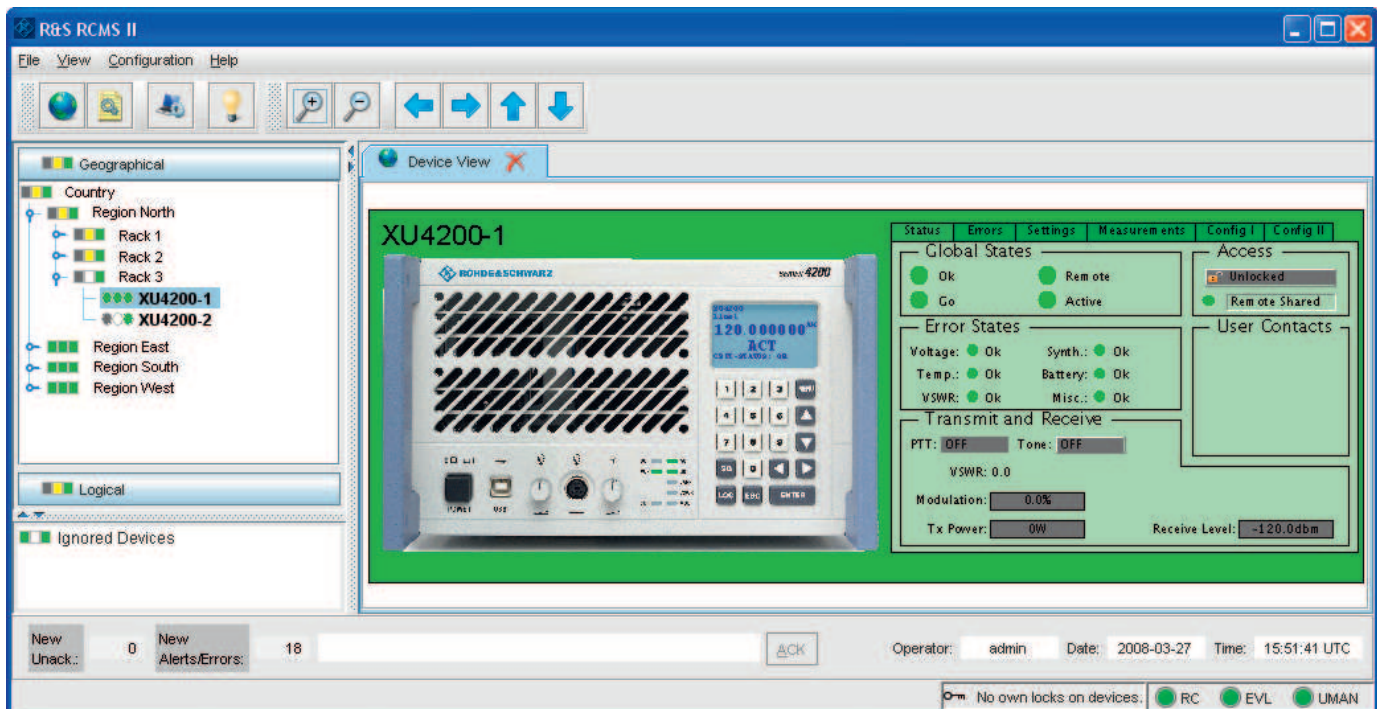## Remote monitoring of radios

R&S®RCMS II enables comprehensive monitoring of Rohde & Schwarz radios and their operational parameters. The easy-to-use graphical user interface provides an overview of the entire radio system as well as information regarding the status of each individual radio.

Information about each radio is displayed on the screen with specific colors to indicate the status of the link and the radio itself. The user-friendly interface makes it easy to navigate between a country-wide overview of the system and detailed information about each individual radio, including its parameters and status. In this way, details can quickly be determined regarding the status of individual modules, error messages and current settings.

Remote control of radios

Using R&S®RCMS II, radio parameters can easily be set and/or changed in order to adapt the radio system to current operational needs. This can be accomplished from one or more locations. In addition to monitoring, the radios can also be managed without any interruption of the monitoring activities in progress.

Standard RCMS configuration for the R&S®Series4200.

Wide range of analysis features

Recording and analysis of system events

The R&S®RCMS II remote control and monitoring system stores all system events for the radios being monitored in a database. In addition to error messages and warnings, information such as user login or logout is also stored. This information is displayed in tabular form and can be filtered according to various criteria such as time frame, message type, message code or radio name. As a result, the history of an individual radio or the entire system can be tracked at any time.

Data stored for customer-specific statistical analysis

R&S®RCMS II stores the incoming status messages from the radios being monitored in a database and can export them for external analysis. The customer can use this data for carrying out further analysis such as determining the frequency of errors.

Extended RCMS configuration for the R&S®M3SR Series4400.

Customized system solutions
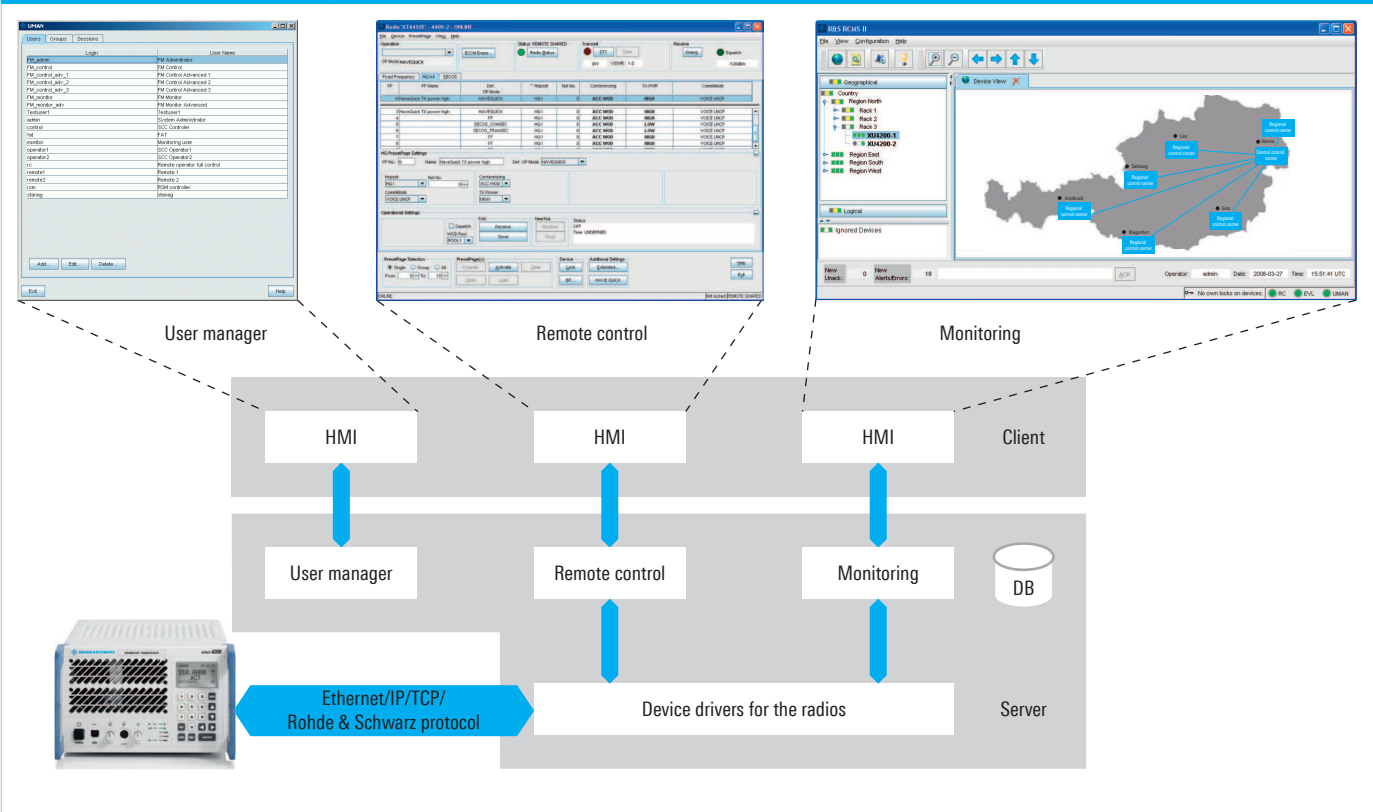
High level of scalability

R&S®RCMS II is based on a client/server architecture. The system can be sized to support a single airport, a region or an entire country in accordance with the customer's requirements.

The client/server architecture permits the operation of systems distributed across various locations. An example of this would be an R&S®RCMS II server at a central location, workstations at regional centers and radios at remote sites.

Expandability of existing R&S®RCMS II systems

R&S®RCMS II can easily be adapted when civil and military air traffic control operators need to expand their radio systems. Radios at a new site can be added to an existing R&S®RCMS II system cost-effectively. R&S®Series4200, R&S®M3SR Series4400 and R&S®M3SR Series4100 radios can be connected directly to existing IP infrastructure without requiring additional hardware.

Various applications using the R&S®RCMS II architecture

User manager

Remote control

Monitoring

HMI   HMI   HMI   Client

User manager   Remote control   Monitoring   DB

Ethernet/IP/TCP/ Rohde & Schwarz protocol   Device drivers for the radios   Server

State-of-the-art technology with off-the-shelf hardware

Windows platform
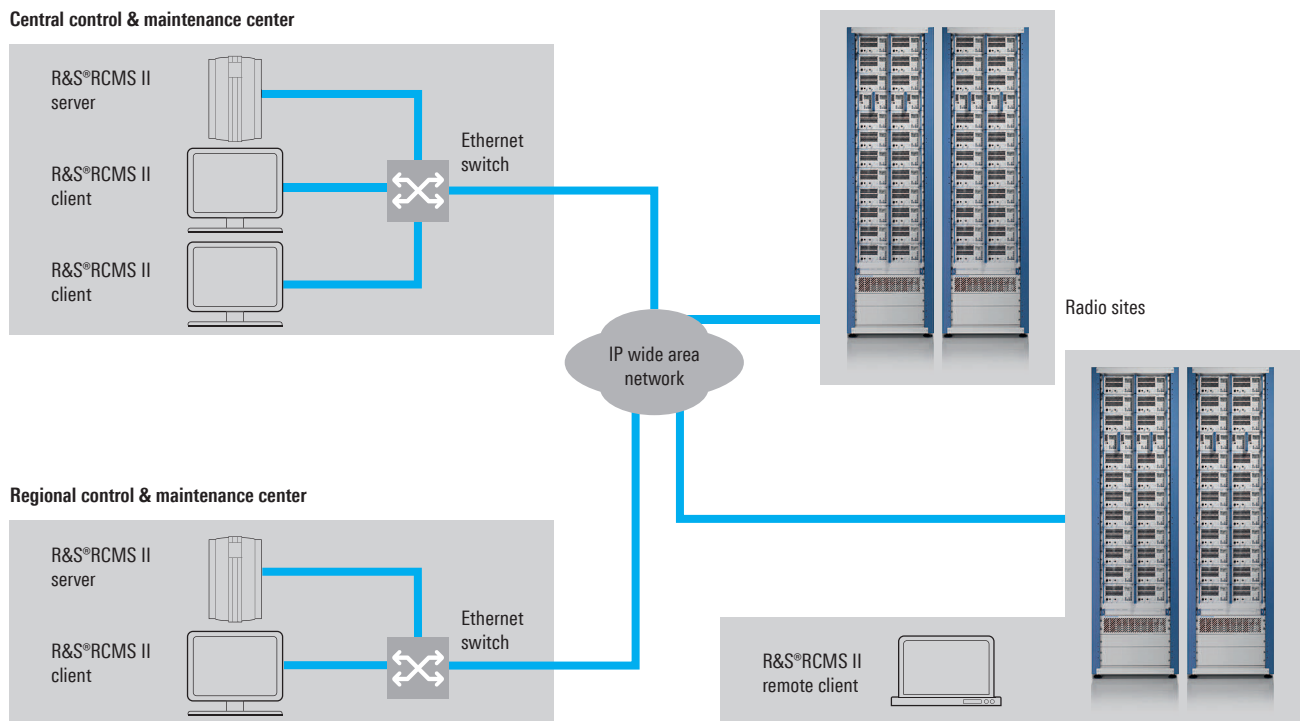R&S®RCMS II uses off-the-shelf computer hardware running Windows 7 Professional.

IP technology
R&S®RCMS II uses IP technology. Communications between R&S®RCMS II workstations, servers and radios are handled via IPv4. Additionally IPv6 is supported for the communications from R&S®RCMS II servers to R&S®Series4200, MultiServers and SNMP devices. Existing LAN/WAN infrastructure can be used if it meets the requirements of R&S®RCMS II.

Time synchronization via network time protocol (NTP)
The system time on the R&S®RCMS II server can be synchronized with the central time provisioning system by means of NTP. In this way, events in the R&S®RCMS II database will have a precise time stamp and can be compared to other events in the radio system much more conveniently.

Connecting the radio sites using IP technology

Central control & maintenance center

R&S®RCMS II server

R&S®RCMS II client

R&S®RCMS II client

Ethernet switch

Radio sites

IP wide area network

Regional control & maintenance center

R&S®RCMS II server

R&S®RCMS II client

Ethernet switch

R&S®RCMS II remote client

Secure and reliable operation

Flexible user management

The user management features facilitate the assigning of access rights. Authorizations for monitoring and/or controlling the radios can be assigned with various user levels. System administrators can revise existing authorizations and create new users and user groups.

High availability

Radio voice and data transmission remains unaffected in the event that the R&S®RCMS II system is not available. It is possible to increase system availability for monitoring and controlling R&S®Series4200, R&S®M3SR Series4400 and R&S®M3SR Series4100 radios radios by expanding R&S®RCMS II to include a secondary server. The secondary server can be used for monitoring and control activities in the case that the primary server fails.

Interoperation with other components in the ATC system

Integration of SNMP-capable devices

SNMP-capable devices from other manufacturers can be monitored with R&S®RCMS II as long as the device has a suitable SNMP MIB. Furthermore, off-the-shelf SNMP-capable sensors can also be integrated and monitored. Using a single monitoring system saves both time and money.

Status information for higher-level monitoring center

The role of a central monitoring center is to collect and display an overview of the status information for all applications and active devices within an ATC system. R&S®RCMS II supports this by sending a status summary for the radio system to the central monitoring center via SNMP. The details and the status of the individual radios are available in the R&S®RCMS II system.

ATC applications using R&S®M3SR Series4400 and R&S®Series4200 radios.

R&S®RCMS II System configuration

The number of workstations, servers, radios and radio sites in the R&S®RCMS II system is easily scalable. Small, mid-sized and country-wide radio systems can be supported by means of various configurations:

❙ Single server solution for small and mid-sized radio systems
❙ MultiServer solution for large-scale radio systems with central monitoring center

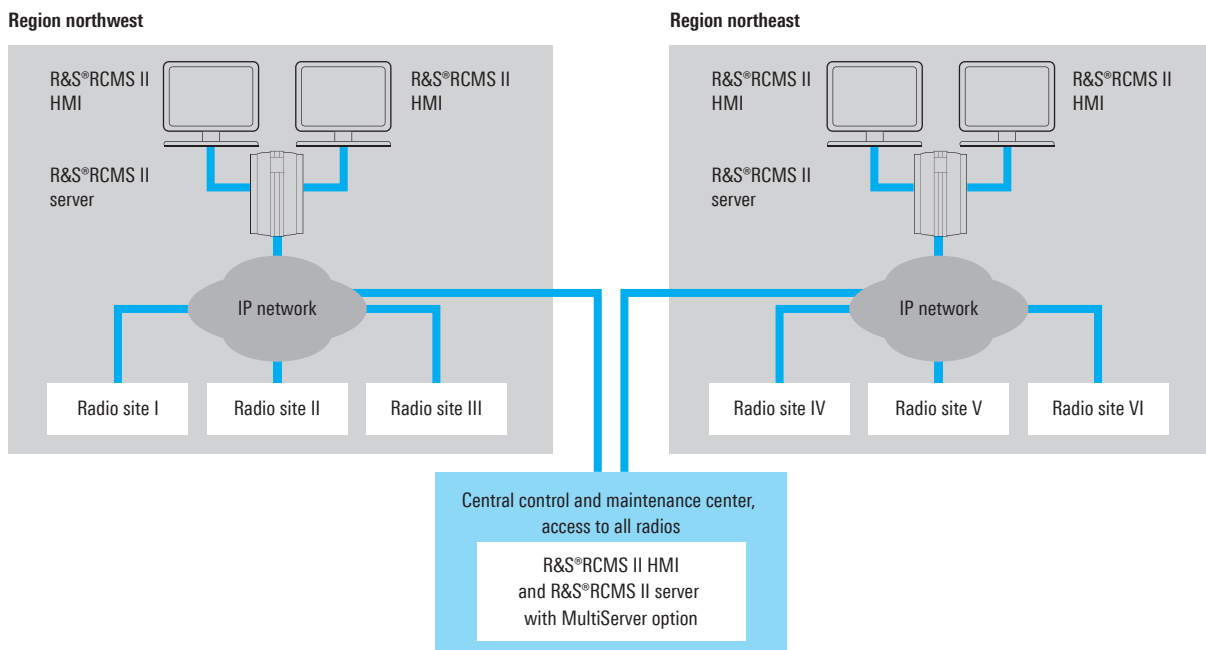## Single server solution for small and mid-sized radio systems

The R&S®RCMS II single server solution operates on a single desktop or laptop on which the server applications and the graphical user interface are installed. In this way, a small radio system for a single airport can be implemented cost-effectively using just one off-the-shelf desktop or laptop.

Moreover, additional R&S®RCMS II workstations can be connected to the R&S®RCMS II server via IP to enable the simultaneous monitoring and operation of the radios by several users, even from multiple locations.

MultiServer solution for large-scale radio systems with central monitoring center

Large-scale country-wide ATC and air defense operators often establish regional structures for their radio systems in the form of regional management centers. A regional center is responsible for a specific region and operates autonomously with its own R&S®RCMS II server and multiple workstations. Additionally, the overall status of the radios in the regions can be monitored from a central location. In this case, the monitoring activities are handled by an additional R&S®RCMS II server with MultiServer option in the central maintenance center, retrieving summarized radio status information from each regional R&S®RCMS II server.

Example of MultiServer solution

Region northwest

R&S®RCMS II HMI

R&S®RCMS II HMI

R&S®RCMS II server

IP network

Radio site I   Radio site II   Radio site III

Region northeast

R&S®RCMS II HMI

R&S®RCMS II HMI

R&S®RCMS II server

IP network

Radio site IV   Radio site V   Radio site VI

Central control and maintenance center, access to all radios

R&S®RCMS II HMI and R&S®RCMS II server with MultiServer option

R&S®RCMS II
Supported radios

R&S®RCMS II supports R&S®Series4200 [1], R&S®M3SR Series4400, R&S®M3SR Series4100, R&S®Series2000 [2] and R&S®Series200 [3] radios. R&S®Series400U [2] radios can be integrated into the R&S®RCMS II system upon request.

The R&S®RCMS II data sheet contains a list of all parameters that can be monitored and controlled for each of the Rohde & Schwarz radio types supported.

[1] Including n+m redundancy via R&S®GV4000 model .31, .32 or .33.

[2] For radios that do not support monitoring and control via IP, the radio site must provide a converter from Ethernet to the radio interface. Radios with an RS-232 interface can only be monitored and controlled from a single system.

[3] The following types of R&S®Series200 radios are supported via R&S®GV4000 model .03: R&S®EU231, R&S®SU251, R&S®XU251, R&S®XU221*, R&S®XD231, R&S®EU230, R&S®SU250, R&S®XU250A, R&S®XU251 MS, R&S®EU230 MS, R&S®SU250 MS*, R&S®EU231 MS, R&S®SU251 MS and R&S®XU221 MS*. For radio types marked with "*" additional release tests have to be planned on a customer-specific project basis.

R&S®RCMS II Platform requirements

The hardware requirements for the R&S®RCMS II server and workstations depend on the number of radios to be monitored and/or controlled by each server. The following example illustrates the hardware configuration for one R&S®RCMS II server and workstation for monitoring and controlling a mid-sized radio system.

Server
❙ Intel Core 2 Quad core 2.4 GHz processor, 3 Gbyte RAM, > 100 Gbyte HDD, CD-ROM, mouse with scroll wheel, keyboard, USB interface, 100 Mbit/s Ethernet interface, 19" monitor
❙ Operating system: Windows 7 Professional (64 bit), English

Workstation
❙ Intel Core 2 Dual core 3.0 GHz processor, 3 Gbyte RAM, 20 Gbyte HDD, CD-ROM, mouse with scroll wheel, keyboard,
100 Mbit/s Ethernet interface, 19" monitor
❙ Operating system: Windows 7 Professional (64 bit), English

The hardware will be scaled according to the size of the radio system to be monitored.

R&S®RCMS II Application scenarios

Scenario 1: Failure of a radio at an airport

One of the radios at an airport with separate transmitter and receiver locations has exhibited a fault. The corresponding standby radio was activated automatically and is now in operation. R&S®RCMS II registers the event and displays it on the R&S®RCMS II workstation in the management center. By selecting the radio with the fault, more detailed information about the fault is shown, such as temperature, voltage and VSWR. Upon command, R&S®RCMS II instructs the radios to carry out a built-in test, which will then provide additional information about the fault condition. This information is forwarded to the maintenance center where the appropriate repair measures are initiated.

Scenario 2: Country-wide ATC system with multilevel monitoring

Radios at various locations around the country are monitored by regional ATC centers throughout the day. At night, when traffic volumes are low, radio activities are monitored from a central location. R&S®RCMS II monitors all the radios at night from this central location as well.

Scenario 3: Changing radio parameters for an air defense application

A military operation requires changing the frequencies and modes of operations used for each mission. For a new mission, a predefined mission parameter set is selected. Upon command, R&S®RCMS II in the control center activates the mission parameter set (preset page) in the ground radios at the remote sites.

R&S®M3SR Series4400 in operation in an R&S®MX400 mobile tower.

Software options

Options	Description
The R&S®RCMS II software is available as a basic package with additional software options.	
Standard RCMS (basic package)	Complete monitoring and basic control functionality for Rohde & Schwarz radios. The supported parameters depend on the types of radio used. [1]
Extended RCMS	Complete remote control functionality for R&S®M3SR Series4400 and R&S®Series2000 radios, including EPM parameters. The supported parameters depend on the types of radio used. [1]
MultiServer RCMS	Supervision of multiple regional Standard RCMS servers and connected radios (summarized status information).
Remote Firmware Upload for R&S®Series4200	Remote firmware upload for one or more R&S®Series4200 radios in parallel
Additional R&S®RCMS II client software	Software licenses for additional R&S®RCMS II workstations.
Licenses for radios	In order for the R&S®RCMS II system to support various Rohde & Schwarz radios, the corresponding license for each radio is required.
License for SNMP-capable devices	In order for the R&S®RCMS II system to support multiple SNMP-capable devices, one license per R&S®RCMS II server is required.
R&S®RCMS II status information via SNMP v2c	Communications of the overall status information for all radios being monitored by an R&S®RCMS II server to a primary monitoring system.

[1] The R&S®RCMS II data sheet contains a list of all parameters that can be monitored and controlled for every supported Rohde & Schwarz radio.

The radio systems described are hardware- and software-configurable. The system delivered has the configuration as confirmed in the order.

Product overview

Designation	Type
Basic software	
Standard RCMS Server Software with one client license ▎ Fault management and remote control ▎ For R&S®Series200, R&S®Series4200, R&S®M3SR Series4400, R&S®M3SR Series4100 and R&S®Series2000 ▎ For up to 500 RX/TX radios or 250 transceiver radios	R&S®DS3800
Software options ("Extended RCMS" functionality for the basic software package)	
Extended RCMS Server Software for one Standard RCMS server ▎ Enhanced remote control for fixed frequency ▎ For R&S®M3SR Series4400, R&S®M3SR Series4100 and R&S®Series2000	R&S®DS3801
Extended RCMS Server Software for one Standard RCMS server ▎ Enhanced remote control for fixed frequency and R&S®SECOS waveform ▎ For R&S®M3SR Series4400	R&S®DS3802
Extended RCMS Server Software for one Standard RCMS server ▎ Enhanced remote control for fixed frequency and HAVE QUICK I/II waveform ▎ For R&S®M3SR Series4400	R&S®DS3803
Extended RCMS Server Software for one Standard RCMS server ▎ Enhanced remote control for fixed frequency and SATURN/HAVE QUICK I/II waveform	R&S®DS3804
Software options ("MultiServer RCMS" functionality for the basic software package)	
MultiServer RCMS Server Software for one Standard RCMS server ▎ For supervision of multiple regional Standard RCMS servers and connected radios	R&S®DS3808
Remote Firmware Upload Software for R&S®Series4200 for Standard RCMS servers ▎ Software can be used for multiple Standard RCMS servers within one R&S®RCMS II system	R&S®DS3809
Licenses for additional R&S®RCMS II workstations	
One Client License ▎ For operational access to one R&S®RCMS II server (Standard or Extended)	R&S®DS3820
Licenses for radios	
RCMS License for one R&S®Series4200 transmitter or receiver	R&S®DS3830
RCMS License for one R&S®Series4200 transceiver	R&S®DS3831
RCMS License for one R&S®M3SR Series4400 or R&S®Series2000 radio	R&S®DS3833
RCMS License for one R&S®M3SR Series4100 radio	R&S®DS3834
RCMS License for one R&S®Series200 receiver or transmitter via R&S®GV4000 model .03 (R&S®EU231, R&S®SU251, R&S®EU230, R&S®SU250)	R&S®DS3838
RCMS License for one R&S®Series200 transceiver via R&S®GV4000 model .03 (R&S®XU251, R&S®XU221, R&S®XD231, R&S®XU250)	R&S®DS3839
SNMP support	
RCMS License for monitoring of third party SNMP-capable devices connected to an R&S®RCMS II server	R&S®DS3840
RCMS License to provide R&S®RCMS II summary status information via SNMP v2c to a third party monitoring system	R&S®DS3841
Services	
R&S®RCMS II server installation and configuration	on request
R&S®RCMS II configuration of a specific third party SNMP device (LUA script)	on request

For data sheet, see PD 5213.6464.22 and www.rohde-schwarz.com

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	Certified Quality System
ISO 9001	EN 9100

Certified Quality System	Certified Quality System
AQAP-2110	EN 9110

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