R&S®RAMON IQzoom

Enabling military intelligence services to detect and analyze HF signals transmitted in the past

At a glance

- **Customer**: COMINT professionals – from interception to analysis specialists
- **Task**: Strategic and tactical intelligence collection over time
- **Scope**: In the intelligence field, strategic COMINT interception has the advantage of being an almost permanent and standoff monitoring capability. COMINT operators need to quickly allocate collection assets to the right parts of the spectrum and ensure a timely and relevant orientation or reorientation of the sensors that produce large amounts of data. Analysts need the right tools to turn this data into finished intelligence (FININTEL).
- **Solution/product**: Postprocessing with the R&S®RAMON IQzoom software from Rohde&Schwarz lets COMINT operators "go back in time" to examine what they might have missed between the early phase of collection and the completion of intelligence production. This ensures that even the smallest details will not be missed and the correlation between past events provides more insights.

Case Study | Version 01.00

ROHDE&SCHWARZ

Make ideas real

Current situation

Today's electromagnetic spectrum is a coveted and limited resource: it is a universal medium shared across land, maritime, air and space environments. Due to its characteristics and qualities, the spectrum allows information to be exchanged with utmost flexibility over a very wide range of distances between fixed and ultra-mobile users. It is the backbone of modern civilization and armed forces.

Military radio engineers expend considerable effort to ensure the signals transmitted by their systems are as quiet and discrete as possible to make them hard to detect. Civilian radiocommunications are also sometimes used by opponents in hybrid conflicts.

Modern digital communications used in today's conflicts are increasingly covert and rarely provide easy access to their content, making interception considerably more difficult.

In a world where information superiority has become a major stake, the role of strategic COMINT interception centers is critical for national intelligence agencies responsible for anticipating and monitoring threats.

Requirements

Strategic intelligence collection typically focuses on anticipating hostile intentions and reducing uncertainty.

Due to the specific propagation modes of HF waves, knowing where, when and what to search for within the electromagnetic spectrum has become a real challenge – particularly for strategic interception centers that are responsible for collecting signals from around the world. This is also true for interception centers that are close to theaters of operation.

To optimize the collection stage of the intelligence cycle, interception planners and their analysts strive to orientate their national sensors by

- Providing defined bands of the electromagnetic spectrum and geographical areas of interest
- Defining activity forecasts
- Describing profiles and patterns of threat activities

This intelligence will usually have been collected over long periods of time.

However, relying solely on real-time monitoring to gather intelligence and build up a sharp situational picture could result in a strategic interception center missing the analysis of a key event that happened somewhere and at some time within the electromagnetic spectrum.

R&S®RAMON IQzoom: a game changer

Persistence over the electromagnetic spectrum

R&S®RAMON IQzoom is a game changer thanks to the unique persistence it provides in the COMINT collection stage: signals of interest (SOI) from the past few days can be searched for in the HF band. This enables new ways to exploit the electromagnetic spectrum, i.e. organizing the collection, analysis and production stages.

Retrieve missed events from the real-time RF activity

With R&S®RAMON IQzoom, nothing goes unnoticed. Postprocessing lets COMINT operators "go back in time" and search again, with hindsight and a sharper focus, for further SOIs that are linked to a predefined objective or an unforeseen event. It provides a COMINT safety net for modern interception centers.

Consolidate the COMINT analysis with valuable insights

With R&S®RAMON IQzoom, the COMINT production enriches the macro view of the spectrum with detailed understanding of RF activity. COMINT operators can zoom into a SOI or zoom out for a complete overview of the RF activities. This might highlight patterns, correlations and RF activities in the adversary's communications plans that would not be revealed otherwise.

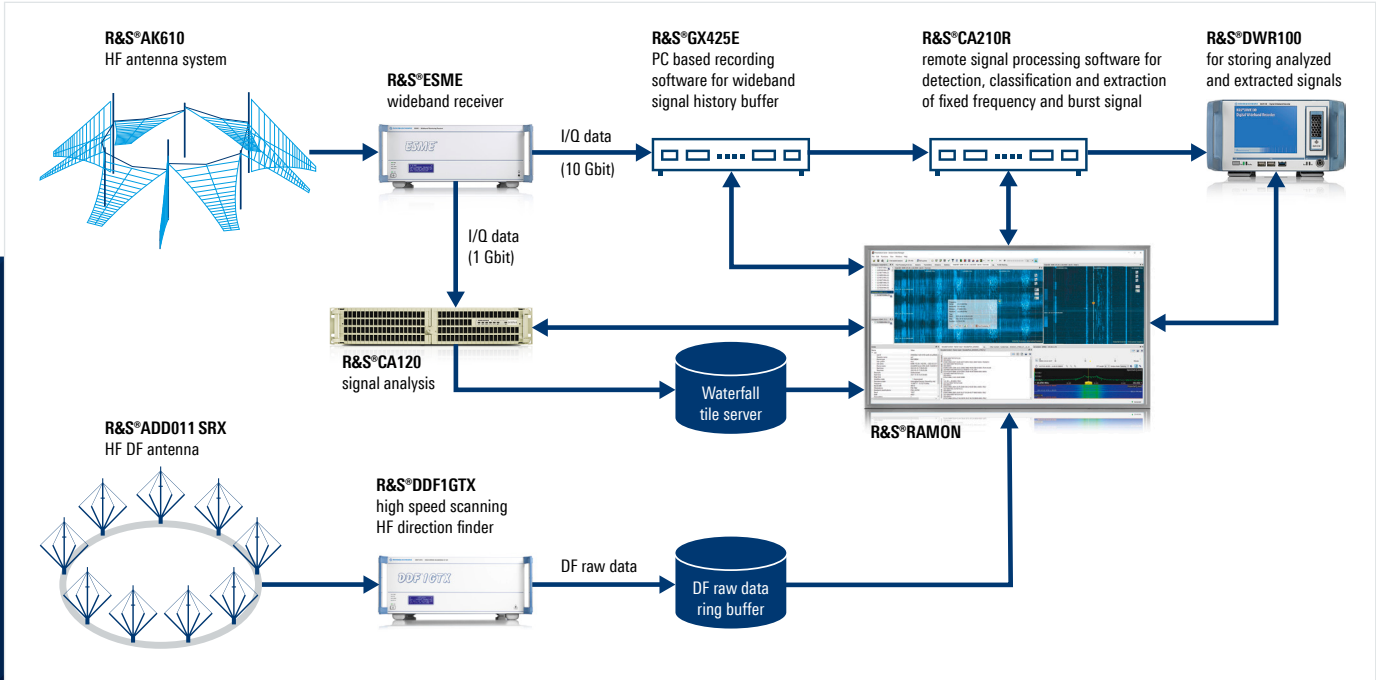
High speed post-event intercept and analysis solution

R&S®RAMON IQzoom is not just a single piece of equipment, but a set of hardware and software tools to enable post-event radiocommunications interception. Signal detection, classification and production are faster than real-time and can be processed ten times quicker than during live operation. R&S®RAMON IQzoom does not solely rely on detection results from online operation, but also uses detectors and classifiers for offline interception of radiocommunications.

Ensure COMINT production despite challenges

R&S®RAMON IQzoom postprocessing software is a safety net for all modern COMINT interception centers. It may help compensate for an initial misorientation of the sensors, inaccurate RF activity forecasts, unforeseen events, overstretched human resources, inexperienced interception operators/analysts and intricate communications plans of adversaries.

Exemplary R&S®RAMON IQzoom architecture



Results

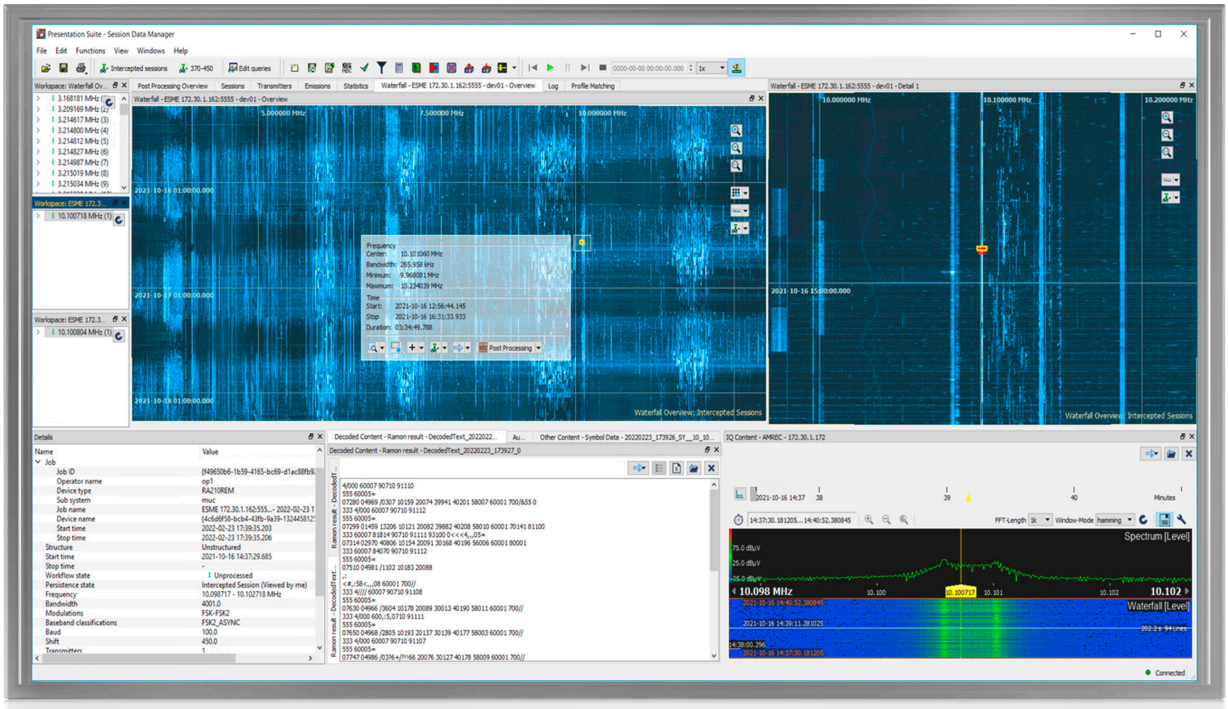
The software can be used at all stages of the military intelligence collection cycle, for both large strategic intelligence collection centers and battlefield operations. The system's ability to analyze several days' worth of signal recordings provided sufficient time for strategic intelligence collection and analysis. Why might users need to perform postprocessing analysis at the strategic level? A sudden, unanticipated event may have occurred such as one country invading another. Analysts will need to collate information collected by strategic COMINT systems at the time when this occurred. Perhaps the focus of the strategic intelligence organization at that time was elsewhere. Maybe no attention was being paid to the invading country as this was an unanticipated event. R&S®RAMON IQzoom allows the user to go back to the past and examine RF signals present at the time of this event. By recording spectrum, R&S®RAMON IQzoom helps operators identify anomalies, which are vital to intelligence work because they indicate when something is exceptional or extraordinary.

R&S®RAMON IQzoom is available for postprocessing in the shortwave frequency band (HF) across frequencies up to 30 MHz with 10 MHz real-time bandwidth and stores several days' worth of recordings in a ring buffer.

R&S®RAMON IQzoom

- Postprocessing in the high frequency band (HF) up to 30 MHz with 10 MHz real-time bandwidth
- Signal recordings for several days
- Continuous recording of wideband I/Q, high-resolution FFT data and DF raw data
- Computation and storage of a high-resolution waterfall display

Graphical user interface of R&S®RAMON IQzoom: the high-resolution waterfall diagram (left) provides an overview of the complete I/Q ring buffer with additional zoom windows (right) for visual inspection of radio signals. The three windows below show detailed information about the currently selected part of a radio transmission with its classified parameters, decoded content and a spectrum display.



High speed post-event signal analysis system

IQzoom ◄◄ REWIND THE SPECTRUM TO GO FORWARD FAST

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You're in great hands

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

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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 85 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.

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- Energy efficiency and low emissions
- Longevity and optimized total cost of ownership

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PD 3684.0947.32 | Version 01.00 | July 2023 (jr)
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