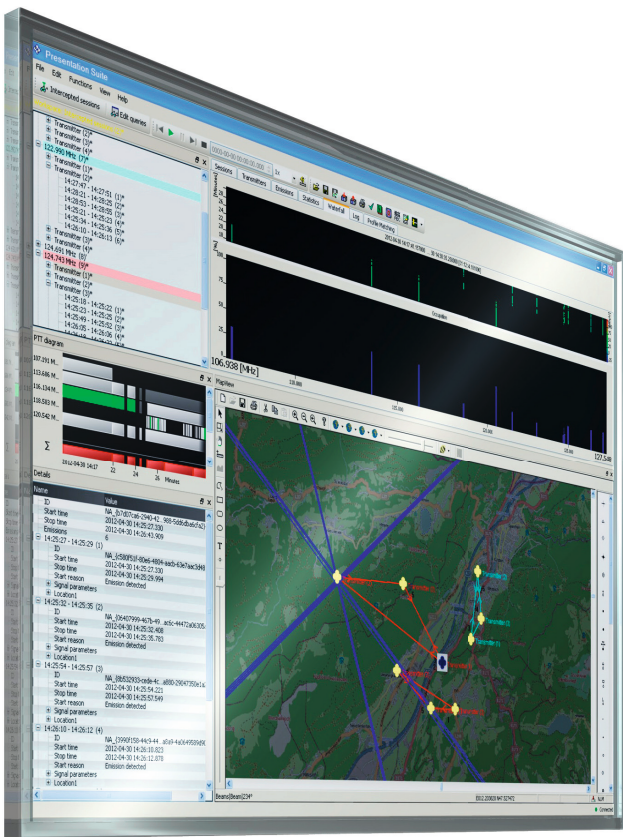


# R&S® Presentation Suite

## Automatic processing and display of intercepted radio emissions



# R&S® Presentation Suite

## At a glance

R&S® Presentation Suite was developed to efficiently handle the constantly growing amounts of data in modern radiomonitoring systems. Powerful algorithms enable the software to automatically identify communications links and networks from intercepted electromagnetic emissions, which significantly accelerates evaluation.

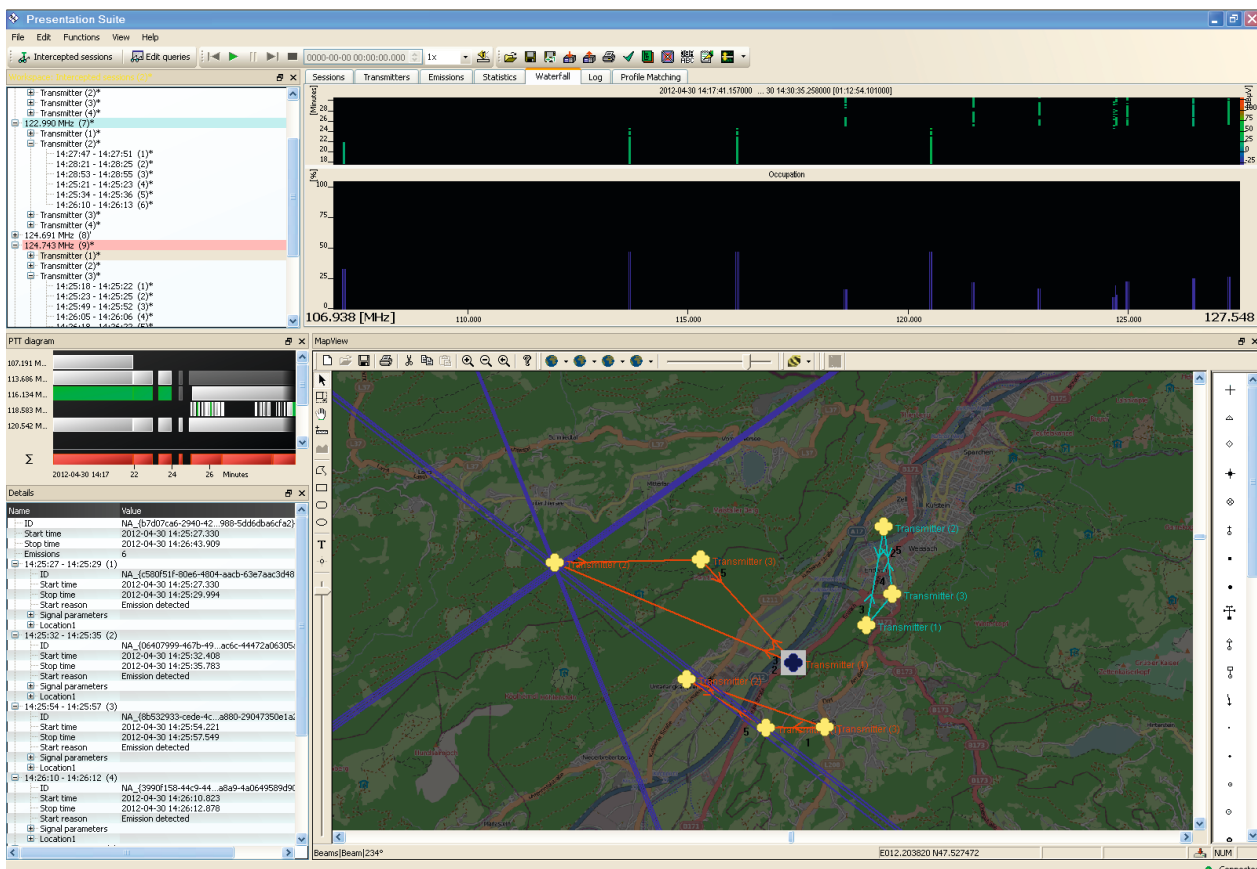
Detected communications links, their parameters and metadata are saved to the R&S®RAMON signal and reference database and are available for further processing. Using detailed database queries, the operator can load the automatically detected communications networks and their emissions. The information can then be displayed in various formats, edited, exported and saved.

R&S® Presentation Suite features a flexible graphical user interface that can be customized so that the operator sees all important information at a glance. This software is part of the tried-and-tested R&S®RAMON software family and adds powerful technical and operational evaluation functions.

### Key facts

- Automatic detection and graphical display of the communications relationships between transmitters detected by Rohde & Schwarz radiomonitoring systems
- Flexible multi-user system with configurable user rights
- Customizable for use in small systems up to nationwide radiomonitoring platforms
- Part of the R&S®RAMON software family (can be added to existing systems by a software update)

User interface of R&S® Presentation Suite showing monitoring results for the frequency range between 107 MHz and 130 MHz.



# R&S® Presentation Suite

## Benefits and key features

### **Automatic identification of communications links and networks**

- ▮ Transmitter and network identification based on technical parameters and analysis of transmit patterns
- ▮ Correlation of intercepted transmitters and comparison with profiles stored in R&S®RAMON
- ▮ Tracking of moving transmitters

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### **Clear presentation of monitoring results and statistics**

- ▮ Graphical display of intercepted transmitters on a digital map
- ▮ Direct access to transmitted contents (audio, text)
- ▮ Fast, straightforward processing of key information
  - Static waterfall display and overview of channel occupancy
  - PTT diagram for analyzing the transmit patterns of multiple transmitters versus time
  - Statistical overview of various emission parameters
  - Fast display and easy editing

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### **Flexible and efficient user interface**

- ▮ Multi-user system with configurable user rights
- ▮ Customizable user interface

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### **From comprehensive analysis to informative reports**

- ▮ Additional powerful presentation functions for the R&S®RAMON software family
- ▮ Easy upgrading of existing Rohde & Schwarz radiomonitoring systems

▷ [page 9](#)

### **Easy database access for third-party systems**

- ▮ Interface for query of raw intercept data
- ▮ Interface for query of pre-evaluated results

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### **Powerful solutions from a single source**

- ▮ Rohde & Schwarz offers complete radiomonitoring solutions
- ▮ R&S®Presentation Suite – scalable for use in small and large systems

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# Automatic identification of communications links and networks

## Transmitter and network identification based on technical parameters and analysis of transmit patterns

The transmit pattern as well as the transmitter frequency, modulation and location are key factors when allocating transmitters to specific communications networks. R&S®Presentation Suite analyzes the location, signal parameters and the start and stop times of each electromagnetic emission. It also combines correlated emissions into communications links and correlated transmitters into communications networks.

For a clearer overview, the operator can use the R&S®MapView software to display identified links and networks on a digital map. R&S®Presentation Suite also displays the transmitters and their emissions in a hierarchical tree structure.

The operator can edit the network allocations made by the software as well as the transmitter and radio network designations and save them to the database. Saved data can be loaded from the database, processed and exported as XML files.

### PTT pattern analysis



Top: The emissions from four transmitters (TX 1 to TX 4) operating at 144.5 MHz are displayed versus time. The sum signal shows that the individual emissions overlap in time. This suggests that the transmitters do not all belong to the same radio network.

Bottom: After deleting TX4, there is no more overlapping in the sum signal. This means that it is highly probable that TX 1, TX 2 and TX 3 belong to the same radio network.

## Correlation of intercepted transmitters and comparison with profiles stored in R&S®RAMON

Detected transmitters can be compared with profiles saved in the R&S®RAMON signal and reference database. If a transmitter matches a profile, the transmitter will be marked. The reference profile in question can be updated with the new data. If a new transmitter is detected, a new database entry can be created. As a result, the database will become more comprehensive over time.

For presentation and analysis, intercepted data can be queried from the database, displayed and filtered applying user-definable criteria. The system can handle multiple, simultaneous database queries. The online update function can be used to refresh the displayed data. This enables the operator, for example, to display only the transmitters that appear for the first time. Other filter criteria can be used to define the frequency range, period of time or geographical area. Filters can be saved and re-used, for example to display the radio activities in a specific geographical area in chronological order.

Prior to the start of monitoring activities, the database can be filled with known data such as basic data, data from license databases, frequency management or other sources. This data allows on-site users to identify electromagnetic emissions more quickly, enabling them to analyze and respond to a situation faster.

## Tracking of moving transmitters

Using powerful comparison algorithms, the software can determine if a currently intercepted transmitter has been intercepted in the past. The software compares the transmitter location data, adjusts it if required and updates the transmitter position on the digital map. This is a continuous process. The system keeps track of previous locations in a history file, making it possible to plot the movement of a transmitter on the map. The user can define how long the interception data should be saved.

The user can select specific combinations of transmitter data, such as the type and number of intercepted transmitters or the transmit pattern. This makes it possible, for example, to draw conclusions as to the technologies or types of radios being used.

Database query dialog box.

The screenshot shows the 'Edit queries' dialog box with the following settings:

- Type: Interceptions
- Button name: Unnamed query
- Time from: relative, -900 s
- Until: relative, 0 s
- Freq. from: 100,000 kHz
- To: 20000,000 kHz
- Modulation: Ignore
- More... button
- Session duration: min 0 s, max 100 s
- Shift: min 0 Hz, max 100 Hz
- Bandwidth: min 0,000 kHz, max 1000,000 kHz
- Baud rate: min 0 Bd, max 1000000 Bd
- Attachments: Ignore
- Area of interest: Only with attachment
- From: (empty)
- To: (empty)
- Buttons: Up, Down, Add, Remove, Reset, Save



# Clear presentation of monitoring results and statistics

## Graphical display of intercepted transmitters on a digital map

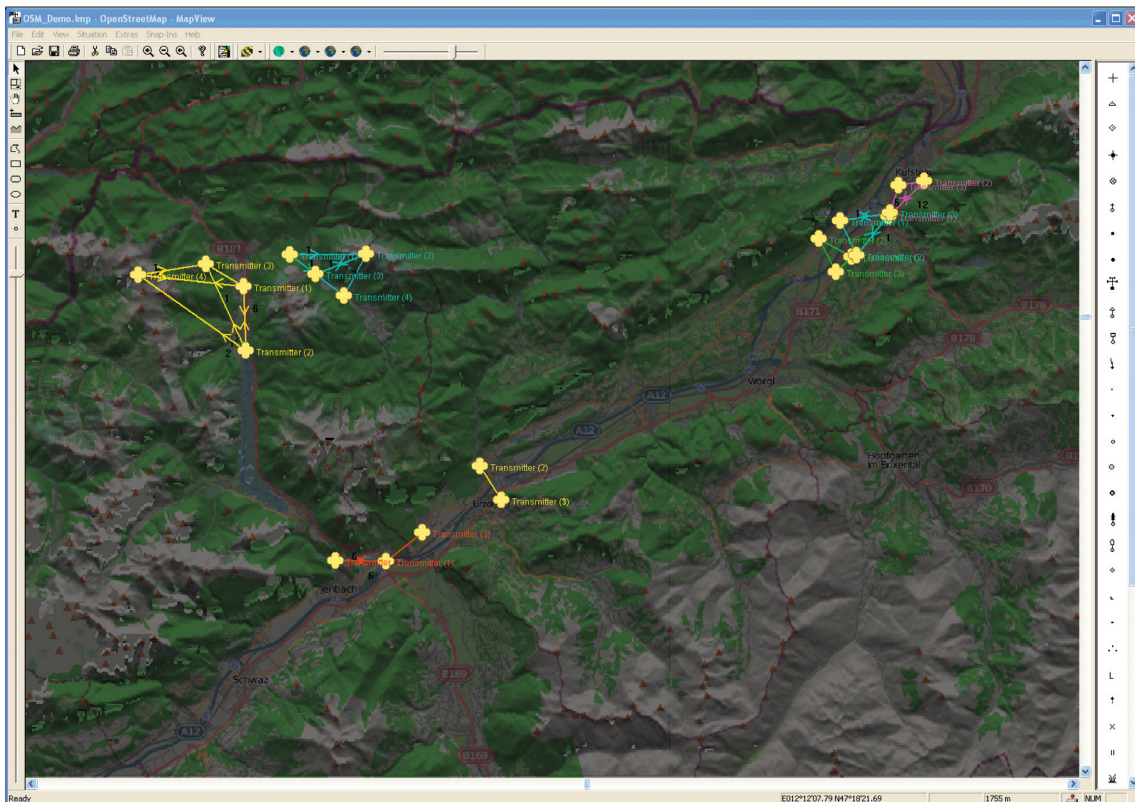
R&S®MapView is used to graphically display intercepted transmitters, identified communications links and radio networks on a digital map. Radio stations are displayed as symbols; identified communications links are shown as lines connecting the stations involved. Different types of radios (such as fixed frequency radios, frequency hopping radios) can be represented by different symbols. The number of intercepted sessions for each link is indicated by a number; the color of the symbols indicates the preliminary assignment of the transmitters. Clicking a symbol on the map displays detailed information about the corresponding transmitter. This information can be edited.

Transmitters can be assigned specific symbols for further evaluation. The user has access to a library offering a wide range of standard civil and military symbols. Transmitters can also be assigned to organizations, persons and platforms. Assignments can be changed if new information becomes available. All additional information is saved to the database.

## Direct access to transmitted contents (audio, text)

If audio recordings and decoded texts are available in the database for an intercepted network, these can be played back using the R&S®Presentation Suite playback toolbar. A symbol (loudspeaker or document image) indicates the signal content type. A click on the symbol displays or replays the content. For audio content, the R&S®Presentation Suite software directly accesses the R&S®AllAudio database and streams the associated audio file to the user's PC.

R&S®MapView showing radio stations and radiocommunications links.



## Fast, straightforward processing of key information

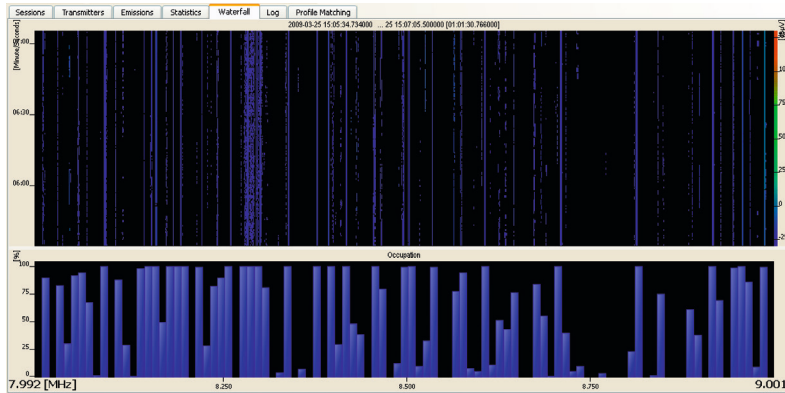
R&S®Presentation Suite offers various ways to visualize relevant information.

### Static waterfall display and overview of channel occupancy

The static waterfall display shows the communications activities detected within a selected frequency range as a function of time. This display mode can be used, for example, to identify radio networks in which the participants use separate frequencies for transmission and reception (FDD, frequency division duplex mode). The signal level is indicated by a color scale.

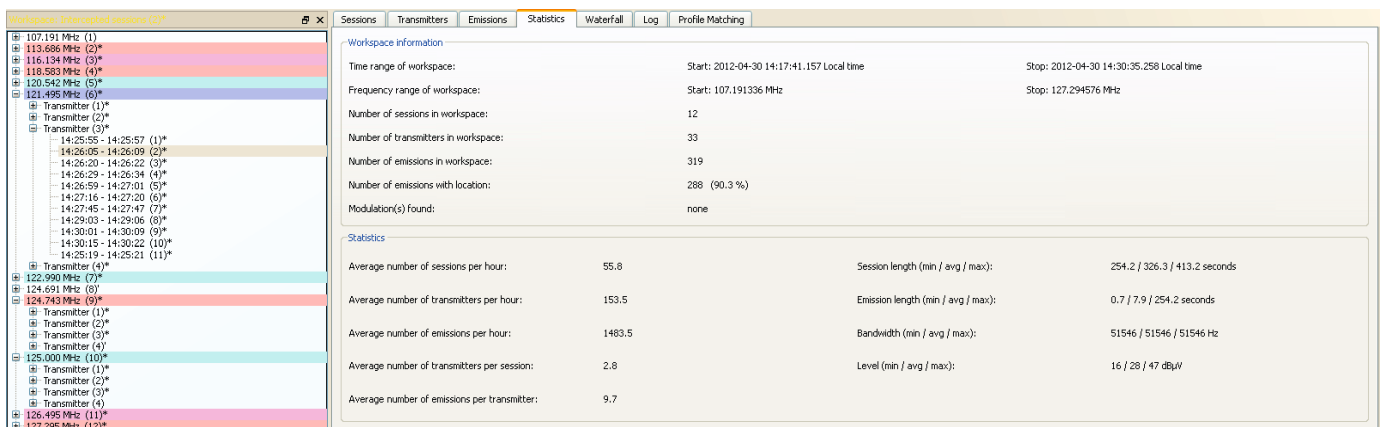
A window displaying the channel occupancy in the selected frequency range is also available. This window provides a quick, comprehensive overview of transmit activities in the selected frequency range, allowing users to detect when a channel is becoming overloaded and to identify new, possibly unauthorized transmitters.

The data is preclassified, meaning that emissions are displayed together with their most important parameters such as frequency and bandwidth. Detailed information about transmitters and emissions can be displayed in a separate window, which is automatically adjusted when another transmitter or emission is selected.



Waterfall and channel occupancy diagrams.

### Network tree and statistics.



## PTT diagram for analyzing the transmit patterns of multiple transmitters versus time

The PTT diagram for selected transmitters and radio networks is another powerful function of R&S®Presentation Suite. The PTT diagram provides a quick overview of intercepted communications sessions versus time. Different transmitters are represented by different colors. The PTT diagram is a powerful tool for further verifying and editing the communications relationships automatically detected by the software.

### Statistical overview of various emission parameters

In addition to windows that provide overviews of transmitters and emissions, R&S®Presentation Suite features a statistical overview of selected data, such as the average number of intercepted emissions per hour or information about frequency occupancy and activities in the selected frequency range and time period. Based on this data, users can draw conclusions as to average radio network activity in specific areas or frequency ranges.

### Fast display and easy editing

Radio networks and assigned transmitters are displayed in a hierarchal tree for fast visualization. Single or multiple entries can be shifted, deleted or copied using the drag and drop function. Edited entries can be saved to the database.

# Flexible and efficient user interface

## Multi-user system with configurable user rights

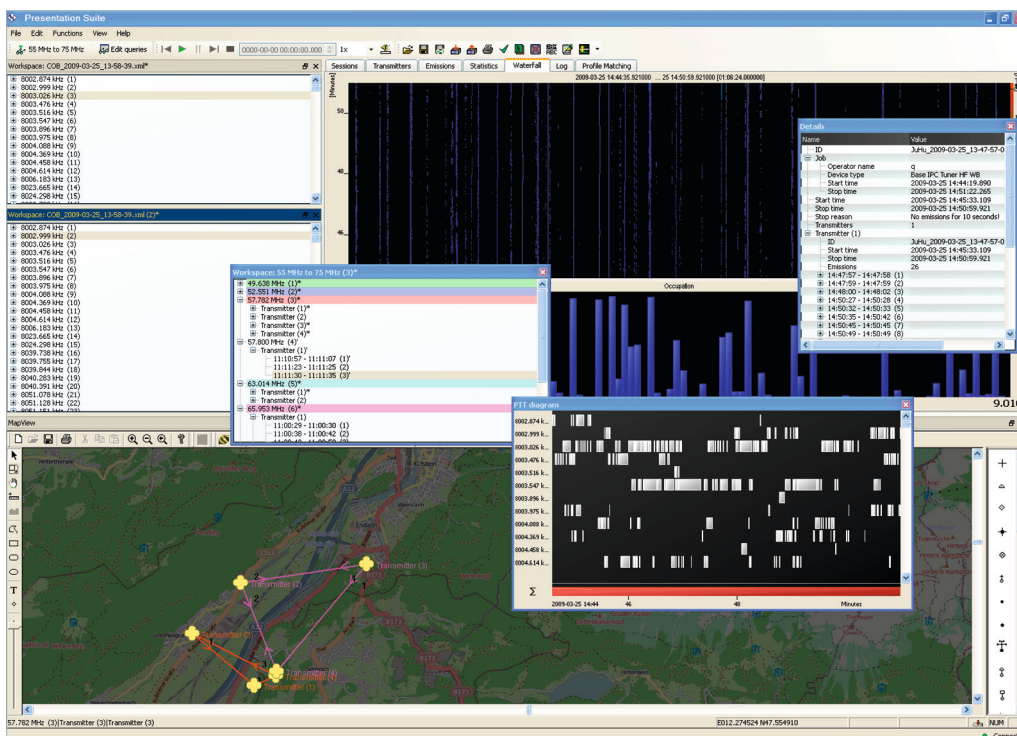
Evaluating information delivered by state-of-the-art radio-monitoring systems is personnel-intensive. Multiple operators are normally involved in evaluating the data in the various phases. R&S®Presentation Suite has the right tools and functions for each phase of the evaluation – for intercept operators and the persons responsible for pre-evaluation, content evaluation and basic evaluation.

The system administrator can assign user-specific access and editing rights for each workstation. This ensures that no data is lost or unintentionally modified.

## Customizable user interface

R&S®Presentation Suite features a flexible graphical user interface. Subwindows can be arranged on the screen as required and the arrangement saved for each user. The database information is displayed in multiple, clearly arranged subwindows that can be moved and scaled as needed. The subwindows are linked to one another so that when selecting an emission in the PTT diagram, for example, the same emission will also appear in the other windows (for example in the waterfall diagram). Windows that are not currently needed can be hidden. Tabs can be used to provide a clear layout even when numerous windows are open. R&S®Presentation Suite optimally supports the extended desktop mode, i.e. the display of information on multiple monitors.

Flexible user interface layout.





# From comprehensive analysis to informative reports

# Easy database access for third- party systems

## **Additional powerful presentation functions for the R&S®RAMON software family**

R&S®Presentation Suite is integrated as a module in the tried-and-tested R&S®RAMON software family and adds powerful technical and operational evaluation functions to the Rohde&Schwarz radiomonitoring systems.

R&S®Presentation Suite identifies automatically intercepted transmitters and communications sessions and displays them in graphical and text form. The software automatically detects communications relationships between transmitters and assigns correlated transmitters to radio networks. The operator can verify and correct each step in this process.

## **Easy upgrading of existing Rohde & Schwarz radiomonitoring systems**

R&S®Presentation Suite was developed and designed for seamless integration into existing R&S®RAMON systems. A system-specific software update is used for upgrading.

Raw intercept data and pre-evaluated intercept results are stored in the R&S®RAMON signal and reference database in two layers and can be exported using a TCP-based interface.

Of capital importance for the user is the information about the recognized transmitters and radio networks. This data forms part of both layers and is the basis for any further evaluation and decision-making process.

The layer with raw intercept data contains all signal parameters and metadata that were automatically written into the R&S®RAMON database during the interception of radio signals. It may also include references to production result files (demodulated audio, decoded bitstream, decoded text, I/Q samples, etc.), depending on the available resources of the monitoring system.

The layer with pre-evaluated data contains the results of the analysis by an operator, who may have created an initial radio situation picture for example. The results may still include some or all of the raw intercept data from the first layer.

Queries via the TCP interface by a third-party software can be used to export data from both layers of the R&S®RAMON signal and reference database.

# Powerful solutions from a single source

## Rohde & Schwarz offers complete radiomonitoring solutions

Modern radiomonitoring systems are extremely powerful yet very complex. This complexity requires system components that are particularly well matched. Rohde & Schwarz supplies complete radiomonitoring systems, from sensor technology (receivers, direction finders, analysis equipment) to evaluation.

R&S®Presentation Suite is part of the Rohde & Schwarz radiomonitoring systems and adds vital functions to these systems. All elements of a system are optimally matched to ensure a high level of efficiency.

## R&S®Presentation Suite – scalable for use in small and large systems

R&S®Presentation Suite can be used in various radiomonitoring systems. The functionality can be selected to match the size and complexity of the system. R&S®Presentation Suite offers a solution for every system – from small, mobile, laptop-based platforms (e.g. R&S®TMSR lightweight interception and direction finding system) to large, stationary radiomonitoring systems.



Stationary radiomonitoring system:  
R&S®Presentation Suite significantly speeds up analysis and evaluation of the enormous data volumes generated by large radiomonitoring systems.

# Ordering information

Designation	Type	Order No.
<b>R&amp;S®Presentation Suite</b>		
Software for automatically generating session and activity data from R&S®AMMOS single-channel IPCs and receivers in fixed frequency mode; storage of the data in the R&S®RAMON signal and reference database	R&S®RA-AGSC	3020.9054.02
Software for automatically generating session and activity data from R&S®AMMOS IPC conventional detection or R&S®GX435 DSC; storage of the data in the R&S®RAMON signal and reference database	R&S®RA-AGMC	3020.9060.02
Software for automatically generating session and activity data from the RF spectrum of Rohde & Schwarz receivers and direction finders; storage of the data in the R&S®RAMON signal and reference database	R&S®RA-AGED	3020.9125.02
Graphical User Interface for editing, storing and exporting situation pictures from session data in the R&S®RAMON signal and reference database	R&S®RA-PS-COM	3028.0627.02
Graphical User Interface for loading, editing, storing and exporting metadata and basic data from the R&S®RAMON signal and reference database	R&S®RA-PS-REF	3028.0633.02
Support of manual transcription of recorded voice, manual translation of recorded voice and text, combination of intercepted information based on integrated time information, highlighting of call signals and text elements, automatic replacement of text elements, management of contents of decoded texts and voice recordings; all functions integrated into system order/report workflow	R&S®RA-PS-TR	3028.0640.02
Interface for export of intercepted and stored session data to the R&S®RAMON signal and reference database	R&S®RA-DBCOM-X	3025.3160.02

Note: The software modules are not sold as single products. Additional products/licenses are required depending on the system and configuration. Rohde & Schwarz sales representatives can answer your questions regarding configuration and licensing.

Your local Rohde & Schwarz expert will help you determine the optimum solution for your requirements. To find your nearest Rohde & Schwarz representative, visit [www.sales.rohde-schwarz.com](http://www.sales.rohde-schwarz.com)

## Service that adds value

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

## Rohde & Schwarz

The Rohde & Schwarz electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, monitoring and network testing. Founded more than 80 years ago, the independent company which is headquartered in Munich, Germany, has an extensive sales and service network with locations in more than 70 countries.

## 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 GmbH & Co. KG

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PD 3606.7130.12 | Version 02.00 | March 2018 (fi)

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3606713012