R&S®GX410
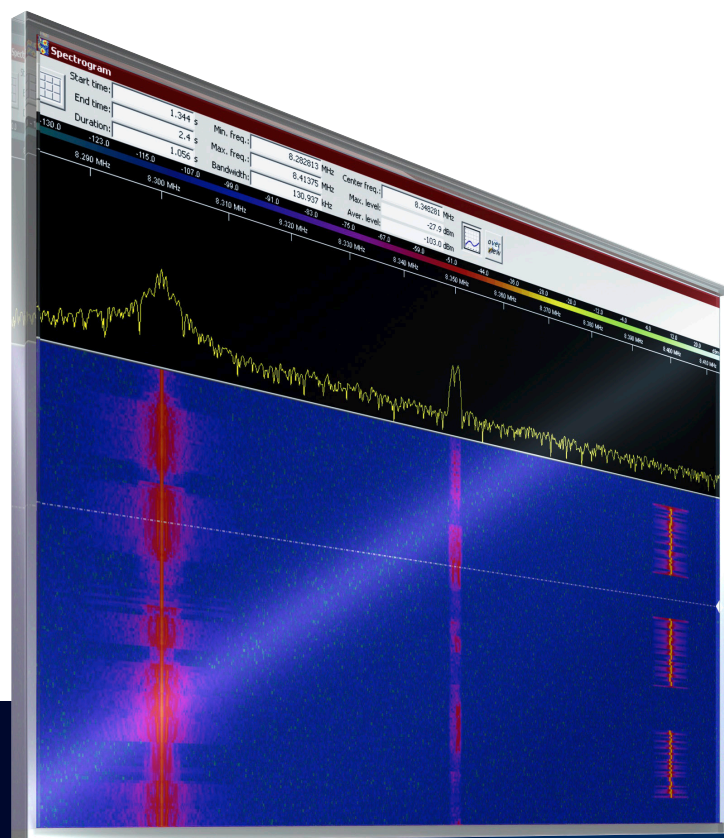# R&S®AMLAB SIGNAL ANALYSIS SOFTWARE

Analysis of unknown or complex signal scenarios

Product Brochure
Version 05.00

ROHDE & SCHWARZ

Make ideas real

AT A GLANCE

The R&S®GX410 is a system for the technical analysis of unknown or complex signal scenarios. It provides solutions for conventional fixed-frequency emissions as well as for the investigation of burst transmissions and frequency hopping (FH) radios.

Key facts

▶ Digital IF (complex baseband) signal snapshot processing in connection with the R&S®GX400 sensor group, delivering a bandwidth of up to 20 MHz (HF and VHF/UHF) and unlimited bandwidth from other sources (e.g. R&S®AMREC or WAV format)

▶ Signal extraction from the wideband signal record using digital downconversion (DDC)

▶ Time and frequency domain signal analysis for determining technical parameters

▶ Automatic recognition of modulation parameters including bitstream classification

▶ Comprehensive library of demodulators and decoders

▶ Online recombination of frequency agile short-time emissions

R&S®GX410 with recommended setup (two screens)

BENEFITS AND KEY FEATURES

Graphical user interface for controlling all analysis functions
▶ Spectrogram showing an overview of the complete signal sample
▶ Time domain analysis for selected emissions
▶ Case-sensitive controls for the R&S®GX410 processing steps (signal acquisition, detectors, demodulators, decoders, etc.)
▶ Navigation center showing all signal samples and calculated analysis results
▶ page 4

Large variety of sources for signal acquisition
▶ Processing of recorded digital signal data
▶ Signals provided by sensors
▶ Calculation of signal-adapted spectrograms
▶ Selection of emissions of interest
▶ page 5

Automatic signal detection for fast and reliable results
▶ Wideband signal sample investigation
▶ Detected emissions listed in a table and highlighted in the spectrogram
▶ page 6

Assisting the user through automatic classification, demodulation and decoding
▶ Powerful R&S®AMMOS classification unit
▶ Segmentation and modulation analysis
▶ Comprehensive library of demodulators and decoders
▶ page 7

Detailed manual modulation analysis
▶ In-depth modulation analysis with measurement cursors in zoomable spectrogram
▶ Using automatic and manual measurement together
▶ page 8

Analysis of short-time signals
▶ Automatic detection algorithm
▶ Identifying different kinds of emitters in a complex scenario
▶ Evaluation of detected emissions for short-time signals
▶ page 10

Online recombination of frequency agile short-time emissions
▶ Realtime technical analysis using R&S®GX413OR
▶ Combined input from several receivers
▶ Detection and extraction of frequency agile short-time emissions
▶ Separation and classification of frequency agile short-time emissions
▶ Profile recognition
▶ Recombination of frequency agile short-time emissions
▶ Signal demodulation/decoding using the R&S®GX410 demodulator library
▶ page 12

Bitstream analysis (using R&S®CA250)
▶ Display of bitstream in different representations
▶ Large set of bitstream analysis functions
▶ Powerful tool for code identification
▶ page 17

System integration
▶ Use as standalone system
▶ Use with R&S®AMMOS automatic production system
▶ page 18

GRAPHICAL USER INTERFACE FOR CONTROLLING ALL ANALYSIS FUNCTIONS

The R&S®GX410 graphical user interface makes it possible to control all analysis functions. Gathered signal samples and all processing results of the offline analysis are organized in a project (file tree) structure that is used for navigation and for starting the following processing steps. All relevant data is stored in an SQL database.
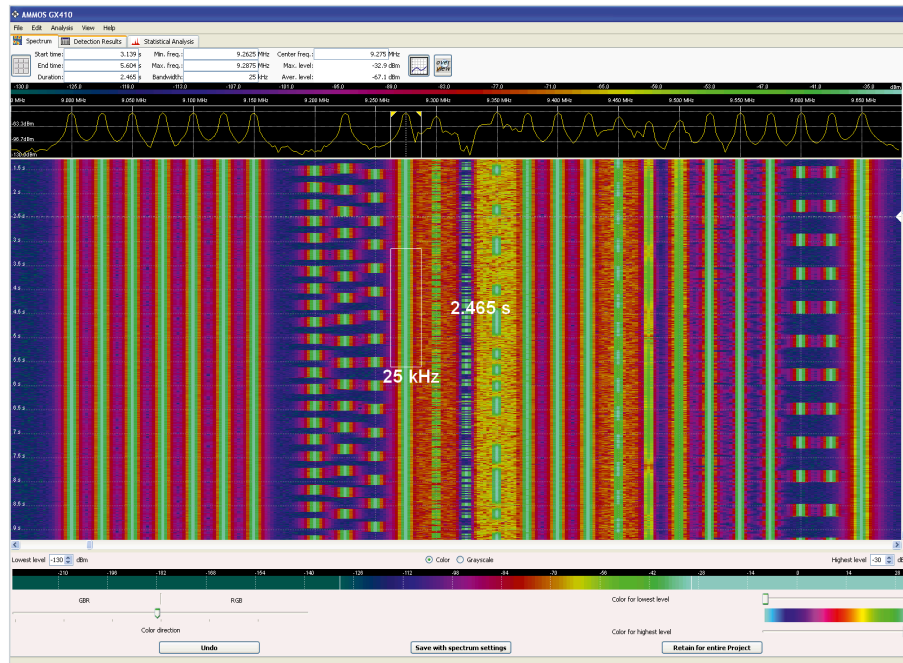
Main overview showing Spectrum tab, Detection Results tab and Statistical Analysis tab. The spectrogram shows an overview of the complete signal sample.
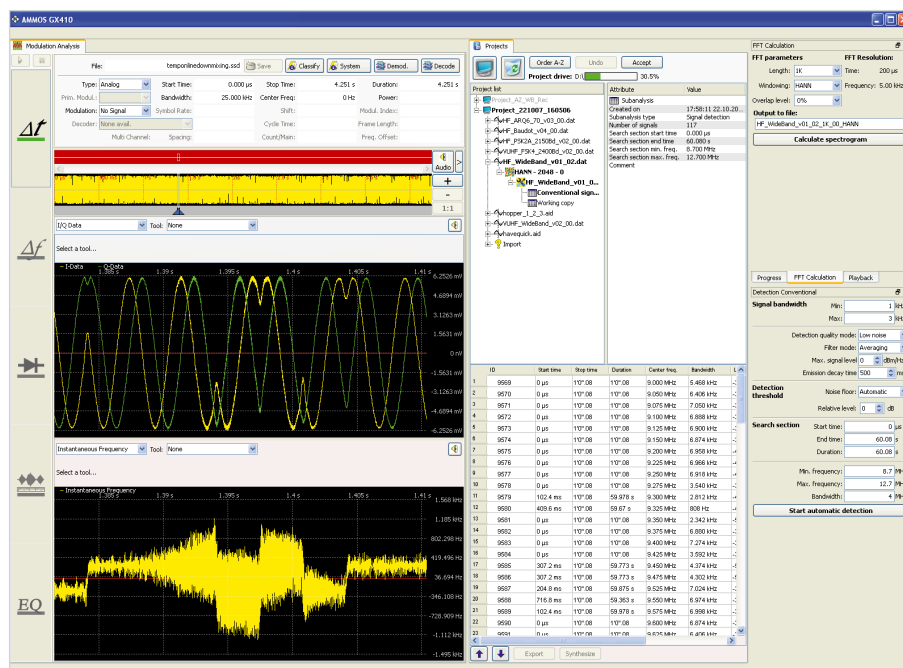
Main overview showing Modulation Analysis tab, Projects tab and case-sensitive controls.
Modulation Analysis tab: shows the time domain analysis for selected emissions.
Projects tab: contains the navigation center with all signal samples and calculated analysis results. Case-sensitive controls for the R&S®GX410 processing steps (signal acquisition, detectors, etc.).

LARGE VARIETY OF SOURCES FOR SIGNAL ACQUISITION

## Processing of recorded digital signal data

The R&S®GX410 processes recorded digital signal data:
► Digital IF data in R&S®AMMOS IF format provided by various Rohde & Schwarz receivers and direction finders; this data may be imported from a file server, for example, or from the R&S®GX425 recording/replay unit (AMREC)
► Digital IF data from non Rohde & Schwarz receivers (after conversion to the R&S®AMMOS IF format; the structure of the R&S®AMMOS IF format is public); this data may be imported from a file server, for example
► WAV files imported from a file server, for example
► Signals provided by sensors
► Online HF and VHF/UHF wideband signals are received by the R&S®GX400 sensor group. The frequency range is presented using a realtime waterfall with a resolution (FFT) of 2048 points and a waterfall speed of up to 200 lines/s.

► Signal attributes can be measured using time and frequency axis cursors. In the case of online control of a wideband receiver, an online waterfall provides a panorama overview of the signal scenario. By activating the recording, a wideband signal sample is stored for offline analysis as a continuous recording on the R&S®GX425 recording/replay unit (AMREC).
► Calculation of signal-adapted spectrograms
► Using the signal sample, a spectrogram is calculated. The operator can calculate several spectrograms (with different FFT lengths, for example, window types and overlap factors may be used according to special emission types). The spectrogram is presented in a zoomable and scrollable window. Additionally, a spectrum can be activated.
► Selection of emissions of interest
► The operator selects emissions of interest and investigates them with an automatic classification algorithm or by manual measurement.

Zooming to emissions of interest
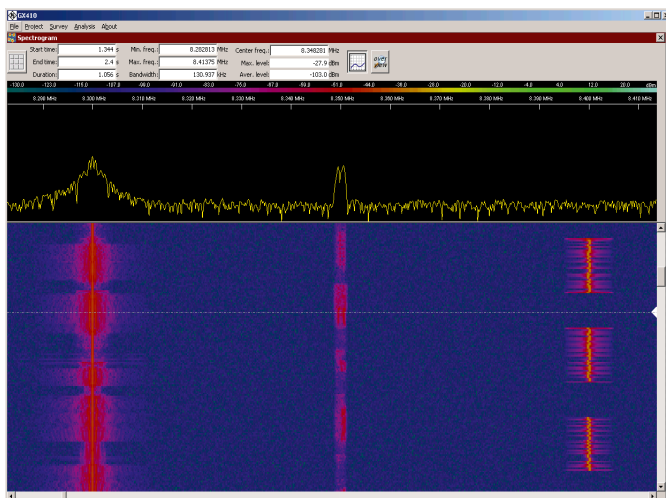


Calculation of several spectrograms
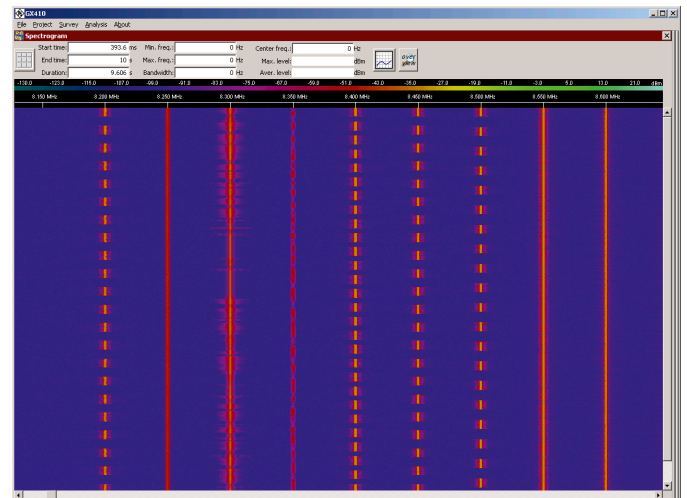
AUTOMATIC SIGNAL DETECTION FOR FAST AND RELIABLE RESULTS

Wideband signal sample investigation

To speed up the investigation of a wideband signal sample that may contain a large number of different emissions, an automatic detection function is provided. The algorithm operates on a selected sample portion and delivers the time/frequency segments of all emissions matching the search criteria (such as frequency range of interest, emission power and bandwidth). The emission list is stored in the database and serves as a starting point for the modulation analysis.

Detected emissions listed in a table and highlighted in the spectrogram

The operator can refine the detection process and edit the emission list in order to obtain a data set containing all emissions of interest. This function may also enable a user to reproduce online detection results delivered by an R&S®GX400 sensor group (for more information, see the R&S®GX403DT data sheet PD 5214.1408.32) and adapt the detection parameters for difficult online search operations using the R&S®GX403DT.
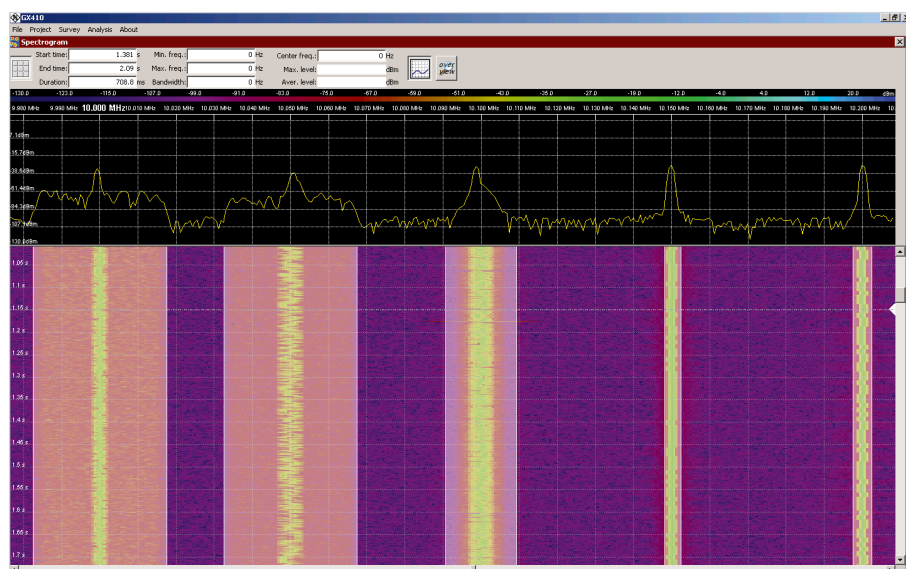
Detected emissions are highlighted in the spectrogram.

ASSISTING THE USER BY AUTOMATIC CLASSIFICATION, DEMODULATION AND DECODING

Powerful R&S®AMMOS classification unit

The R&S®GX410 contains the powerful R&S®AMMOS classification unit for the HF and VHF/UHF frequency ranges and can recognize the modulation type and transmission system of a huge variety of analog and digital signals. Information about supported modulation types included in the R&S®AMMOS classification unit is provided in the R&S®GX410 data sheet. This library will be continuously expanded.
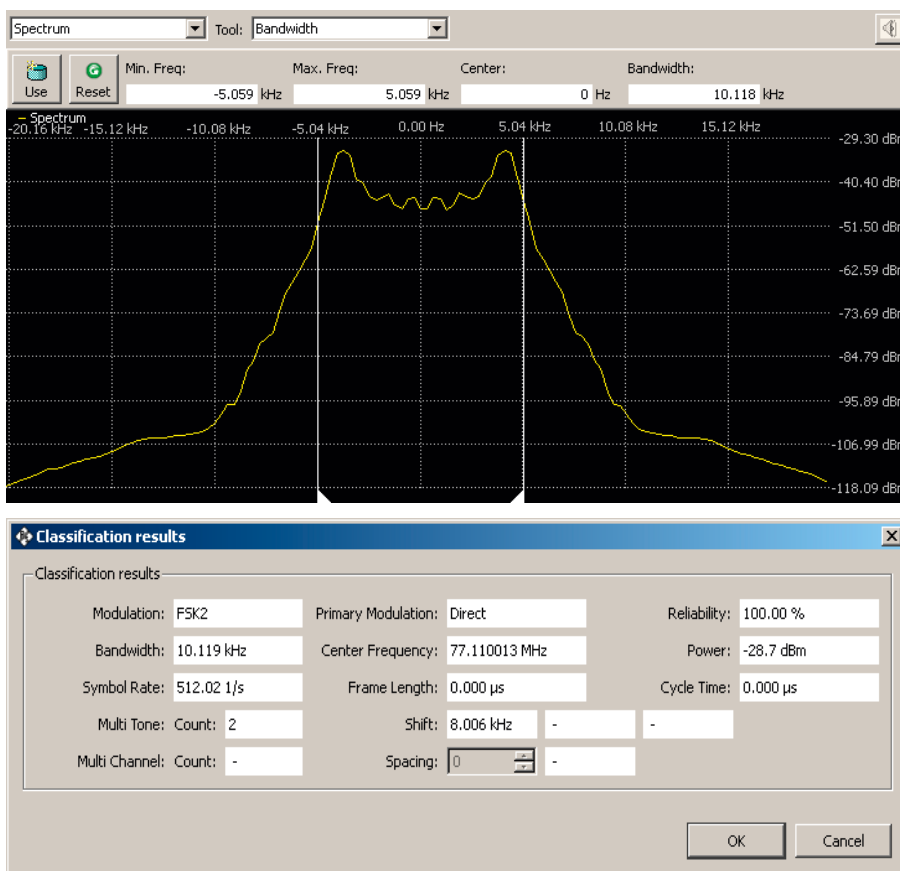
Segmentation and modulation analysis

The classification algorithm provides a segmentation and modulation analysis result for every signal previously selected in the emission list. The segmentation determines the accurate center frequency and bandwidth of the signal. The modulation analysis determines the modulation type and all relevant modulation parameters (symbol rate, frequency shift, etc.).

Comprehensive library of demodulators and decoders

The classifier results can be used to parameterize a demodulator from the R&S®AMMOS demodulation library in order to demodulate a signal sample. The resulting symbol/bitstream can be analyzed by using the bitstream analysis tool or can be decoded by using the decoders of the R&S®AMMOS decoding library. In addition, the data stream can be exported to other customer-specific tools.

Information about the included demodulators and decoders is provided in the R&S®GX410 R&S®AMLAB data sheet. This library will be continuously expanded.

Automatic measurement/classification of fixed-frequency signals

DETAILED MANUAL MODULATION ANALYSIS

In-depth modulation analysis with measurement cursors in zoomable spectrogram

Manual measurements of emission characteristics (bandwidth, duration, S/N ratio) can be performed with measurement cursors in the zoomable spectrogram.

For in-depth measurements, the selected emission is transferred (via DDC) to high-resolution modulation analysis. The filter bandwidth is automatically adapted to filter out all disturbing out-of-band emissions and noise.

Emissions are analyzed in detail with the high-precision time domain analysis unit of the R&S®GX410. Zoomable level, envelope, frequency, phase and spectrum plots make high-precision measurements possible, e.g. of start/end time of an emission, level range, frequency shift and symbol rate.

Emission selection for in-depth analysis
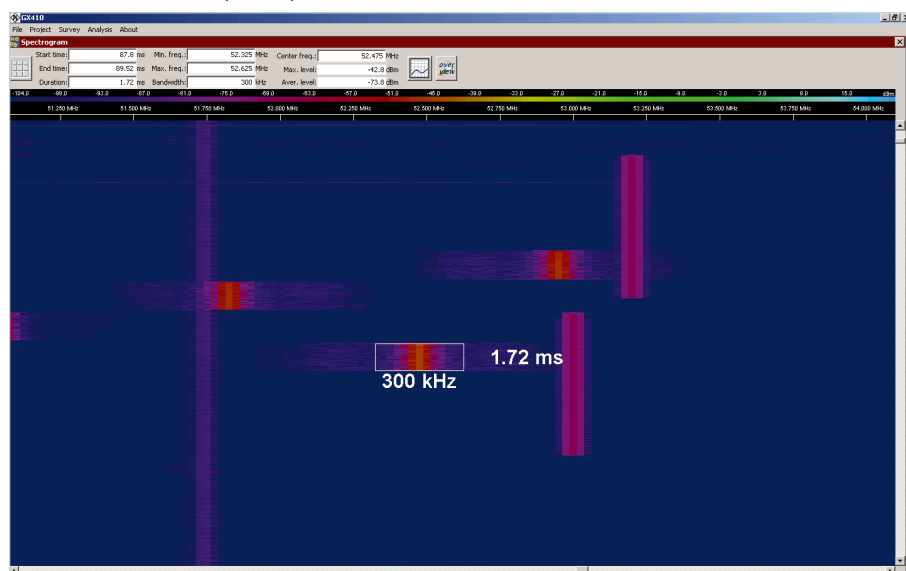
Using automatic and manual measurement together

The system's interactive modulation analysis feature is the most powerful way to quickly achieve reliable modulation analysis. The automatic classification algorithm displays all its results in a wizard, giving the operator access to all relevant intermediate results (including time and frequency segmentation, primary demodulation, symbol rate estimation, equalization, harmonic analysis and sampling).

The operator can verify the output of the automatic classification process one step at a time and concentrate on analysis steps where the algorithmic output might need manual refinement. A new classification process can then be started, taking into account the expert settings.

Detailed high-precision time domain analysis
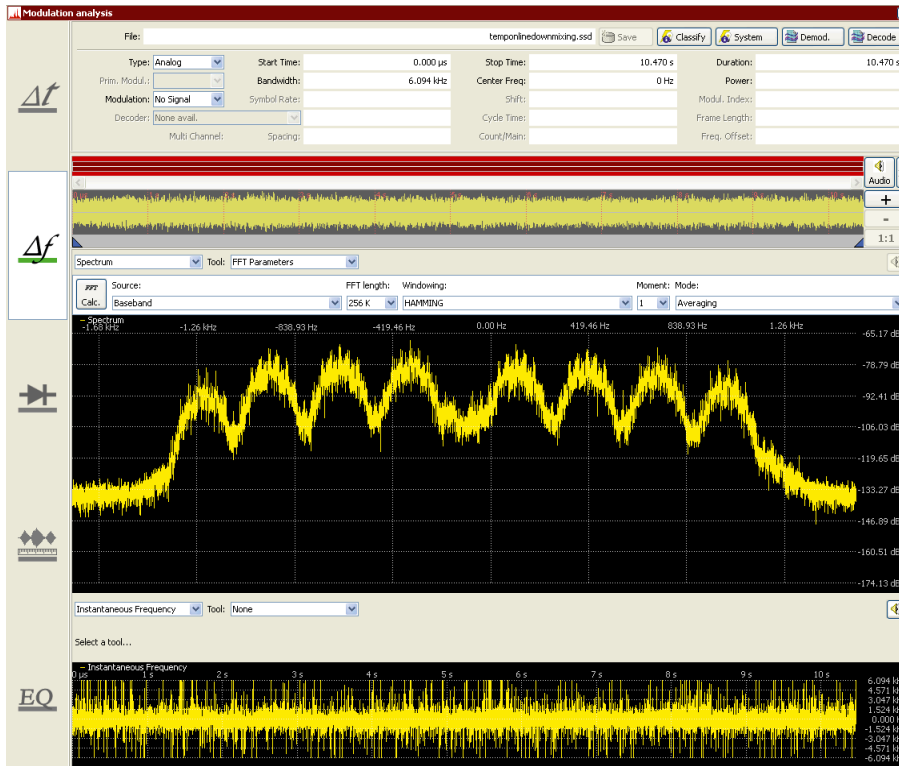
Spectra can be calculated with an FFT length of up to 256k points (irrespective of the signal bandwidth).

ANALYSIS OF SHORT-TIME SIGNALS

Automatic detection algorithm

The R&S®GX410 provides an automatic detection algorithm for digital and analog short-time emissions. The automatic detection has a special algorithm for SSB short-time signals. By manual or automatic measurement of some of the emissions (duration, bandwidth, S/N ratio), the operator can set up a search pattern for the detection algorithm. The algorithm will scan the signal sample to detect all emissions that fit the defined pattern.

## Identifying different kinds of emitters in a complex scenario

All detected emissions are graphically marked in the spectrogram and stored in an emission result list where they can be sorted, evaluated, and selected for the next processing steps.

A special toolset enables the operator to distinguish between different kinds of emitters in a complex scenario and to create an emission list for each detected emitter. These emission lists are the basis for in-depth transmission system analysis and successful recombination.

List of detected bursts

	ID	Start time	Stop time	Duration	Center freq.	Bandwidth	Level	Symbol rate	F
	5800	277.467 ms	279.24 ms	1.773 ms	54.025 MHz	25.310 kHz	-60.5 dBm		
140	5801	279.422 ms	281.195 ms	1.773 ms	44.500 MHz	25.310 kHz	-62.4 dBm		
141	5802	281.377 ms	283.15 ms	1.773 ms	51.250 MHz	25.310 kHz	-64.9 dBm		
142	5803	283.332 ms	285.105 ms	1.773 ms	50.550 MHz	25.310 kHz	-57.8 dBm		
143	5804	285.287 ms	287.06 ms	1.773 ms	58.150 MHz	25.310 kHz	-56.4 dBm		
144	5805	287.242 ms	289.015 ms	1.773 ms	52.400 MHz	25.310 kHz	-52.3 dBm		
145	5806	289.197 ms	290.97 ms	1.773 ms	52.300 MHz	25.310 kHz	-52.7 dBm		
146	5807	291.152 ms	292.925 ms	1.773 ms	40.350 MHz	25.310 kHz	-63.8 dBm		
147	5808	293.107 ms	294.88 ms	1.773 ms	58.525 MHz	25.310 kHz	-53.9 dBm		
148	5809	295.062 ms	296.835 ms	1.773 ms	41.000 MHz	25.310 kHz	-59.3 dBm		
149	5810	297.017 ms	298.79 ms	1.773 ms	52.825 MHz	25.310 kHz	-53.0 dBm		
150	5811	298.972 ms	300.745 ms	1.773 ms	43.775 MHz	25.310 kHz	-70.2 dBm		
151	5812	300.927 ms	302.7 ms	1.773 ms	45.975 MHz	25.310 kHz	-60.5 dBm		
152	5813	302.882 ms	304.655 ms	1.773 ms	54.100 MHz	25.310 kHz	-60.8 dBm		
153	5814	304.837 ms	306.61 ms	1.773 ms	53.275 MHz	25.310 kHz	-58.5 dBm		
154	5815	306.792 ms	308.565 ms	1.773 ms	56.900 MHz	25.310 kHz	-59.4 dBm		
155	5816	308.747 ms	310.52 ms	1.773 ms	42.975 MHz	25.310 kHz	-65.6 dBm		
156	5817	310.702 ms	312.475 ms	1.773 ms	46.000 MHz	25.310 kHz	-60.4 dBm		
157	5818	312.657 ms	314.43 ms	1.773 ms	51.300 MHz	25.310 kHz	-65.8 dBm		
158	5819	314.612 ms	316.385 ms	1.773 ms	54.425 MHz	25.310 kHz	-58.1 dBm		
159	5820	316.567 ms	318.34 ms	1.773 ms	55.350 MHz	25.310 kHz	-55.4 dBm		
160	5821	318.522 ms	320.295 ms	1.773 ms	41.050 MHz	25.310 kHz	-60.1 dBm		
161	5822	320.477 ms	322.25 ms	1.773 ms	56.250 MHz	25.310 kHz	-55.2 dBm		
162	5823	322.432 ms	324.205 ms	1.773 ms	55.700 MHz	25.310 kHz	-48.8 dBm		

Export   Synthesize   Delete   Quantize

Detected bursts
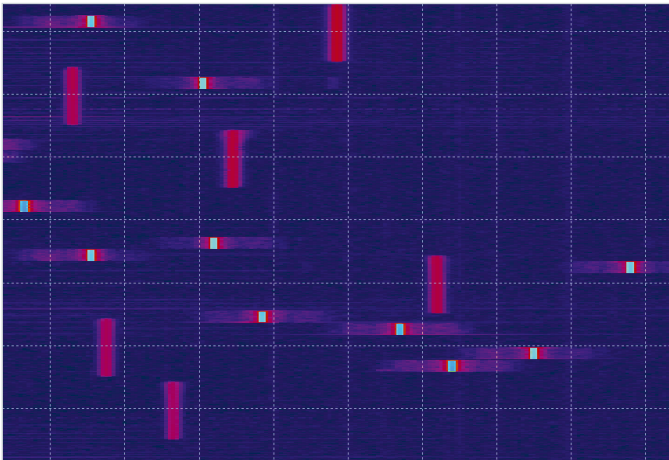
Evaluation of detected emissions for short-time signals

The R&S®GX410 provides several statistical evaluation algorithms for the detected list of emissions.

The emission list data can be exported to a standard spreadsheet (not included in the R&S®GX410), where R&S®AMLAB operators can use their own macro library with self-developed macros to perform special evaluation operations on the selected emissions.

The evaluated emission result list can be used, for example, for the recombination of selected baseband emissions to build a continuous narrowband digital IF signal for further analysis (e.g. classification or demodulation).

Histogram of signal power
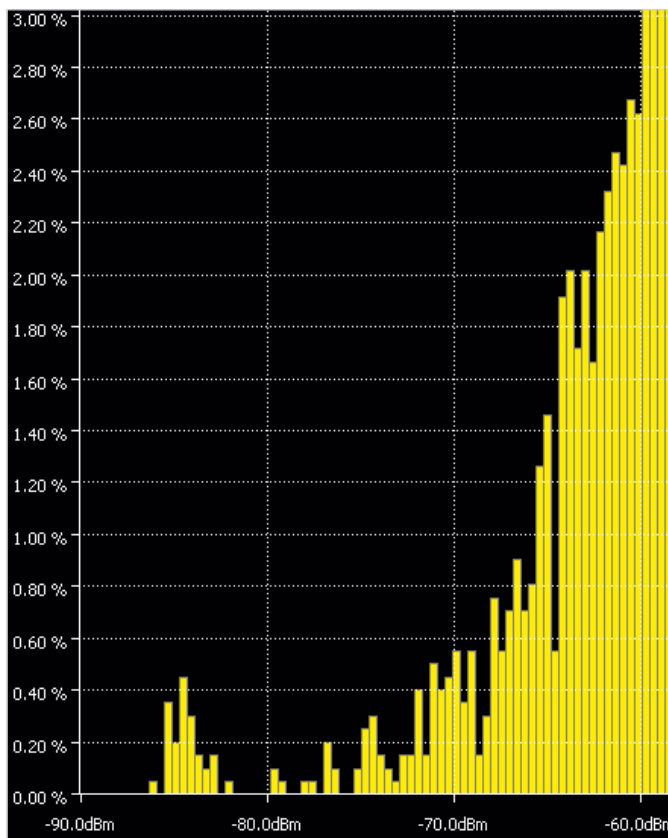
Recombined digital IF signal

ONLINE RECOMBINATION OF FREQUENCY-AGILE SHORT-TIME EMISSIONS

Realtime technical analysis using R&S®GX413OR
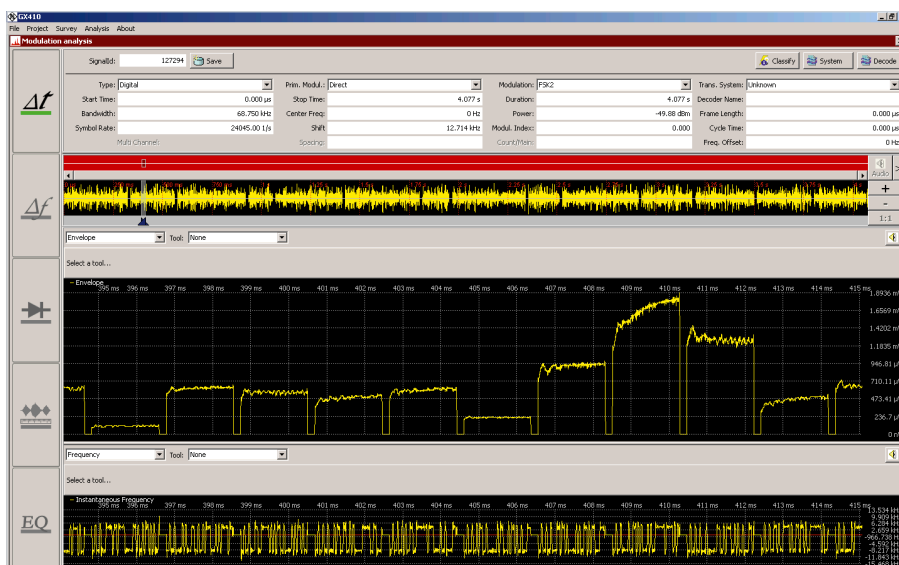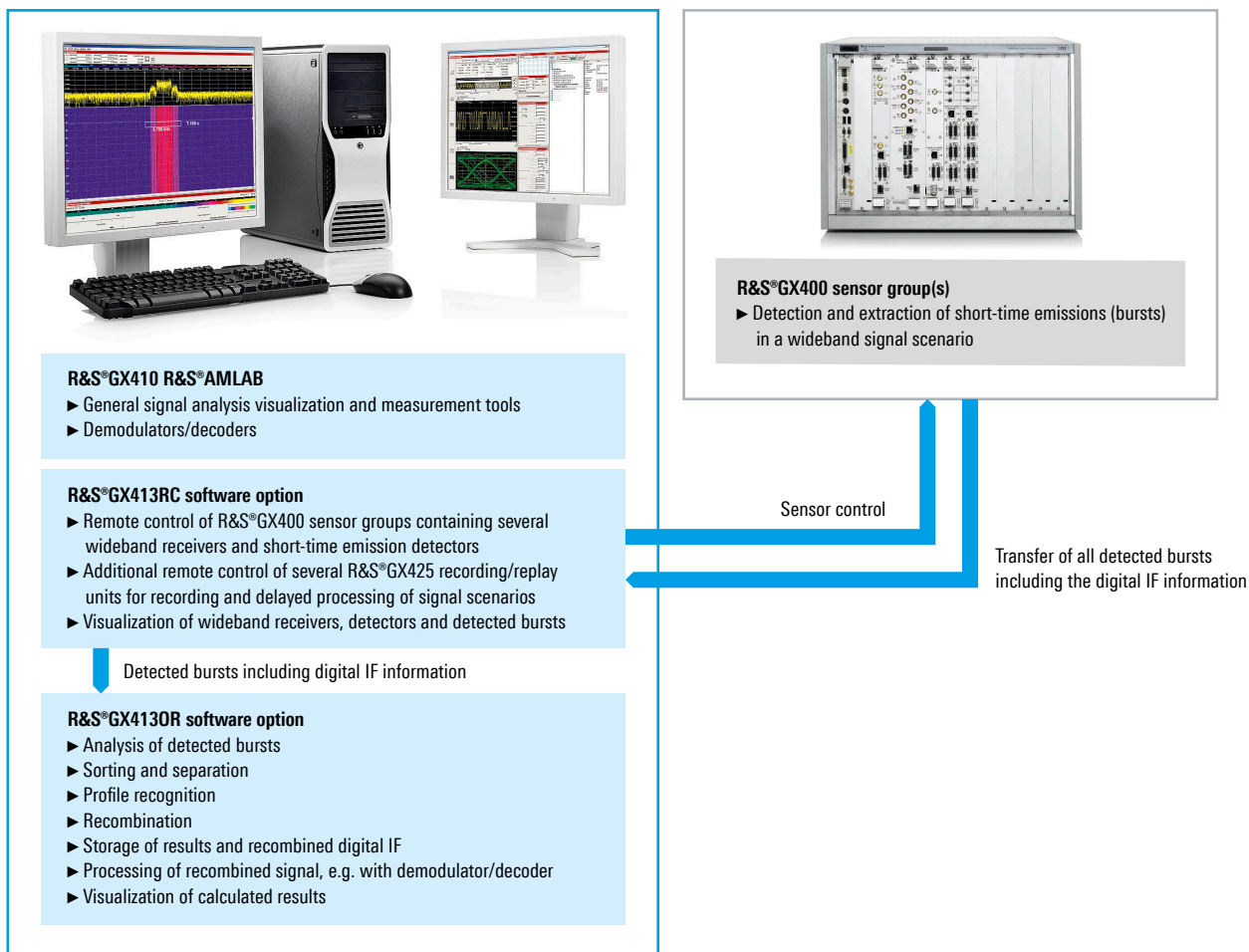
R&S®GX413OR is a software option for the R&S®GX410 system. Frequency-agile short-time emissions are automatically analyzed, classified and recombined in realtime by using the detection results provided by the R&S®GX400 sensor groups. The latency of this process is negligible, lasting a few seconds.

Combined input from several receivers

R&S®GX413OR can use multiple wideband receivers in the R&S®GX400 sensor groups at the same time and thus seamlessly covers a bandwidth between 1 MHz and 60 MHz per sensor group.

Recombination of R&S®GX410, R&S®GX413RC, R&S®GX413OR and R&S®GX400

R&S®GX400 sensor group(s)
▶ Detection and extraction of short-time emissions (bursts) in a wideband signal scenario

R&S®GX410 R&S®AMLAB
▶ General signal analysis visualization and measurement tools
▶ Demodulators/decoders

R&S®GX413RC software option
▶ Remote control of R&S®GX400 sensor groups containing several wideband receivers and short-time emission detectors
▶ Additional remote control of several R&S®GX425 recording/replay units for recording and delayed processing of signal scenarios
▶ Visualization of wideband receivers, detectors and detected bursts

Detected bursts including digital IF information

R&S®GX413OR software option
▶ Analysis of detected bursts
▶ Sorting and separation
▶ Profile recognition
▶ Recombination
▶ Storage of results and recombined digital IF
▶ Processing of recombined signal, e.g. with demodulator/decoder
▶ Visualization of calculated results

Sensor control

Transfer of all detected bursts including the digital IF information

Detection and extraction of frequency-agile short-time emissions

In the R&S®GX400 sensor groups, the wideband IF data streams are processed on multiple parallel R&S®GX401EM VXI DDC/DSP signal processing modules. R&S®GX403ST, a detection algorithm for short-time emissions, automatically detects and extracts all relevant short-time emissions, and then transfers these signals to R&S®GX413OR for processing. The user may set all adjustable parameters of the detection algorithm, e.g. short-time emission length, short-time emission bandwidth or minimum signal-to-noise ratio.

Separation and classification of frequency-agile short-time emissions

R&S®GX413OR measures and weights the detected short-time emissions. The transmission systems can be assigned to specific classes by using the detected technical parameters, e.g. hop rates or modulation mode. A subsequent, in-depth statistical analysis enables users to automatically separate various transmissions.

Profile recognition

The profile recognition will automatically match the technical parameters of the detected transmissions with user-defined profiles. The result list provides an overview of the activity of detected radios.

Broadband signal scenario with multiple different frequency-agile transmission systems
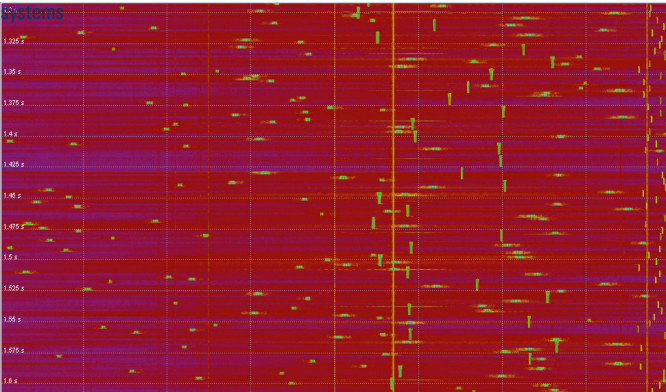
For a detected radio, statistical analysis made it possible to assign the volume of detected short-time emissions to six different transmissions.
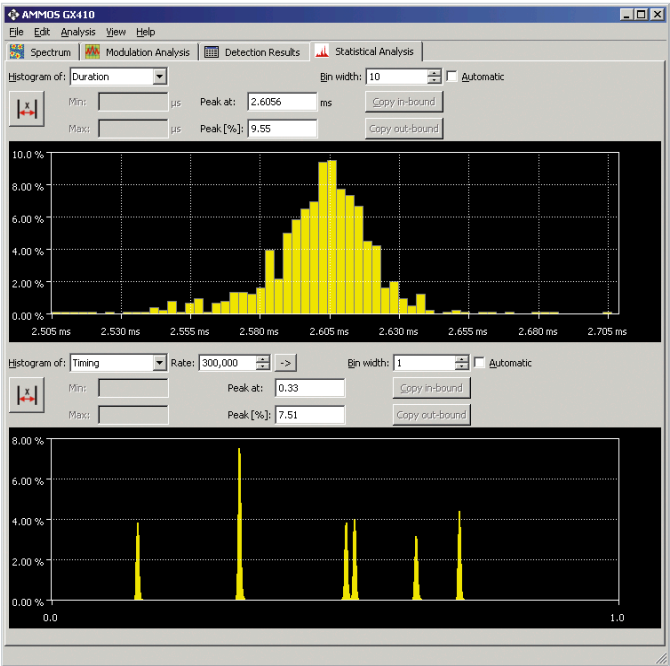
Examples				
Start time	Stop time	Profile	Duration	Technical parameters
10:15:20	10:15:29	Digital Radio A	9 s	300 hops/s, FSK2, etc., 60 MHz to 70 MHz/25 kHz
10:15:25	10:15:27	Digital Radio B	2 s	100 hops/s, FSK2, etc., 45 MHz to 51 MHz/25 kHz
10:15:33	10:15:40	Digital Radio A	7 s	300 hops/s, FSK2, etc., 60 MHz to 70 MHz/25 kHz
10:16:01	10:16:12	Analog Radio	11 s	10 hops/s, AM, etc., 55 MHz to 56 MHz/25 kHz

Recombination of frequency-agile short-time emissions

After the transmissions have been separated, R&S®GX413OR performs signal recombination for each of them.

An IF signal is calculated for each transmission by putting together the short-time emissions assigned to the transmission using precisely defined time parameters. All recombined signals are stored as a digital intermediate frequency together with their essential technical parameters (e.g. start time, message length, frequencies used, hop rate, modulation mode).

The technical parameters can be exported immediately via an interface and then remain available for tasks such as creating a situation picture in combination with other recorded results from monitoring and/or direction finding systems.

Signal demodulation/decoding by using the R&S®GX410 demodulator library

R&S®GX413OR enables the immediate processing of a selected signal in the R&S®GX410 system. The recombined signal is demodulated by using the R&S®GX410 demodulator library. In the case of a digitally modulated signal, automatic bit stream analysis can subsequently be performed (search for bit patterns, preambles, code structures). As with the technical parameters, detected structures are output via an interface. Online decoding is possible for specific, identified digital systems.

A recombined signal with precisely defined time parameters represented in various ways. Top to bottom: oscilloscope, amplitude versus time, frequency versus time. The time guard period between the short-time emissions and the modulation mode of the short-time emissions (FSK2) are clearly displayed.

Configuration examples
Online processing

This configuration can cover a bandwidth between 15 MHz and 60 MHz (3 × 20 MHz). In the defined frequency range, up to approx. 3000 short-time emissions per second can be detected and extracted in realtime. All detected short-time emissions are recombined, and the signals are stored as digital intermediate frequency in the R&S®GX410 system. Technical parameters are transferred to the system level for processing. One of the signals can be processed immediately in the R&S®GX410 system.

The configuration consists of one R&S®GX410 system with the R&S®GX413RC and R&S®GX413OR options as well as three R&S®GX400 sensor groups. R&S®GX413RC controls the R&S®GX400 sensor groups. R&S®GX413OR automatically evaluates the data that is delivered online.

Each R&S®GX400 sensor group includes one VHF/UHF wideband receiver (R&S®EM050 combined with R&S®GX405BP) and six R&S®GX401EM VXI DDC/DSP signal processing modules. The sensor groups are synchronized to a common time base using GPS time and linked to the R&S®GX410 system via Gigabit Ethernet.

If more than 3000 short time emissions per second have to be processed, the processing capacity can be expanded by connecting additional R&S®GX400 sensor groups. Another way to expand capacity is to connect R&S®GX425 recording/replay units (see next configuration example).

Online processing

Three R&S®GX400 sensor groups with six R&S®GX401EM modules, detection and extraction of bursts

LAN

R&S®GX410 system, sensor group control, evaluation, recombination and storage of detected bursts
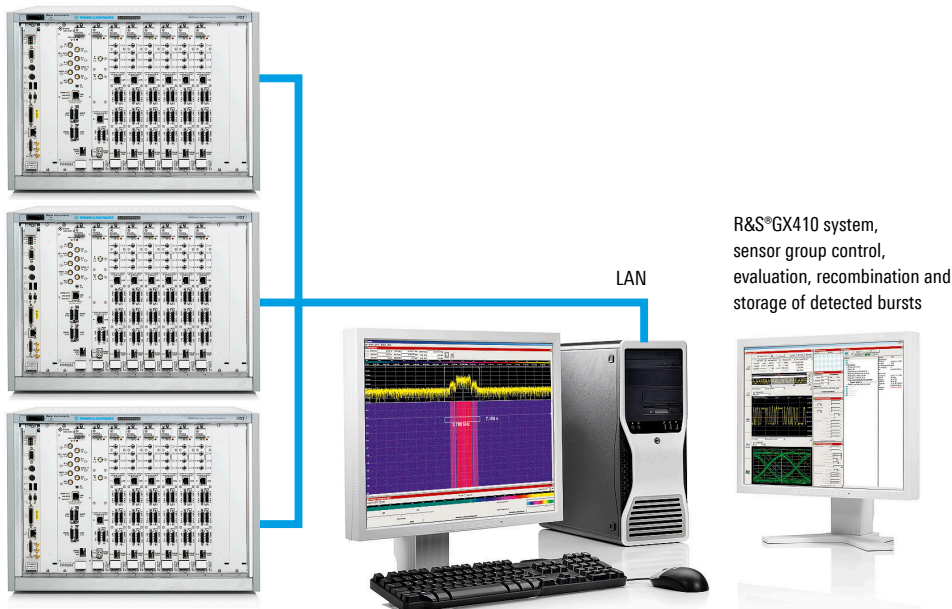
Combined online processing and recording/replay processing

This configuration, like the online configuration, can cover a bandwidth of 15 MHz to 60 MHz (3 × 20 MHz). In the defined frequency range, up to approx. 3000 short-time emissions per second can be detected and extracted in realtime. All detected short-time emissions are recombined, and the signals are stored as digital intermediate frequency in the R&S®GX410 system. Technical parameters are transferred to the system level for processing. One of the signals can be processed immediately in the R&S®GX410 system.
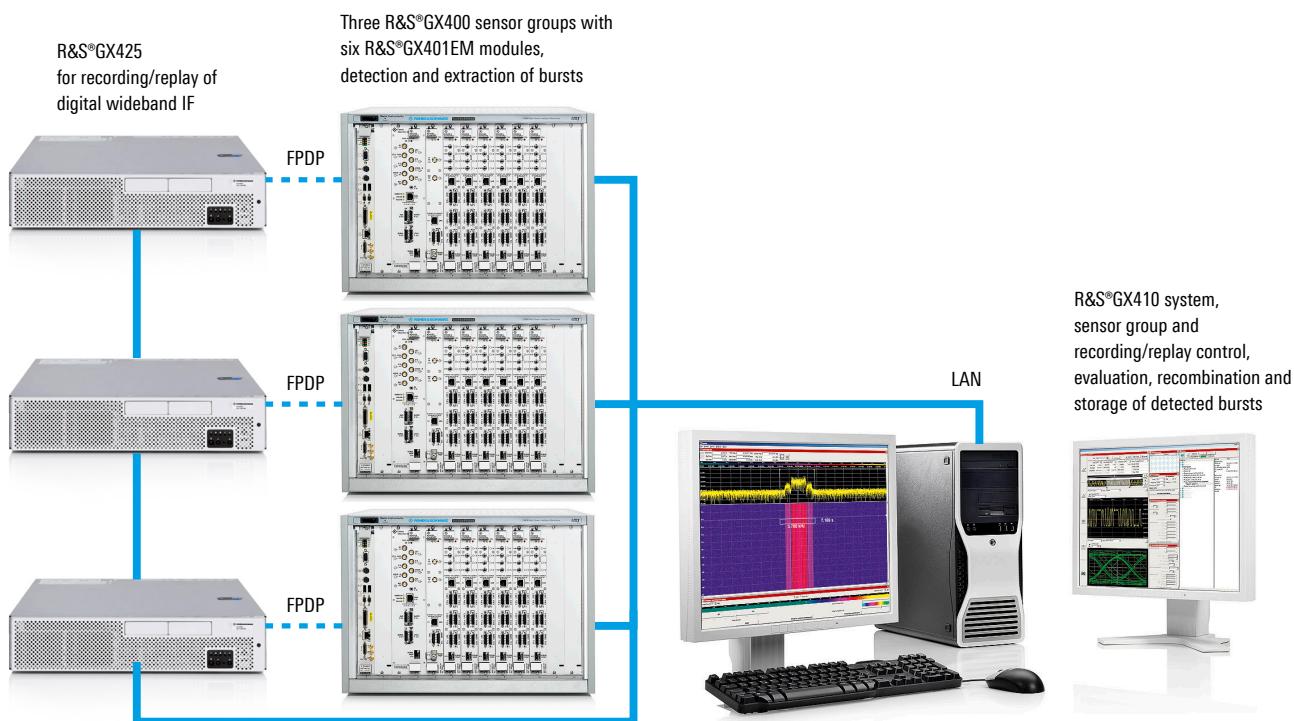
If more than approx. 3000 short-time emissions per second are received in the monitored frequency range, seamless processing can no longer be achieved with the available online resources. The system reports these moments to the user. Even as online processing is taking place, seamless recording of the digital intermediate frequencies of all wideband receivers can be initiated.

The recorded digital intermediate frequency can be replayed later. The system is switched off line in this case, i.e. work is no longer performed on the antenna, but with the recorded IF data instead. The wideband intermediate frequency is fed back to the wideband receivers by the R&S®GX425. The following processing steps – detection, extraction, recombination, etc. – are identical to those in online processing. If more than 3000 short-time emissions per second are detected simultaneously, the replay speed of the R&S®GX425 will be reduced as long as necessary. This makes sure that no data is lost even if significantly more short-time emissions are present than can be processed in realtime.

The configuration consists of one R&S®GX410 system with the R&S®GX413RC and R&S®GX413OR options as well as three R&S®GX400 sensor groups and three R&S®GX425. R&S®GX413RC controls the R&S®GX400 sensor groups and the R&S®GX425. R&S®GX413OR automatically evaluates the data that has been provided online or from a recording. Every R&S®GX400 sensor group includes one VHF/UHF wideband receiver (R&S®EM050 in combination with R&S®GX405BP) and six R&S®GX401EM VXI DDC/DSP signal processing modules. The sensor groups are synchronized to a common time base via GPS time and linked to the R&S®GX410 system via Gigabit Ethernet. Each wideband receiver is connected to one R&S®GX425 unit and can store its broadband intermediate frequency.

Online processing and recording/replay processing

R&S®GX425
for recording/replay of
digital wideband IF

Three R&S®GX400 sensor groups with
six R&S®GX401EM modules,
detection and extraction of bursts

FPDP

FPDP

FPDP

LAN

R&S®GX410 system,
sensor group and
recording/replay control,
evaluation, recombination and
storage of detected bursts

BITSTREAM ANALYSIS (USING R&S®CA250)

For information about bitstream analysis solutions from Rohde&Schwarz, see the R&S®CA250 bit stream analysis data sheet PD 5214.0618.22.
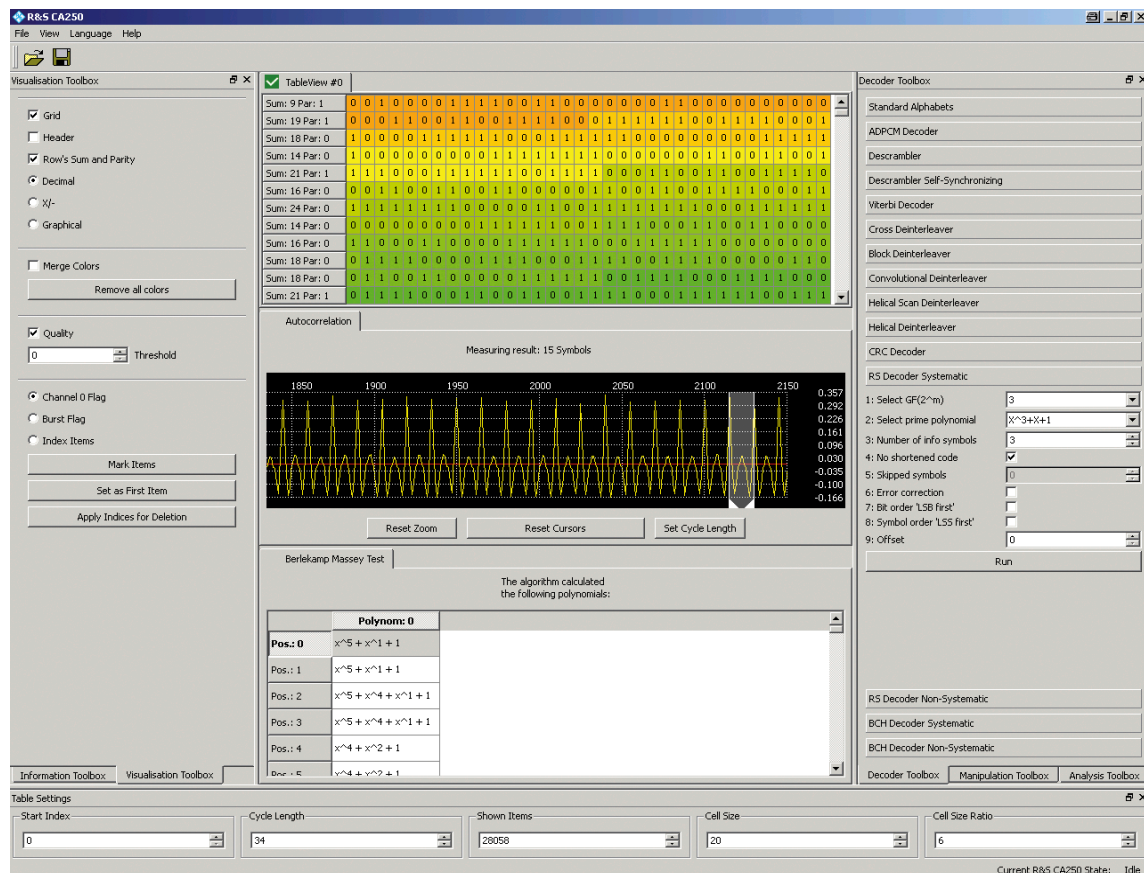
Bit stream analysis.

SYSTEM INTEGRATION

In addition to its technical analysis capabilities, the R&S®GX410 provides the optimal starting point for the following tasks:

▶ Using the complete R&S®AMMOS based HF and VHF/UHF communications intelligence (R&S®GX400) for manual and automatic detection, classification, demodulation, decoding
▶ Teaching operators the basics of modern digital modulation/transmission methods and low probability of intercept (LPI) signals

Use as standalone system
The R&S®GX410 can be used as a standalone system for HF and VHF/UHF technical analysis. Signal samples may be archived by using the built-in DVD/CD writer. An optionally attached R&S®GX425 recording/replay unit (AMREC) allows the recording of digital wideband and narrowband IF data streams (from the R&S®GX400 sensor group).

Use with R&S®AMMOS automatic production system
Similarly, recordings made with the R&S®GX400 sensor group on the R&S®GX425 recording/replay unit (AMREC) may be imported to the R&S®GX410 for technical analysis.

R&S®GX400 sensor group

R&S®GX425 recording/replay unit (AMREC)

R&S®GX410 with recommended setup (two screens)

ORDERING INFORMATION

Designation	Type	Order No.
Base units		
R&S®AMLAB signal analysis software (R&S®GX410 application base software, including signal import, manual measurement of modulation parameters and analog demodulation)	R&S®GX410	4063.9681.02
Options		
Control of HF VXI wideband receivers (requires R&S®GX400 sensor group and R&S®GX410AR)	R&S®GX410HF	4063.0013.03
Control of VHF/UHF VXI wideband receivers (requires R&S®GX400 sensor group and R&S®GX410AR)	R&S®GX410VU	4063.0071.03
R&S®AMREC control, for recording continuous IF on R&S®GX425 and import from R&S®GX425	R&S®GX410AR	4063.9930.02
Technical and statistical analysis of short-time signals	R&S®GX410ST	4069.4569.02
Automatic HF and VHF/UHF modulation analysis	R&S®GX413MA	4069.4317.02
HF and VHF/UHF system and code recognition (bitstream classification) (requires R&S®GX413MA)	R&S®GX413SR	4069.4498.02
HF and VHF/UHF demodulation	R&S®GX413DM	4069.4430.02
HF and VHF/UHF decoding (requires R&S®GX413DM)	R&S®GX413DC	4069.4552.02
Expanded digital civil HF communications (requires R&S®GX413DC)	R&S®GX413DC-C	4069.4517.02
Expanded HF and VHF/UHF decoding capability (requires R&S®GX413DC)	R&S®GX413DC-E	4069.4575.02
Expanded CODAN3012 decoding capability (requires R&S®GX413DC)	R&S®GX413DC-CO	4069.4598.02
System integration, including order management, reporting, system resources	R&S®GX410SY	4069.4630.02
Software option for R&S®GX410, recombination of frequency agile short-time emissions, online (requires R&S®GX413RC and R&S®GX400; R&S®GX425 optional)	R&S®GX413OR	4069.4652.02
Software option for R&S®GX410, hardware-supported recombination of frequency agile short-time emissions, offline (requires R&S®GX400 and R&S®GX425)	R&S®GX413RC	4069.4623.02

For data sheet, see PD 5214.0353.22 and www.rohde-schwarz.com.

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