

CERTIUM VCS

Secure voice communications system for safe
air traffic control



Product Brochure
Version 10.00

ROHDE & SCHWARZ

Make ideas real



AT A GLANCE

CERTIUM VCS is the most innovative fully IP based VCS on the market, combining rich functionality with excellent usability for seamless airspace operations. CERTIUM VCS utilizes all the advantages of IP technology and provides strong security, innovative resilience and easy administration.

Ready for future fully IP communications systems

ATC systems are evolving towards flexible and scalable IP based network elements. CERTIUM VCS makes use of all the advantages of IP technology such as high resilience, security and flexibility. It provides outstanding and innovative functionalities for both air traffic controllers and system operators.

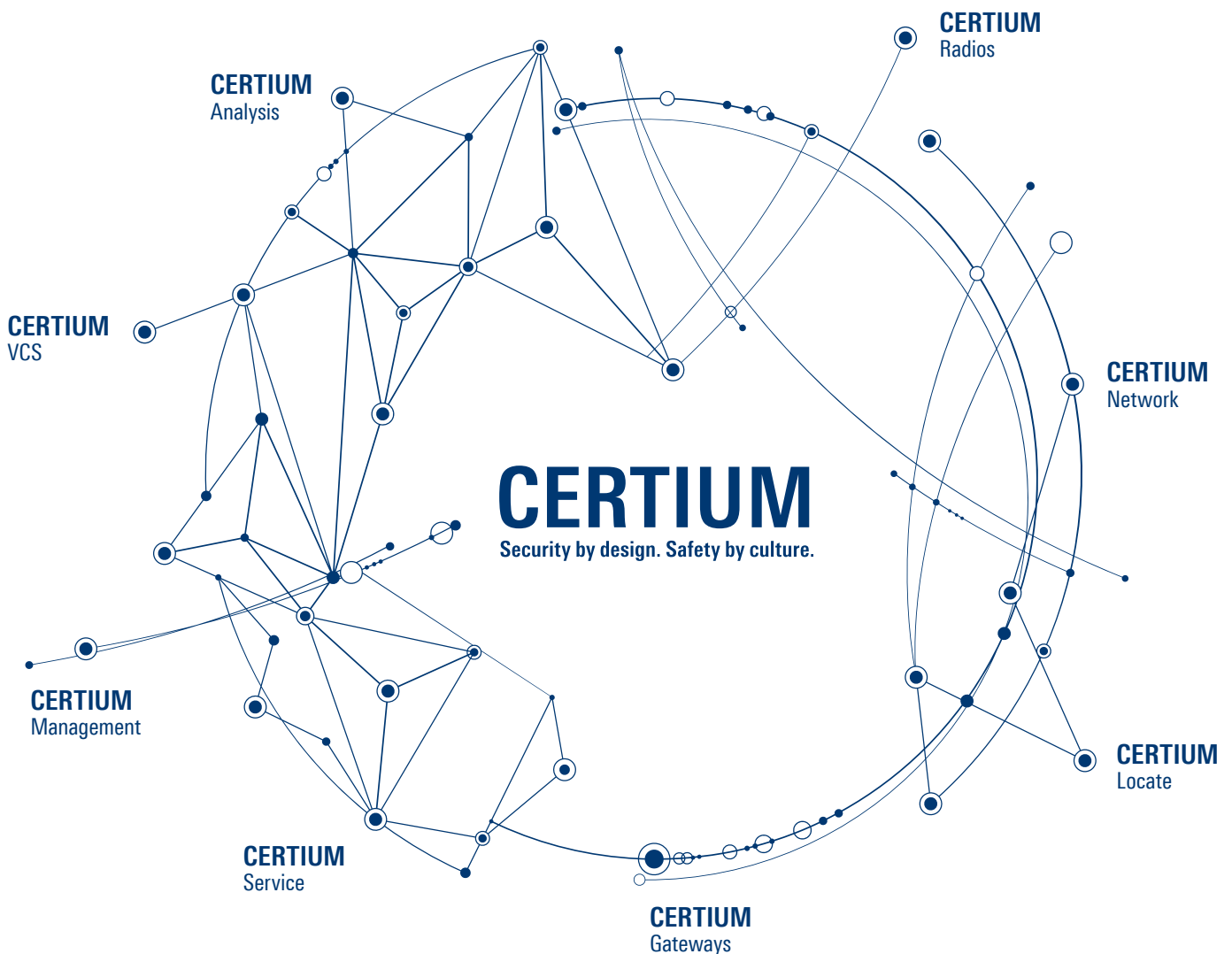
Unparalleled ATC voice service availability

System availability is paramount for VCS operations. CERTIUM VCS implements technologies unique on the market such as quad-redundant servers, m+n radio redundancy and direct peer-to-peer calling. to ensure systems remain operational even in case of e.g. natural disasters.

Security by design

During the development of all components of the CERTIUM portfolio, Rohde&Schwarz focused strongly on security to ensure air navigation service providers (ANSP) can reliably operate their critical communications infrastructures.

The intrinsically secure VCS is protected with state-of-the-art security mechanisms such as firewalls as well as software hardening and management traffic encryption. This ensures safe and secure operations within the critical infrastructure environment.



Part of the CERTIUM ecosystem

CERTIUM is an advanced ATC communications suite from a single source that surpasses existing safety and efficiency standards. All CERTIUM products are seamlessly integrated into single portfolio. Although the VCS can be used on its own, users benefit the most by combining it with other CERTIUM products.

Combining CERTIUM VCS with CERTIUM Radios and CERTIUM Gateways significantly improves system integration and enables easy centralized monitoring and management. CERTIUM network products are harmonized and tested within the CERTIUM environment, which maximizes operational safety and security.

The monitoring and service capability of CERTIUM Analysis and CERTIUM Service make operation of the VCS more straightforward and efficient.

BENEFITS

Completely IP based VCS

- ▶ IP technology
- ▶ Central management
- ▶ EUROCAE ED-137 standard
- ▶ Connections
- ▶ [page 4](#)

Security by design

- ▶ Secure VCS for critical infrastructures
- ▶ Hardened operating system and software
- ▶ Network isolation and secure transport
- ▶ [page 5](#)

Exceptional resilience thanks to quad redundancy

- ▶ Uninterruptible system operation
- ▶ Device redundancy
- ▶ Control center redundancy
- ▶ System redundancy
- ▶ Network redundancy
- ▶ Radio site redundancy
- ▶ [page 6](#)

Intuitive controller user interface

- ▶ Intuitive user interface
- ▶ Easy customization
- ▶ [page 8](#)

Trusted partner throughout the project lifecycle

- ▶ System engineering
- ▶ Project implementation
- ▶ Testing and training
- ▶ Service level agreement
- ▶ Service partner program
- ▶ Obsolescence management
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COMPLETELY IP BASED VCS

IP technology

IP technology is used worldwide for state-of-the-art communications systems due to its flexibility, redundancy and security. Rohde&Schwarz was one of the first manufacturers to understand the power of this technology and established the fully IP based CERTIUM VCS on the market.

The basis for the VCS solution is the use of standard IP protocols for internal and external communication.. Common IP routers or layer 3 switches connect all VCS components: servers, controller working positions (CWPs) and radios. The distributed architecture enables functionalities that improve resilience and security.

Central management

The VCS central management server (VCMS) provides centralized administration for easy configuration and management of the entire distributed system. The VCMS stores and distributes the configuration of all components and receives system status data. Administration is performed via a secure web interface and does not require additional tools.

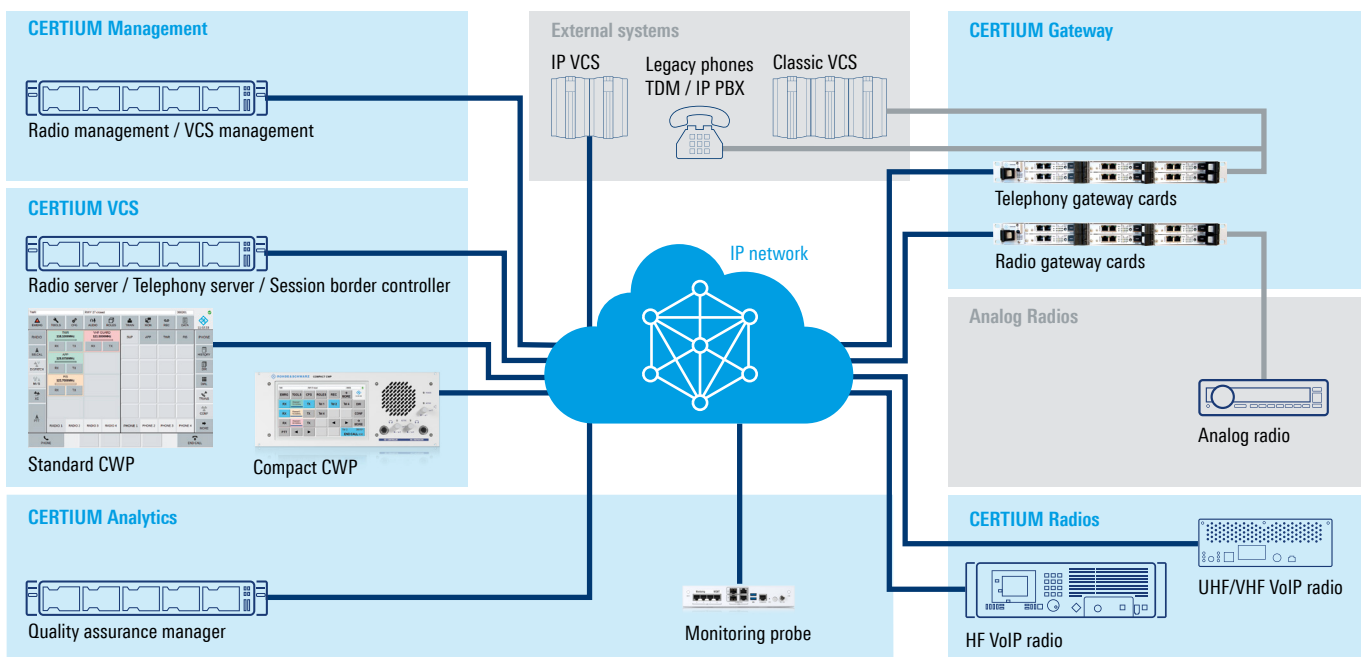
EUROCAE ED-137 standard

The EUROCAE ED-137 standard defines the IP protocols between the VCS, radio and recording system. It ensures systems from different manufacturers are compatible with each other. CERTIUM VCS supports all versions of ED-137 A, B and C. It is fully compatible with both CERTIUM Radios and the ED-137 compliant solutions of other manufacturers. The functionalities and interoperability were extensively tested in various plug tests.

Connections

CERTIUM VCS offers a variety of options for connecting to other VCSs as well as analog radios and legacy telephony services.. Other VCSs can be directly connected via the integrated session border controller or via CERTIUM Gateways (R&S®GW54xx VCS gateways). To connect to legacy radio or telephony resources, Rohde&Schwarz also offers several modular gateways that offer many analog and digital interface options.

IP based CERTIUM environment



SECURITY BY DESIGN

Strong security for critical infrastructures

Secure VCS for critical infrastructure

Communications systems of ANSP are highly sensitive, critical infrastructures. Attacks on them may lead to air-space closure or even cause safety issues.

Rohde&Schwarz used its extensive experience in developing systems for critical infrastructures when creating CERTIUM VCS systems. The level of security follows the recommendations of international standards such as Federal Information Processing Standards (FIPS), the Open Web Application Security Project (OWASP) and the EUROCONTROL VOTE Security Handbook.

Hardened operating system and software

The operating system of the components is designed in accordance with state-of-the-art software hardening techniques. This results in an intrinsic architecture based on a two-level approach that prevents cyberattacks as well as containing them and minimizing their impact. For example, a file integrity tool continually monitors file systems and raises an alarm if it detects any unauthorized changes.

Network isolation and secure transport

To minimize denial of service (DoS) attacks, all IP interfaces are protected by a very restrictive firewall. Only defined communication paths are allowed. This restrictive approach effectively reduces attack vectors.

The management interface is critical and must be secured accordingly. If misused, it can affect the availability of the entire system.

CERTIUM VCS therefore uses secure protocols such as https (WebGUI), SNMPv3 (remote control and management) and SSL for secure configuration deployment to ensure that the information sent cannot be intercepted and misused.



EXCEPTIONAL RESILIENCE THANKS TO QUAD REDUNDANCY

ATC grade resilience for uninterruptible system operation

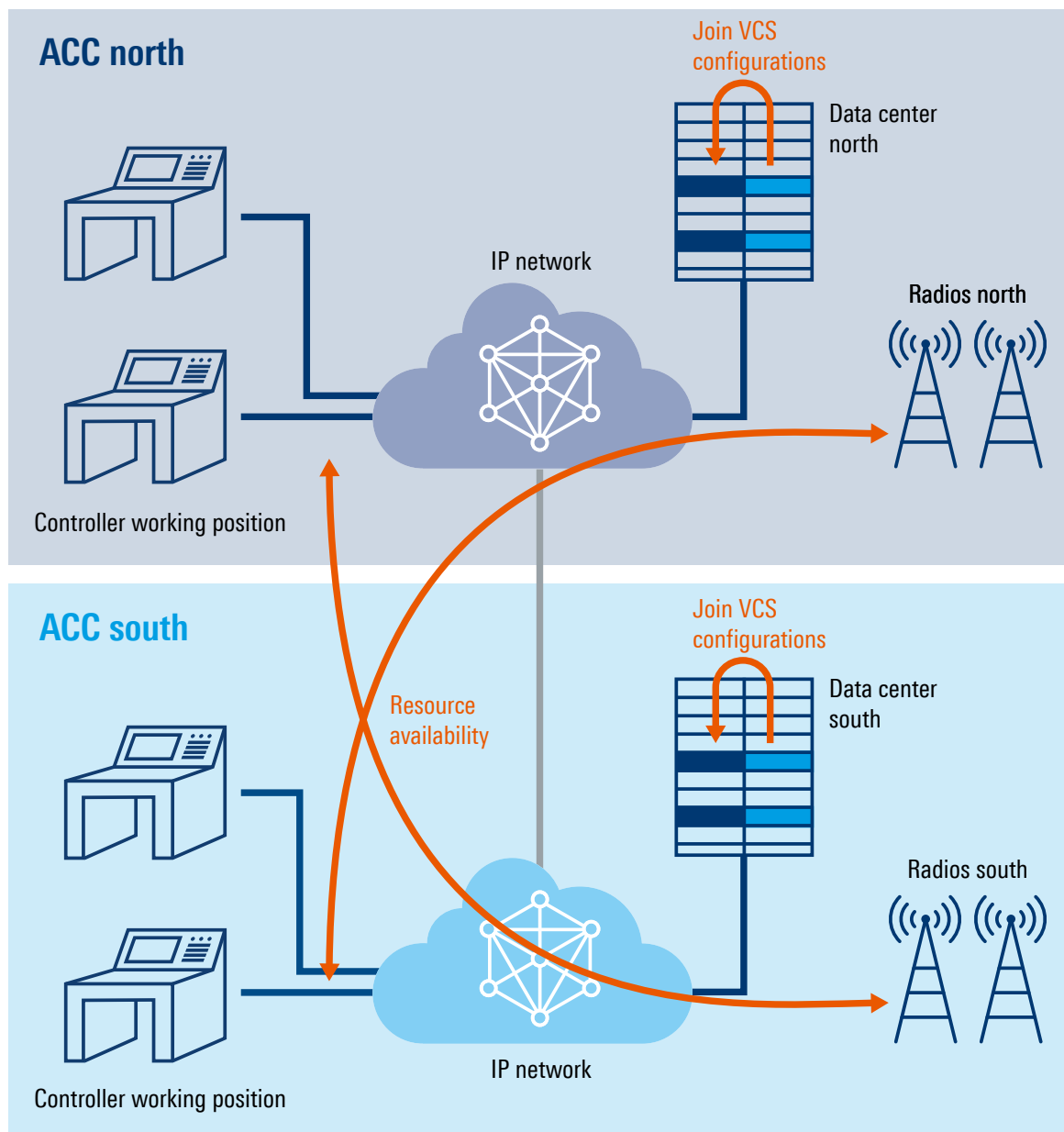
Uninterruptible system operation

Safe airspace operations require steady and uninterruptible communications between the pilot and controller even in case of exceptional events such as natural catastrophes. Unique mechanisms in the Rohde&Schwarz VCS provide outstanding availability even in case of multiple outages. This increases the safety and security of airspace operations.

Device redundancy

Rohde&Schwarz develops high-quality components to maximize the mean time between failures (MTBF). Each component also has multiple power supplies so it can be connected to separate electric circuits. This significantly reduces the risk of outage due to power issues.

Resource sharing in a virtual center



Control center redundancy

Problems within the center itself significantly affect airspace operations. In exceptional cases such as a center outage or mass absenteeism, the controllers would not be able to operate the airspace. Using Rohde&Schwarz virtual center technology, controllers from another center can immediately take over airspace control by simply having new roles allocated to them.

The virtual center solution from Rohde&Schwarz can be also used on a daily basis for workload optimization between centers. This is used e.g. in North Atlantic airspace, which is operated jointly by two centers.

System redundancy

All server components are deployed as redundant systems consisting of two nodes, where one node can take over if the other becomes unavailable. The handover between the nodes is completely seamless and users do not notice it. Communications, even active calls, are not interrupted. The nodes can be used in georedundant datacenters within the same region.

To achieve exceptional resilience against irregularities, Rohde&Schwarz implemented a unique quad redundancy option for the application servers. The primary redundant server cluster is backed up by a secondary redundant server cluster with almost no distance restrictions, which enables fail-safe geo-redundant server deployment. Both systems have the same configuration and are fully interchangeable. In case there is an issue with the components of one system, the other system takes over within a few seconds, so that the airspace remains fully operational.

Network redundancy

A network outage can cause significant issues. Rohde&Schwarz uses proven redundancy protocols and dual-homing server connectivity. In case of network issues, the VCS components immediately switch over to the backup network. Smart routing allows the controller to use multiple paths to connect to the radio site. Backups via satellite can also be used for complete ground network independence.

Radio site redundancy

CERTIUM VCS supports typical scenarios that use 1+1 radio redundancy at the radio sites. Even higher availability at lower cost can be achieved using m+n redundancy, where a set of m radios can be backed up by a set of n radios. This results in much higher availability of a single frequency compared to 1+1 redundancy. If the entire radio site becomes unavailable, another radio takes over immediately without interrupting airspace operations.

CERTIUM VCS provides many redundancy techniques for uninterruptable airspace operations.



INTUITIVE CONTROLLER USER INTERFACE

Easy operation for the air traffic controller.

Intuitive user interface

The clear, well-structured user interface simplifies the work of the air traffic controller. The screen on the (CWP) is divided into multiple functional areas, making operation intuitive.

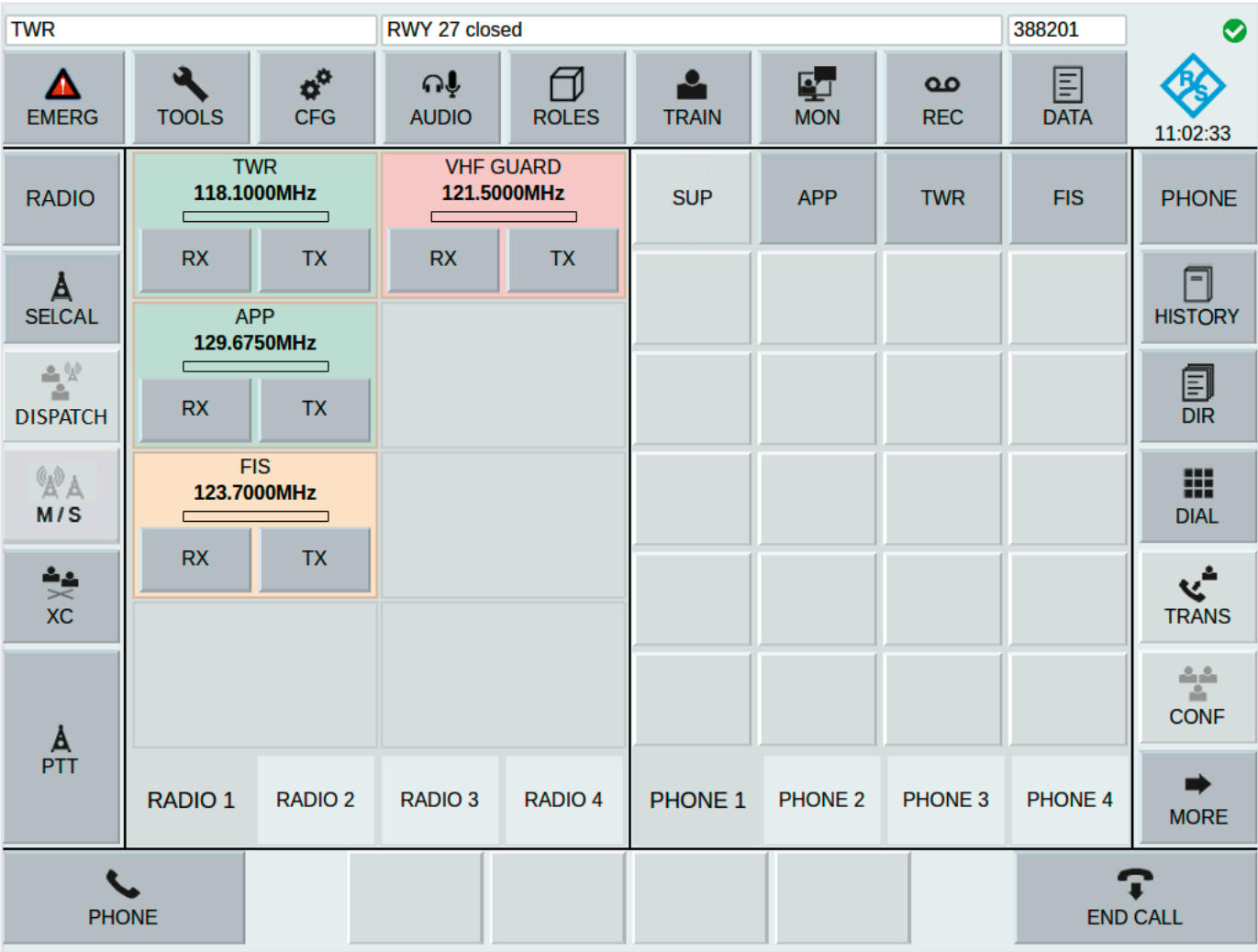
Multiple colors inform the controller about the status of the radio resources, number of controllers connected to the same resources, receive signal strength indicator (RSSI) information and best signal selection (BSS). Within the GUI, the controller can set up e.g. audio management, get more detailed information on the radio and reconfigure the frequency.

Easy customization

Air traffic controllers usually demand a customizable user interface to keep the system similar to the one they are used to operating. The flexibility of CERTIUM VCS allows users to easily adapt to it. The size of the buttons, color scheme, fonts, icons and layout are freely definable by the system administrator.

The easy customization of the GUI reduces the necessity for extensive GUI training for the air traffic controller.

Samples of customized user interfaces



TRUSTED PARTNER THROUGHOUT THE PROJECT LIFECYCLE

A key pillar of CERTIUM VCS

Rohde&Schwarz supports customers by offering its expertise and advice through all phases of the project lifecycles – from systems engineering to project implementation and aftersales service. Our technology experts draw on their vast experience from ATC projects around the world to provide advice on updates and on migration and enhancement of existing systems.

System engineering

Based on your input, our experts develop a tailored system design to optimally address your operational requirements.

Project implementation

Experienced project managers and integration experts ensure project completion on time and on budget.

Testing and training

Comprehensive acceptance testing and hands-on training for engineering and maintenance teams ensure a smooth system handover.

Service level agreement

With a service level agreement, you define the scope of service that best matches your business and technical requirements.

Service partner program

The service partner program offers various concepts, from the verification of device functionality to manufacturer-independent repairs.

Obsolescence management

Obsolescence management monitors the availability of all your system components as well as the presence of in-house software and service skills.

CERTIUM VCS COMPONENTS

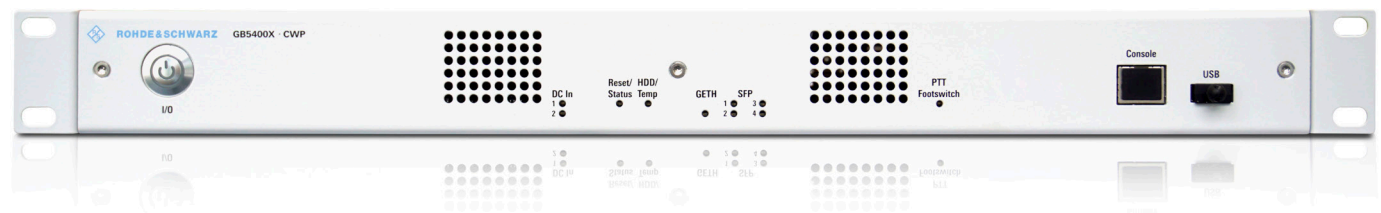
CERTIUM VCS consists of multiple components that work together seamlessly and act as one integrated system. CWP's are the interface to the controller. Application servers are available for different operational needs, e.g. for centralized system configuration and monitoring. All server components run on standardized COTS servers with long-term support. Other devices are specially designed for the unique requirements of the ATC market.

R&S®GB5400X standard CWP

The CWP acts as an interface to the air traffic controller. It is a standalone rack mountable device that handles all the processing of audio and video signals. For the graphical interface, it connects to a touchscreen that can be integrated into the console or installed on the controller's desk.

The audio signals are processed in up to six external audioboxes. Specially designed devices can manage up to two stereo channels each in extremely high quality. The audioboxes can be connected to headsets or loudspeakers.

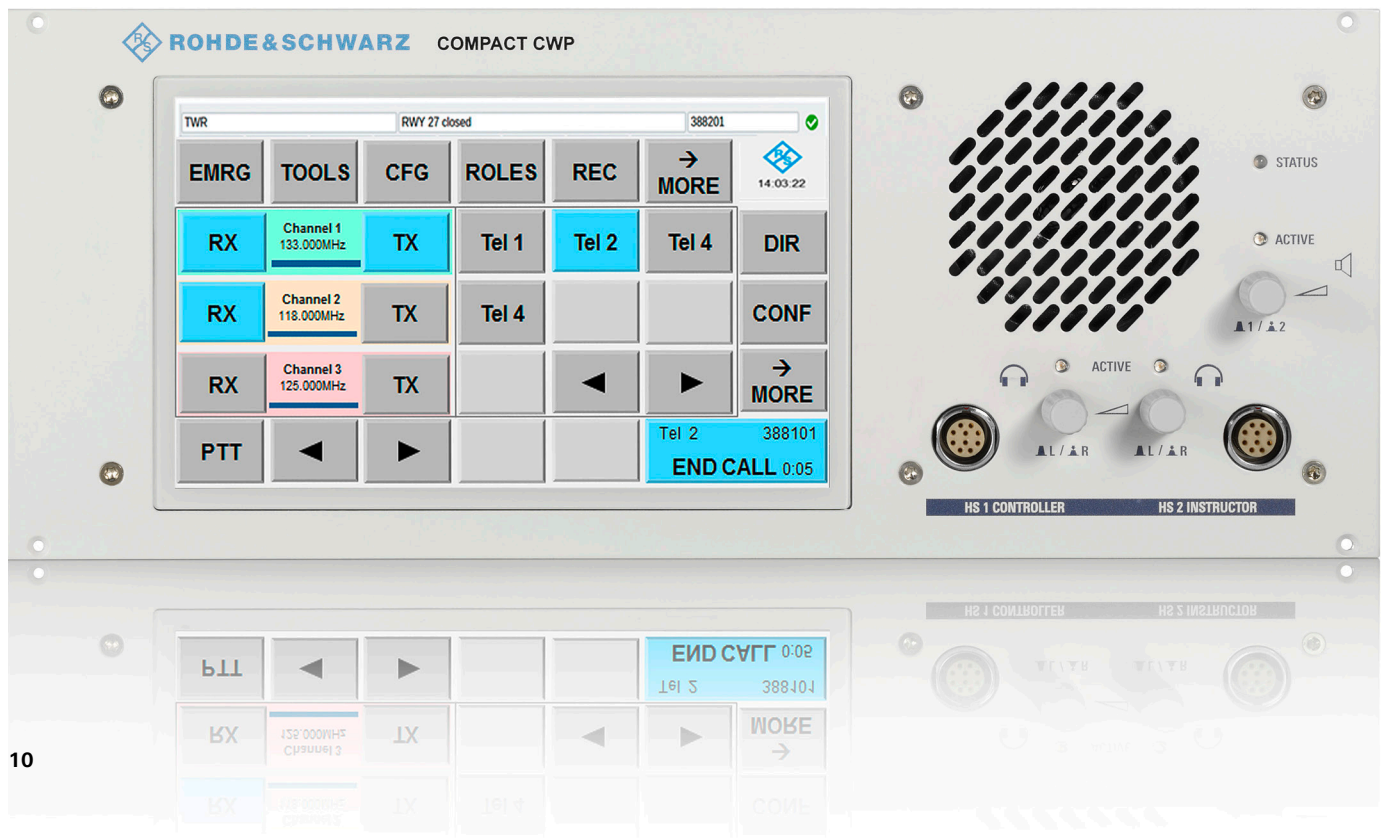
R&S®GB5400X CWP



R&S®GB5450 compact CWP (cCWP)

The cCWP is ideal for use in small-scale deployments and backup systems. It is an all-in-one device with integrated touchscreen, loudspeaker and two headset connectors. Due to the smaller screen, the graphical user interface was slightly adapted.

R&S®GB5450 compact CWP



R&S®DB5400 VCMS server

The centralized management server enables central configuration of all CERTIUM VCS and CERTIUM Gateways components. It also monitors the status of all devices and radios and provides this information to the controller and administrator.

R&S®DB5400 VCMS server



R&S®RS5400 radio server

The radio server acts as a conference bridge between CWP's and radios. It distributes traffic coming e.g. from one radio to multiple CWP's or from one CWP to multiple radios. It also includes advanced functions such as Climax best signal selection (BSS) and m+n redundancy.

R&S®VS5400 telephony server

The telephony server acts as an interface between the VCS and the other voice networks. Its session border controller functionality protects the VCS infrastructure and smartly distributes incoming and outgoing voice traffic. The telephony server also allows the registration of SIP phones and acts as a small PBX with conferencing features.

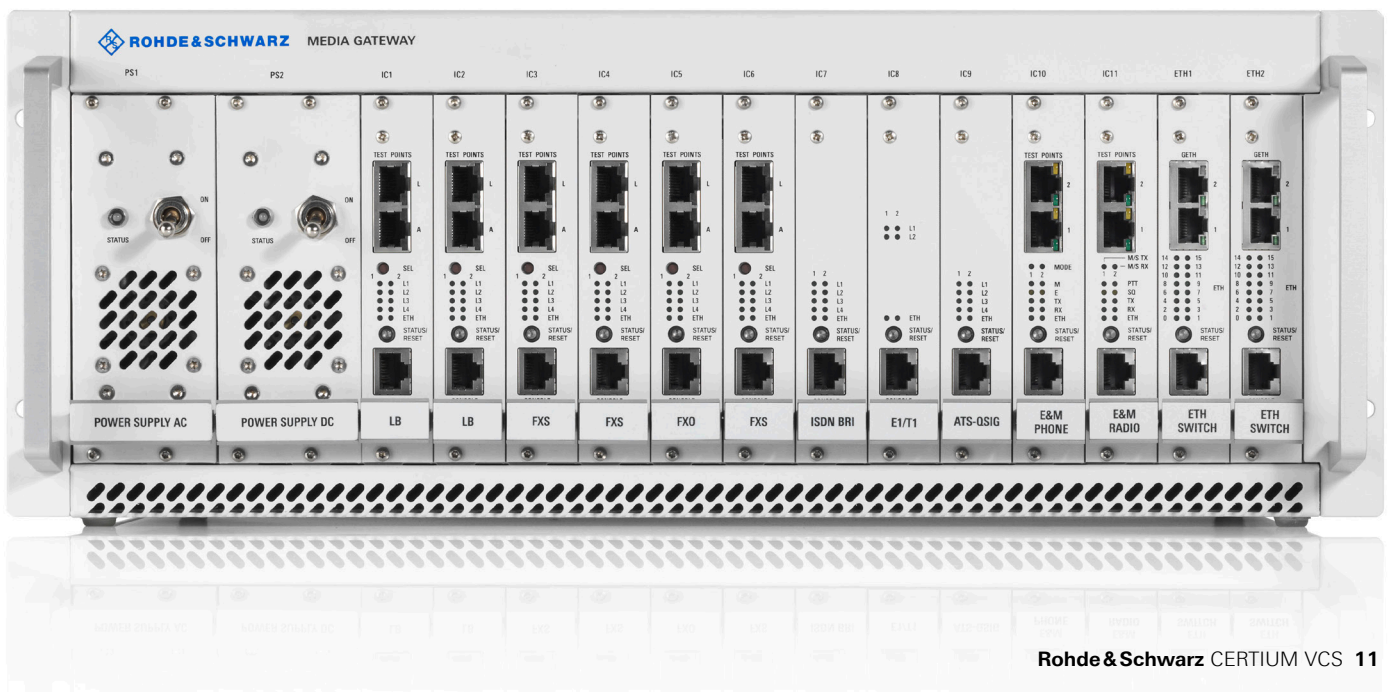
R&S®GW54xx gateways

CERTIUM Gateways allow easy integration of legacy systems into IP infrastructures. Rohde&Schwarz provides gateways to connect to other VCSs, radios and telephony systems. There is a huge variety of interfaces and gateways to meet the needs of every customer.

R&S®GW5490 universal media gateway



R&S®GW5440 universal media gateway



Service at Rohde & Schwarz
You're in great hands

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

Rohde & Schwarz

The Rohde & Schwarz technology group is among the trailblazers when it comes to paving the way for a safer and connected world with its leading solutions in test & measurement, technology systems and networks & cybersecurity. Founded more than 90 years ago, the group is a reliable partner for industry and government customers around the globe. The independent company is headquartered in Munich, Germany and has an extensive sales and service network with locations in more than 70 countries.

www.rohde-schwarz.com

Sustainable product design

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

Certified Quality Management

ISO 9001

Certified Environmental Management

ISO 14001

Rohde & Schwarz training

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