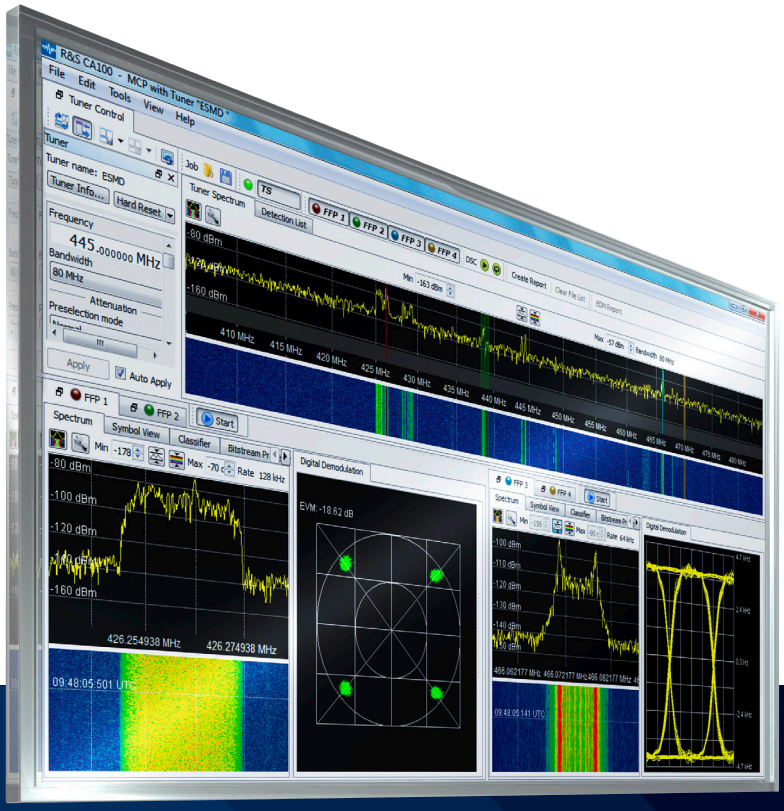
R&S®CA100
PC-BASED SIGNAL ANALYSIS AND SIGNAL PROCESSING SOFTWARE

Detection, classification, demodulation and decoding of communications signals



Product Brochure
Version 10.00

ROHDE&SCHWARZ
Make ideas real

AT A GLANCE

R&S®CA100 is a standalone software solution for analysis, classification, demodulation and decoding of digital and analog IF signals. The software provides powerful signal analysis and signal processing functions and runs on a Windows PC. If connected to modern Rohde&Schwarz monitoring receivers with internal digital downconverters (DDC), e.g. R&S®ESMW or R&S®ESME, up to four signals can be processed in parallel.

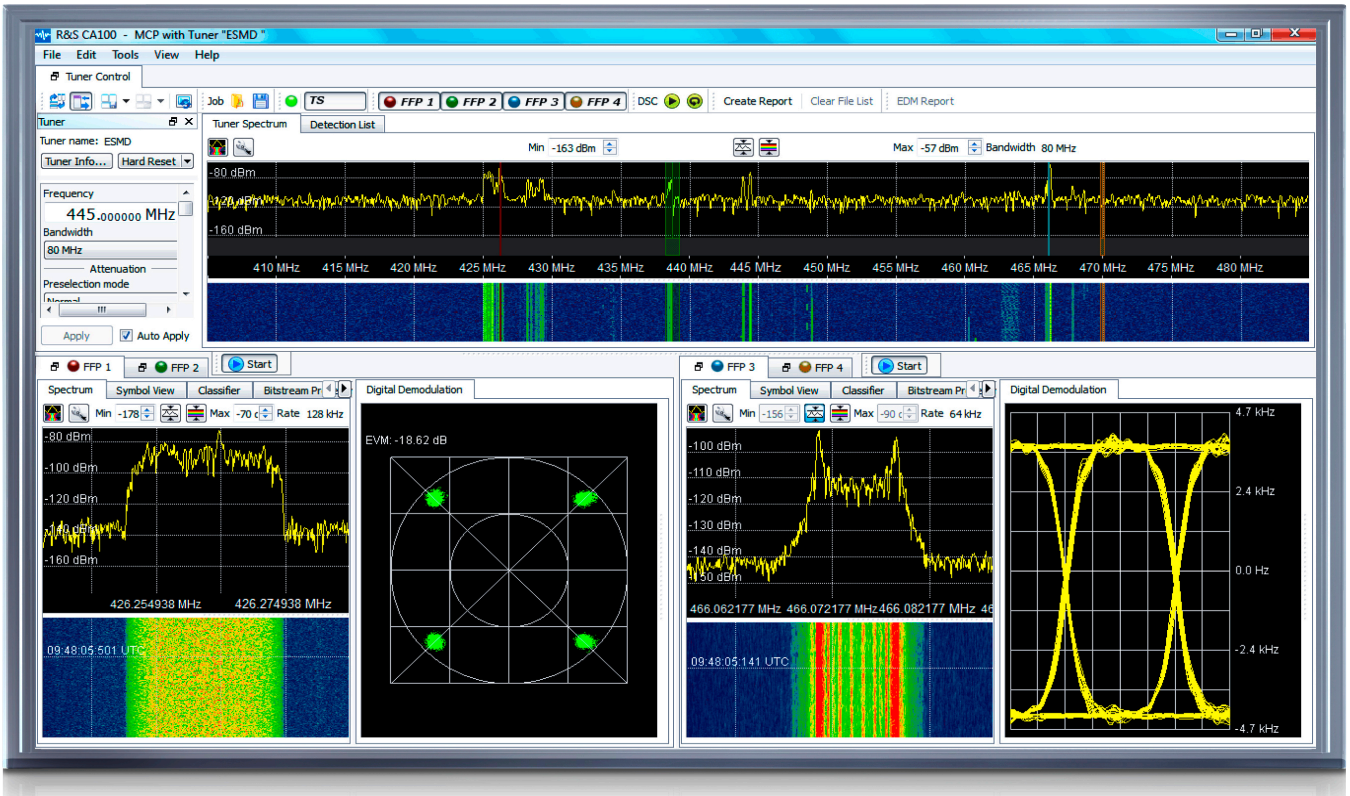
R&S®CA100 provides a signal overview using a high-speed spectrum/waterfall display; it supports both the monitoring of known signals (demodulation and decoding to content level) and surveillance/search operation by automatically detecting signals of interest and performing a classification (recognition of modulation type and transmission system/code).

For complex (very dense, weak or disturbed) signal scenarios, the user can override the automatic signal processing and manually set the classifier or demodulator/decoder to the signal of interest. An additional time domain analysis function makes it possible to manually measure technical signal parameters.

The detect, search and classify application provides a fully automatic mode to monitor a frequency range, detect signals of interest, classify, demodulate, decode these signals and store the results for later processing.

Signal data (digital IF) can be recorded to the computer hard disk or external AMREC devices (e.g. R&S®DWR100) and replayed for processing.

Four signals of an 80 MHz signal scenario provided by a Rohde&Schwarz wideband monitoring receiver are classified, demodulated and decoded in parallel.



KEY FACTS

- Supports automatic interception and monitoring of complete signal scenarios
- Powerful classifier and extensive signal processing library with demodulators and decoders
- Configurable detection of fixed frequency and burst signals with subsequent automatic processing of detected signals (including content recovery depending on signal type)
- Modular scalability from one-channel to four-channel signal processing solution (multichannel capability available if connected to a Rohde&Schwarz monitoring receiver/digital direction finder with internal digital downconverters, e.g. R&S®ESMW/ESME/EB510/EB500/DDF260/DDF255/DDF205)
- Open interface for independent extension of signal processing capabilities by the user
- Manual signal measurement in line with ITU-R SM.1600
- Signal recording and replaying to/from hard disk

BENEFITS

LARGE VARIETY OF SOURCES FOR SIGNAL ACQUISITION

Processing of digital IF data

R&S®CA100 processes digital IF signal data, covering the following:

- Online digital IF data provided by various Rohde&Schwarz receivers/digital direction finders
- Online analog IF data digitized via sound card
- Offline replay of digital IF data (R&S®AMMOS IF format); the signal sample can be an IF file replayed from local hard disk or from an external AMREC recording/replaying device (e.g. R&S®DWR100)
- Offline replay of WAV file

Spectrum/waterfall representation of signal data

The frequency range is presented using a real-time waterfall with up to 1000 lines/s. Signal attributes can be measured by using time and frequency axis cursors.

Signal recording and replaying to/from hard disk

By activating the IF recording, a signal sample is stored on the computer hard disk for later IF replay or IF export. Alternatively a connected AMREC recording/replaying device (e.g. R&S®DWR100) can be used for data storage.

By using an audio demodulator, (analog) emissions can be listened to and recorded to WAV files on the computer hard disk or on a connected AMREC recording/replaying device.

Processing of multiple signals

If connected to a Rohde&Schwarz monitoring receiver with internal digital downconverters (DDC) such as the R&S®ESME, R&S®CA100 is able to process up to four [1] downconverted signals in parallel. The center frequency and bandwidth of each DDC can be set independently within the limits of the processable real-time bandwidth of the monitoring receiver or digital direction finder.

[1] Depends on monitoring receiver/digital direction finder type.

The R&S®ESME provides an 80 MHz spectrum. Four DDCs were set to downconvert four signals. These signals are indicated with different colors and will be processed in parallel by R&S®CA100.

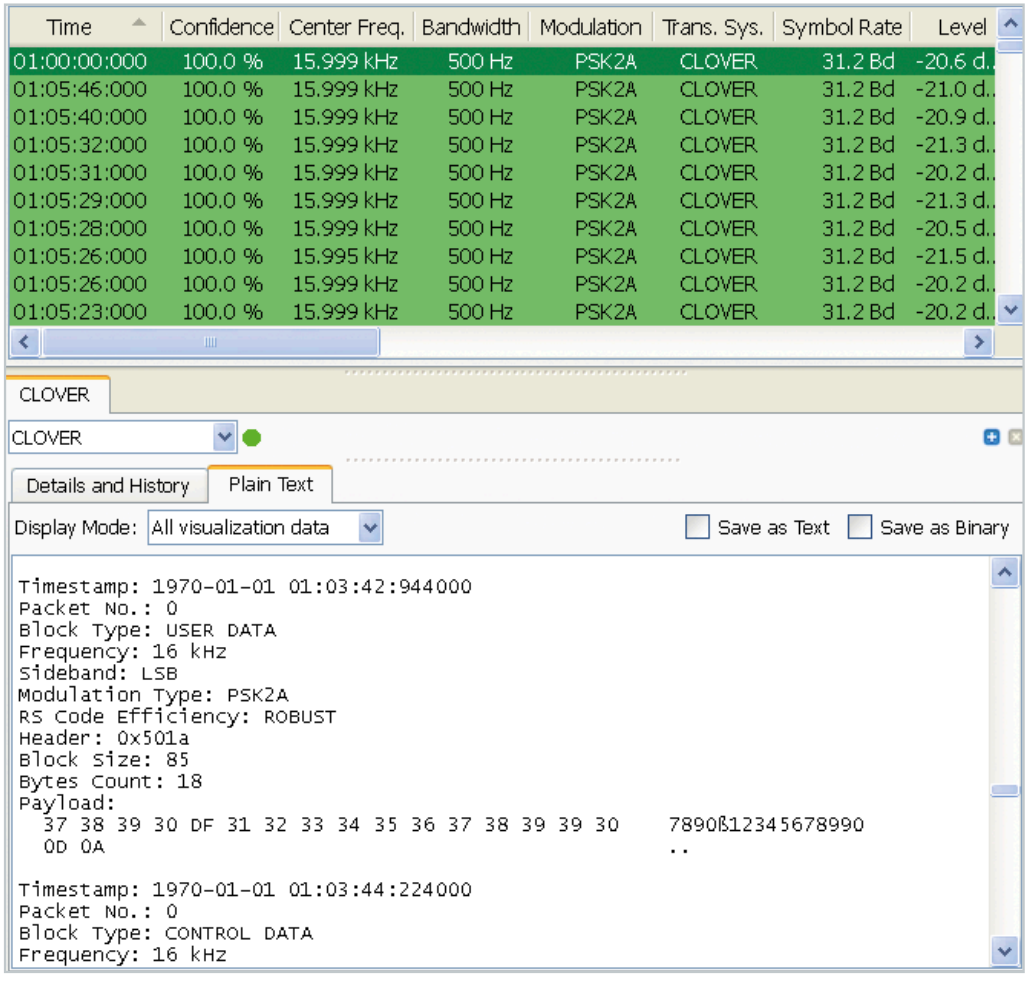
QUICK RESULTS WITH AUTOMATIC CLASSIFICATION

Powerful R&S®AMMOS classification unit

R&S®CA100 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. A list of supported modulation types included in the R&S®AMMOS classification unit is provided in the specifications. This list will be continually expanded.

The classification algorithm delivers a segmentation and modulation analysis result. The segmentation process determines the accurate center frequency and bandwidth of the signal. The modulation analysis determines the modulation type and all important modulation parameters (symbol rate, frequency shift, etc.).

CLOVER system classification and visualization example



Wideband classification

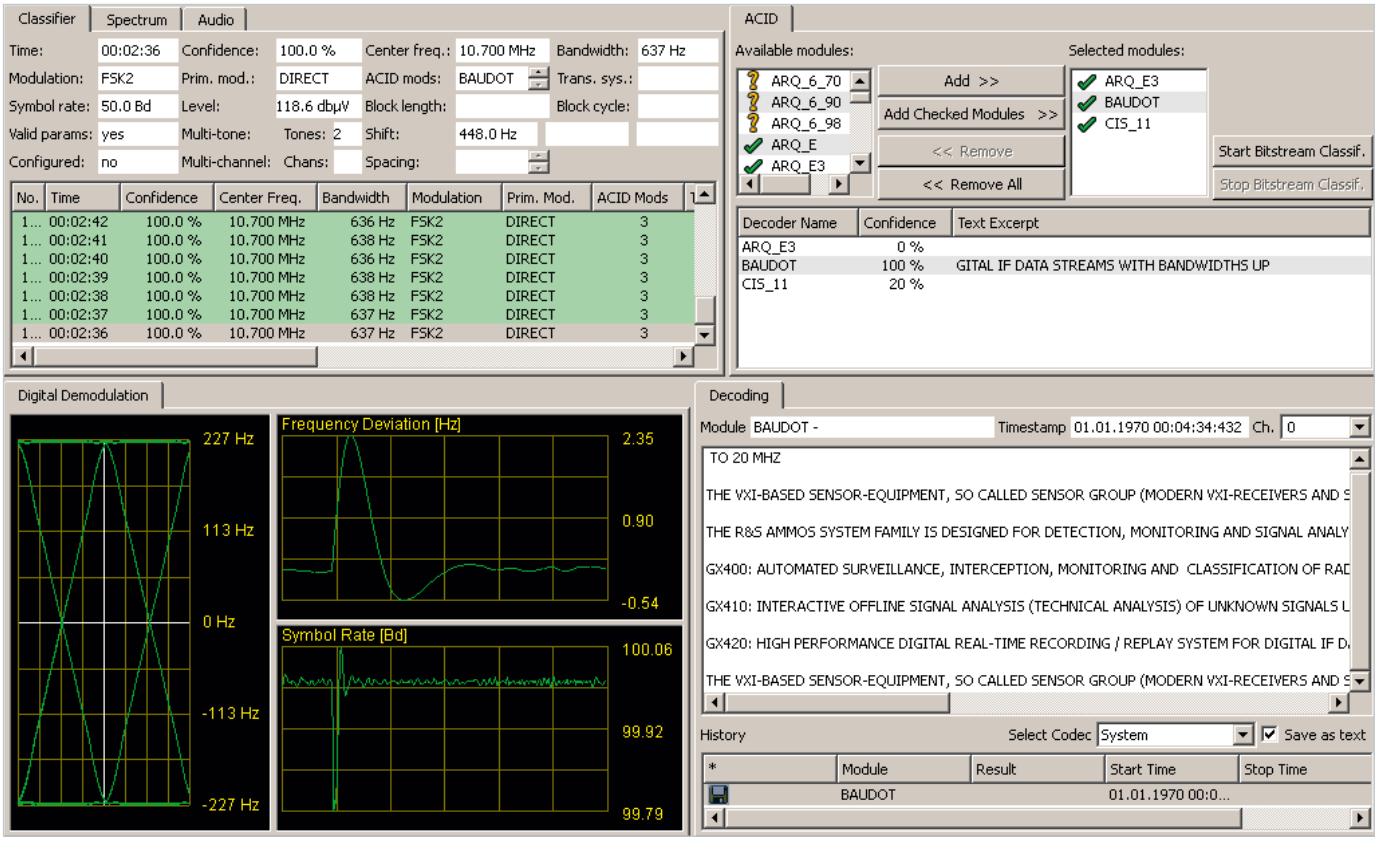
The classifier in combination with the wideband snapshot access option (R&S®CA100WSN), connected for example to an R&S®ESME wideband monitoring receiver, uses the receiver's internal wideband snapshot buffer to classify wideband signals (e.g. DVB-T, LTE or WLAN (IEEE 802.11a/g/n) in a bandwidth up to 80 MHz.

Comprehensive library of demodulators and decoders

The classifier results are used to automatically parameterize a demodulator from the R&S®AMMOS demodulation library. The resulting symbol/bitstream can be analyzed using transmission system recognition and can be decoded by using the decoders of the R&S®AMMOS decoding library. Depending on the transmission system, the corresponding decoder output will be displayed.

User-specific decoders that are developed with the decoder development framework and installed on R&S®CA100 are also used in the classification process. Symbol/bitstream data can be exported for bitstream analysis with R&S®CA250.

Classification, demodulation and decoding



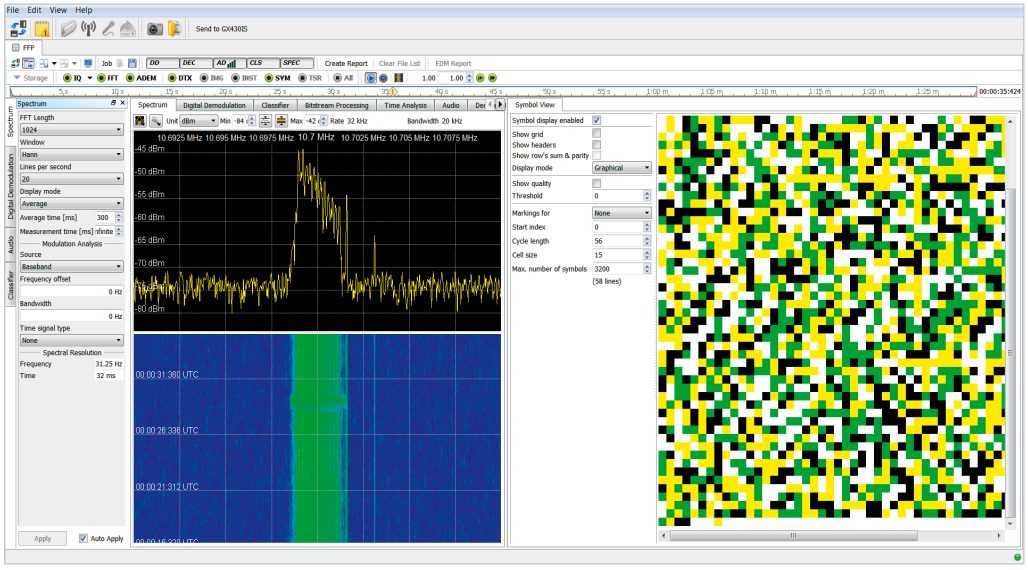
DEMODULATORS AND DECODERS FOR A WIDE RANGE OF USE CASES

Manual or automatic demodulation and decoding

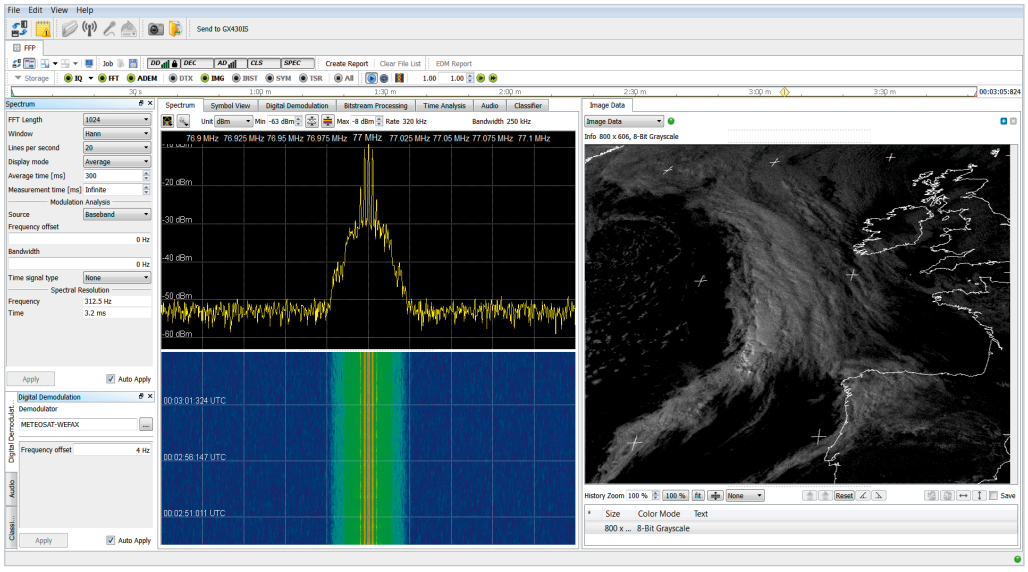
Demodulators and decoders can be set manually by the operator or automatically by the R&S®CA100 modulation and transmission system classifier. The symbol viewer is used for visualizing symbol data. For a list of the demodulators and decoders included in R&S®CA100, see the specifications (PD 3606.9340.22). This list will be continually expanded.

User-specific decoders and demodulators

User-specific decoders and user-specific demodulators can be installed on R&S®CA100 to expand the demodulation/decoding capability (see page 16).



Symbol view of multichannel PSK signal



Meteosat weather fax

FAST AND RELIABLE SIMULTANEOUS PROCESSING OF MULTIPLE SIGNALS

R&S®CA100 has an automatic detector that enables the user to scan or monitor frequency ranges automatically for fixed frequency and burst signals.

Manual parallel processing of multiple signals

Frequently, the real-time bandwidth of a monitoring receiver contains multiple signals simultaneously. If R&S®CA100 is connected to a Rohde&Schwarz monitoring receiver/digital direction finder with internal digital downconverters, e.g. R&S®ESMW/ESME/EB510/EB500/DDF260/DDF255/DDF205, the user can downconvert multiple signals and then manually process them in parallel. The individual DDCs can set their center frequencies and bandwidths within the limits of the processable real-time bandwidth of the monitoring receiver. The downconverted signals are processed by the user with audio demodulation, classification, demodulation/decoding and recording.

Automatic detection of fixed frequency and burst signals for fast and dependable results

In addition to its manual mode, R&S®CA100 provides a high level of automation for detecting and monitoring fixed frequency and burst signals. A detection result is generated for every detected signal that meets the predefined selection criteria (signal duration, bandwidth, level, etc.).

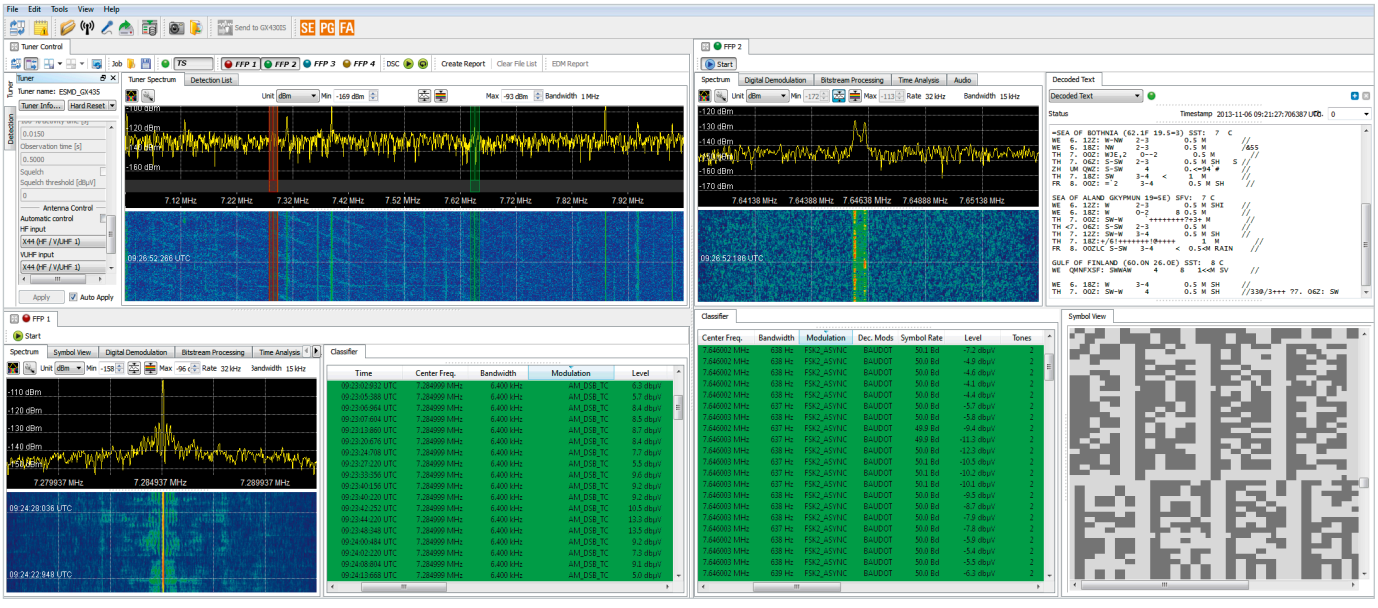
The detection results are cyclically compared with the signal scenario from the previous processing cycles. The following events are reported:

- New signal (signal over threshold for first time)
- Change in characteristic of a known signal (activity status, change in level, bandwidth or center frequency)
- Inactive signal (signal level falls below detection threshold)
- End of signal reached

Detected signals are classified automatically.

For content recovery, the user can manually select signals from the list of detected/classified signals and start demodulation/decoding with the measured parameters. The user can also configure a rule-based automated workflow that independently handles the processing of the relevant signals (see page 12).

Manual processing of multiple signals



High performance detection of FSK2 signals

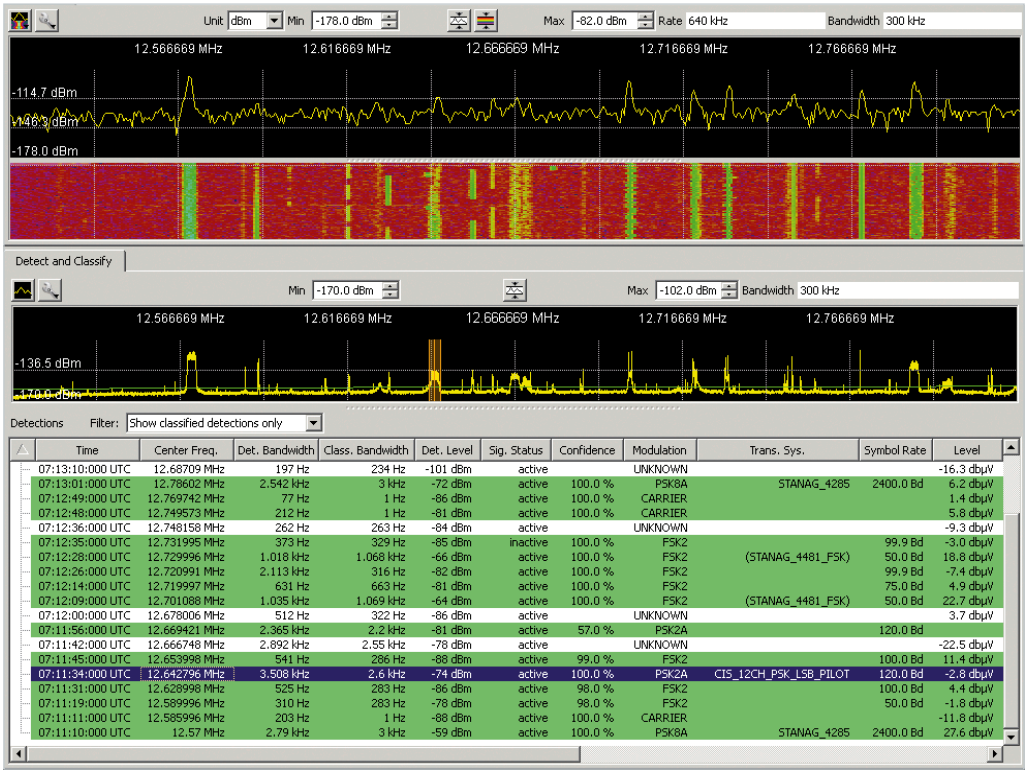
The correlative detector optimizes the detection of weak and specific FSK2 signals with very high reliability. Preknowledge of the included bit sequence and user-definable modulation parameters enable the correlative detector to monitor and search for targeted signals within a wideband spectrum. The detected signal will be further analyzed to determine the payload, demodulated payload, etc. The correlative detector is extremely beneficial for users who want to effectively detect predefined FSK2 signals.

Detection threshold and ignoring of frequency ranges

The automatically computed detection threshold adapts to the variable noise floor that is typical of a specific frequency range. In scenarios where certain signals or frequency ranges are of no interest, a list of frequency ranges to ignore can be included in the detector algorithms. The detectors will then stop generating messages for signals in these ranges.

Detection using a scanning receiver

For signal detection, the receiver is operated in scan mode, which means it can cover any frequency range. The automatic detector operates in the scan spectrum and detects signals as described above. To process (e.g. classify/demodulate/decode) detected signals automatically, the monitoring receivers' internal digital downconverters are used to extract signals if the receiver is in fixed frequency mode.



The automatic detection functionality informs the user about signals and events of potential interest.

HIGH-SPEED SPECTRAL SHAPE SEARCH

R&S®CA100 excels in detecting and identifying spectral shapes of interest within a wide, densely populated scenario.

Fast recognition of signals using spectral matching

The spectral shape detector is designed to search for known and unknown signals by performing spectral pattern matching. It is very fast and customizable (i.e. it searches for signals of interest as specified by the user). The decisions of the matching algorithm are based on many criteria within a comprehensive decision matrix, which allows the similarities between input signals and shape description sets to be reliably assessed. Owing to this unique algorithm, the spectral shape detector can operate effectively across wide frequency ranges, dense signal scenarios, and even under harsh radio conditions.

Fast recognition of spectral shapes has two other advantages:

- Known shapes of interest can be captured quickly (effective search)
- Known shapes that are not of interest can be ignored (efficient search)

Both capabilities will significantly speed up the work of a surveillance operator and are greatly beneficial for quick search applications.

Thanks to its high speed, the use of predefined shapes and the new search algorithm, the spectral shape detector provides the following features:

- Rapid: It accelerates spectral search by analyzing 1000 spectral shapes in less than 1 s
- Robust: It excels in dealing with varying and complex signal scenarios, by considering noise, fading and shifting sampling rates
- Reliable: It aims to effectively detect signals with distinct spectral shapes (e.g. CW, AM-DSB, multichannel and FSK signals) and also improves the reliability by feeding the recognized spectral shapes to the baseband classifier
- Reconfigurable: It enables users to define signal categories and configurations that suit their own wishes and needs

Enhancement of detect, search and classify workflows using detection list filtering

The spectral shape detector is designed to obtain optimized results and is especially useful for the following applications:

- Filtering spectral shapes of interest (e.g. identifying only those signals with a spectral shape that matches the shapes of signals of interest) before a baseband classifier/demodulator/decoder optionally starts analyzing and processing them in more detail
- Filtering out known and even unknown spectral shape types that are not of interest and do not need to be analyzed or processed in depth
- Extending the list of recognizable signals based on user-defined categories

The detector is provided with a database of spectral shapes. This is the spectral reference library. The patterns in the database can either be specific user-defined signal types with corresponding parameters, or predefined within the detector as generic signal types (i.e. CW, AM-DSB, multichannel and FSK signals).

To increase the robustness of the detector, several different instances of the same signal category are gathered and processed by the spectral collector. These are used by the spectral detector trainer, which “learns” to recognize and define these shapes in order to develop the spectral reference library. After this “training” phase has been completed, the detector is able to work with the live spectrum (the receiver can be in fixed frequency or scanning mode).

Spectral collector and spectral detector trainer

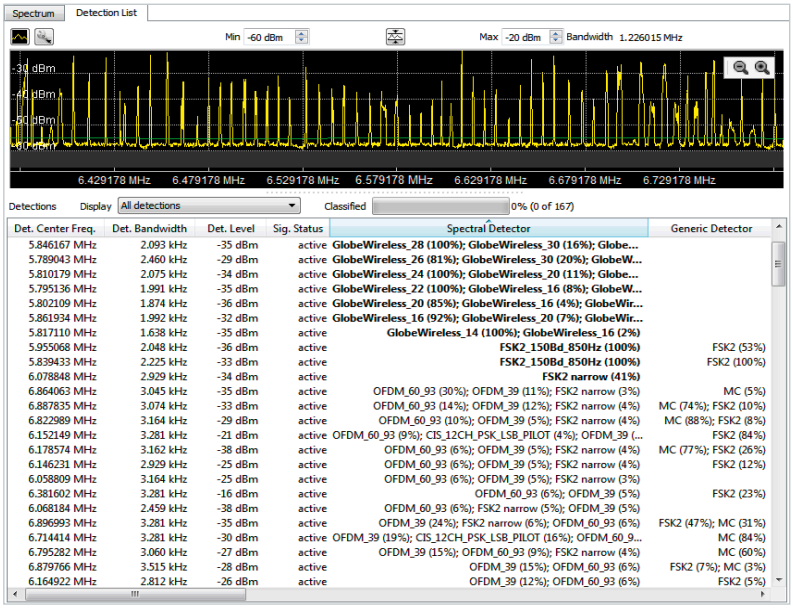
The spectral collector is a fully automatic application for identifying and collecting a reasonable number of signals (based on live or offline spectrum) that are suited for training purposes. Based on an automatic algorithm, it selects and gathers a number of spectral shapes that are representative of the signal of interest. These spectral shapes vary because they have been computed at different times (i.e. within a few seconds of the selection time). The spectral collector also manages the repeated collection of different emissions associated with the same signal category.

The spectral detector trainer is a standalone application for extracting relevant spectral information and identifying certain signal types based on a set of spectral sample data. The extracted spectral features define a specific category of signals. This information is used by the detector to recognize signals with similar spectral characteristics during a spectral shape search.

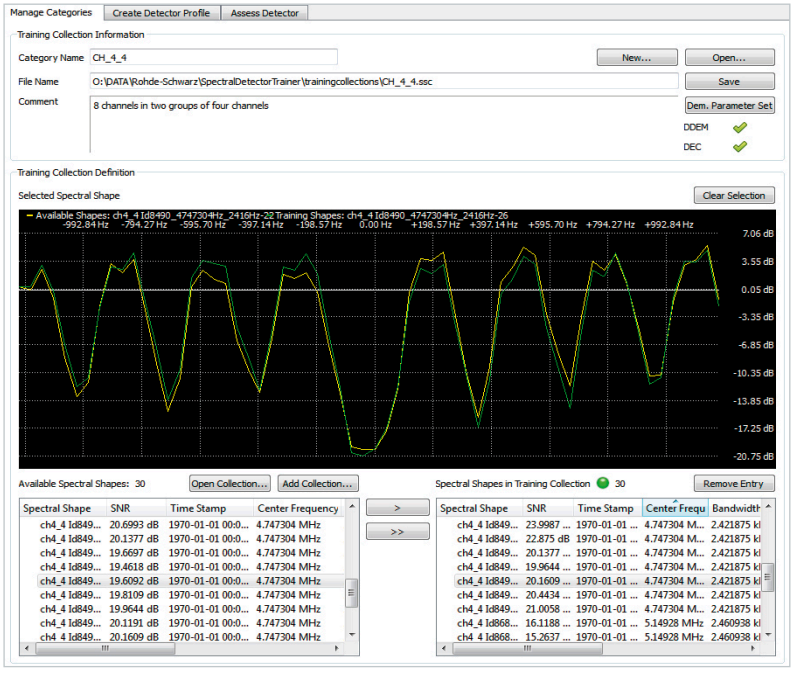
In order to train the detector, the user decides which signal types are of interest, collects the corresponding sample data and defines the desired signal categories. It is also possible to automatically create a training collection using the spectral detector trainer. Each signal category is represented by a reasonable number of spectral shapes (approximately 30) and defined in the spectral reference library.

The training is carried out based on a list of shape-describing features derived from the signals within the spectral reference library. In order to achieve a more reliable detection, the set of reference shapes used for training should include examples of degraded signals. This makes shape detection more robust against negative influences such as noise and fading.

Based on the input data from the spectral reference library, the spectral detector trainer creates a profile for the detector for each signal category. Using an automatic decision algorithm, the detector evaluates how well each detected signal matches the characteristics of the trained categories.



The conventional energy detector is combined with a high-performance spectral shape detector to enhance the signal search and recognition process. The screenshot shows the result of matching the library of generic and user-defined signal types by using the spectral shape detector.



Spectral detector trainer

REDUCED USER WORKLOAD DUE TO AUTOMATIC PROCESSING OF DETECTED SIGNALS

R&S®CA100 combines signal detection with configurable, automatic processing (classification, demodulation, decoding, content recovery, recording).

Automatic monitoring of signal scenarios

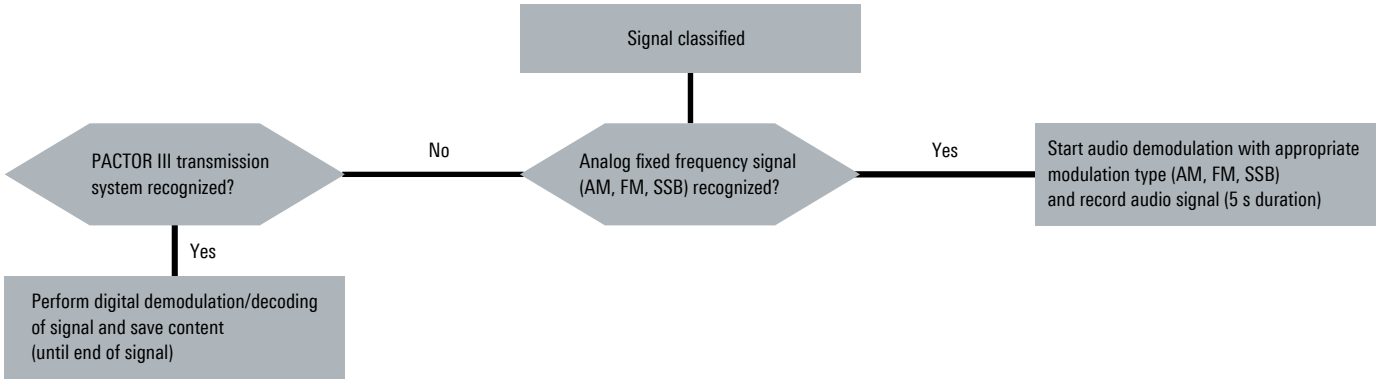
The most impressive benefit of R&S®CA100 is the combination of automatic detection and classification with fully automated processing of signals (demodulation, decoding, recording). This allows R&S®CA100 to independently monitor a wide frequency range and eliminate many routine tasks for the user.

The user defines a set of rules. For each signal, these rules are used to automatically and independently perform the following actions:

- Event triggering: The signal's technical parameters are associated with signal types of special interest. An event notification is generated and sent to the user immediately after recognition
- Recording: A snapshot of the signal (with predefinable length) is to be saved for subsequent processing.
  The digital IF is saved on a recording/replaying unit. It performs IF recording of the fixed frequency signal as well as wideband IF recording (with defined duration)
- Demodulation or demodulation/decoding: If the demodulators/decoders for the recognized transmission system are found in the library of R&S®CA100, then they are configured with the measured parameters and started. The signal content is recovered and saved. The maximum duration of the content snapshot can be predefined. Automatic processing includes the following:
  - Audio demodulation: performs audio demodulation of the fixed frequency signal and saves the audio data
  - Digital demodulation: performs digital demodulation of the fixed frequency signal and saves the symbol stream data
  - Digital demodulation/decoding: performs digital demodulation/decoding of the fixed frequency signal and saves the content

Application example for fully automatic signal processing

The user can simultaneously intercept various signal types with R&S®CA120. Example: For detected analog signals, the audio data is recorded (5 s duration). Detected digital PACTOR III signals are decoded until the end of the signal.

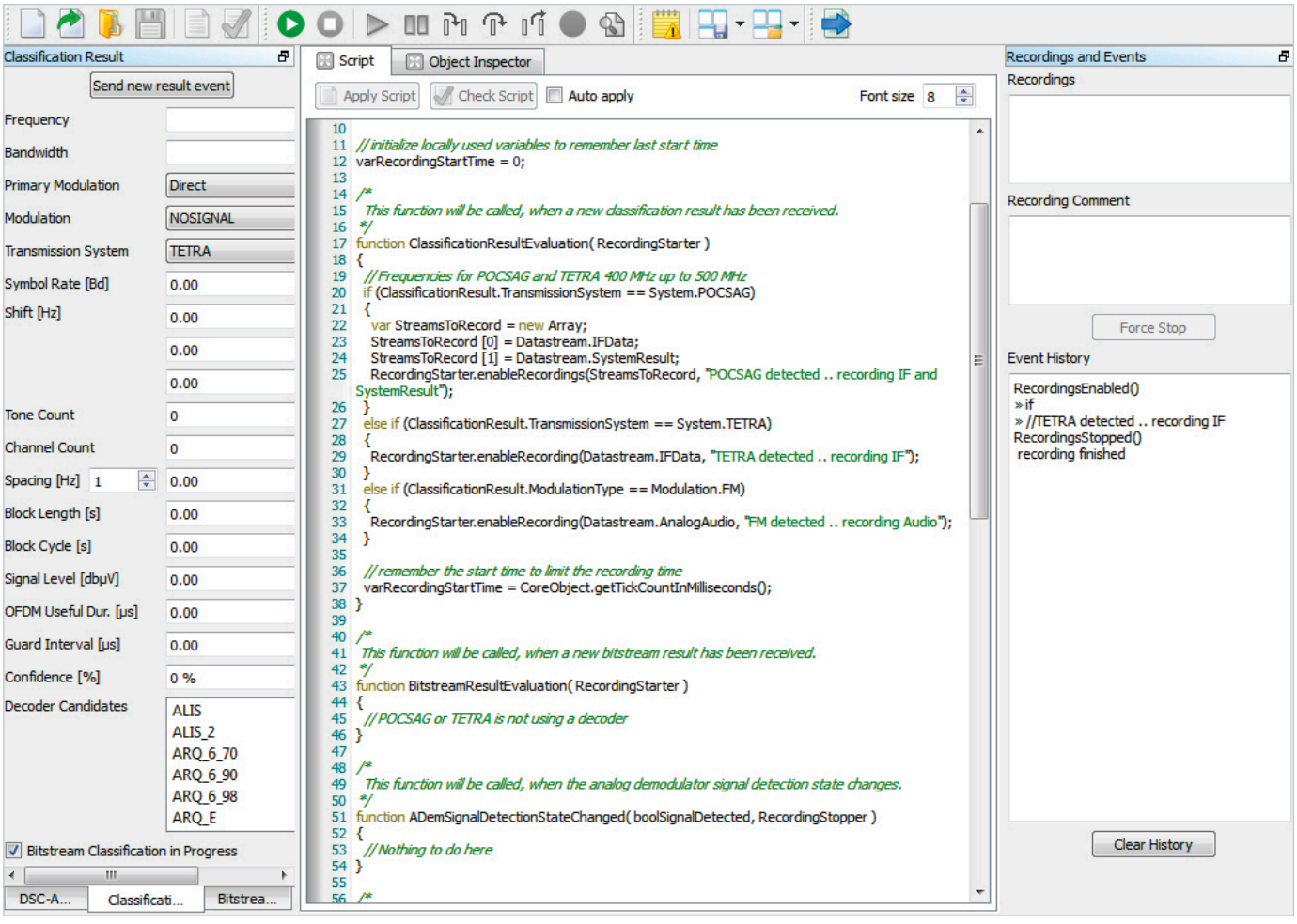


Fully automatic signal processing with user-defined rules via script editor

R&S®CA100 performs fully automatic processing using JavaScript scripts to trigger actions that control what is recorded or processed. These scripts make it possible to define conditions or criteria based on the relevant parameters. When these conditions are met, the script triggers the corresponding actions (predefined by the user). The script can also decide when a signal will be skipped and define how long a signal will be recorded if an action is triggered.

R&S®ScriptEditor provides an environment in which such scripts can be written, tested and debugged. This tool has been designed to allow a straightforward approach to script development and to reduce the effort involved in developing the scripts.

General overview of the R&S®ScriptEditor GUI, with the input fields that act as triggers (left), the central scripting area where analysis is performed (center) and windows where analysis results are shown (right).



GOING INTO DETAIL WITH MANUAL MEASUREMENTS

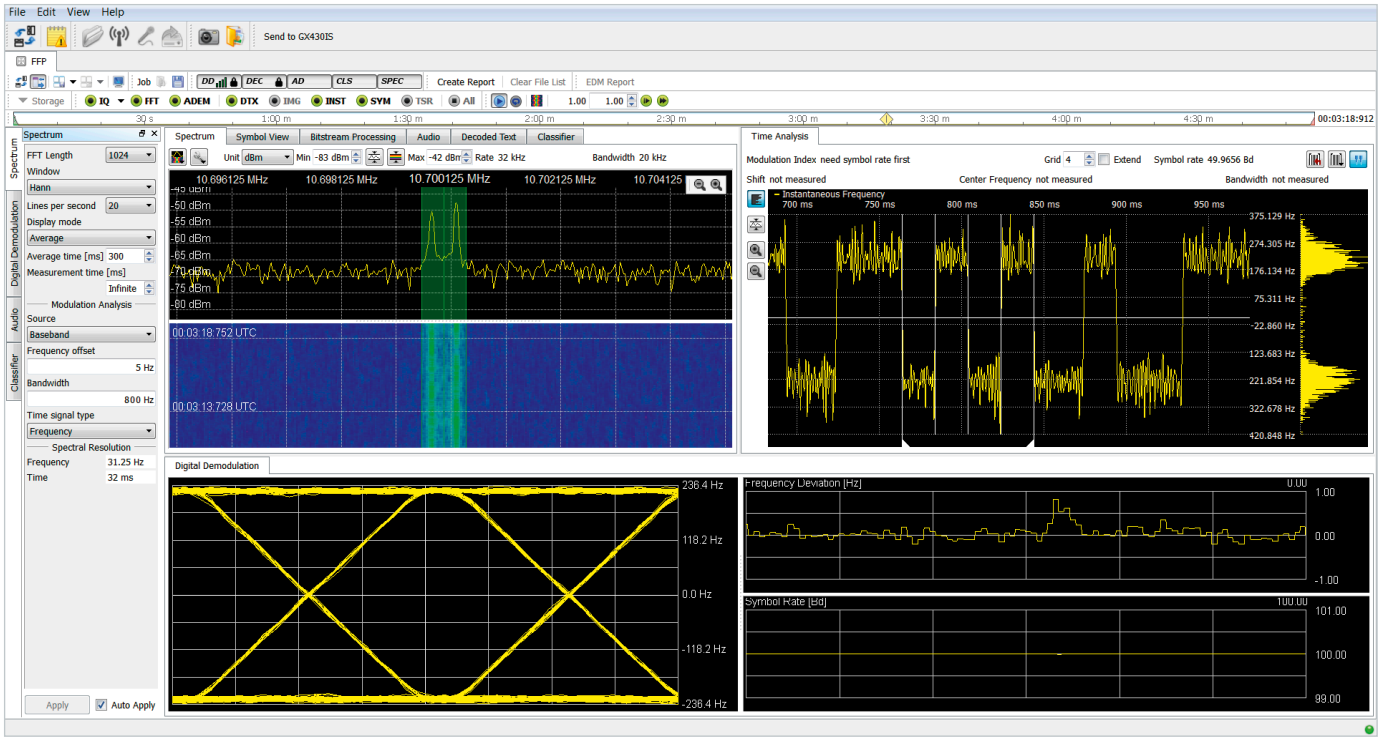
Manual measurements of emission characteristics

Manual measurements of emission characteristics (bandwidth, duration, S/N ratio, level) can be performed with measurement cursors in the zoomable spectrum. The filter bandwidth is automatically adapted to filter out all disturbing out-of-band emissions and noise.

Emission analysis

Emissions are analyzed using the time domain analysis functionality of R&S®CA100. Zoomable level, envelope, frequency, phase and spectrum plots make it possible to measure technical parameters such as level range, frequency shift and symbol rate.

Spectrum, time analysis and digital modulation.

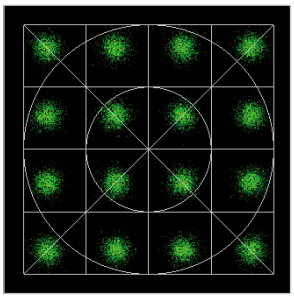


ANALYSIS OF SIGNAL SCENARIOS IN LINE WITH ITU-R SM.1600

Technical parameters of unknown signals

R&S®CA100 covers the measurement methods specified in the ITU-R SM.1600 recommendation. For unknown signals, it offers a variety of representations and tools for analyzing and measuring technical parameters such as bandwidth, symbol rate, number of tones, tone spacing, shift, modulation index, length of guard interval, number of channels, signal duration, symbol valency and modulation type.

QAM16 constellation diagram



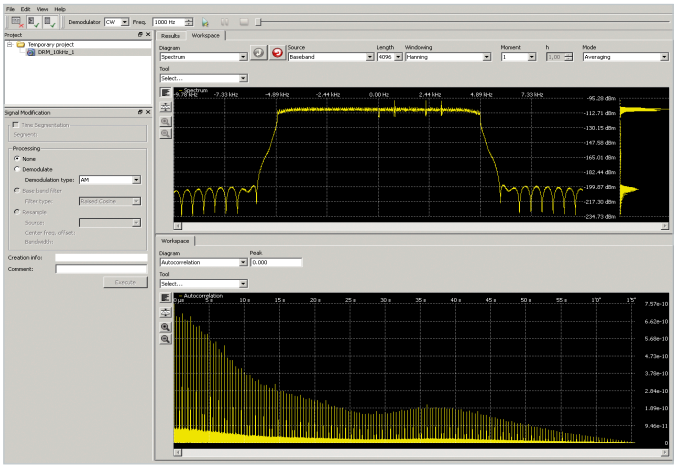
Recognition of known or standardized methods

For known or standardized methods (GSM, DECT, CDMA, etc.), correlation and pattern analysis techniques are available. The tools of R&S®CA100 allow quick recognition of preambles, training sequences and synchronization words of known methods.

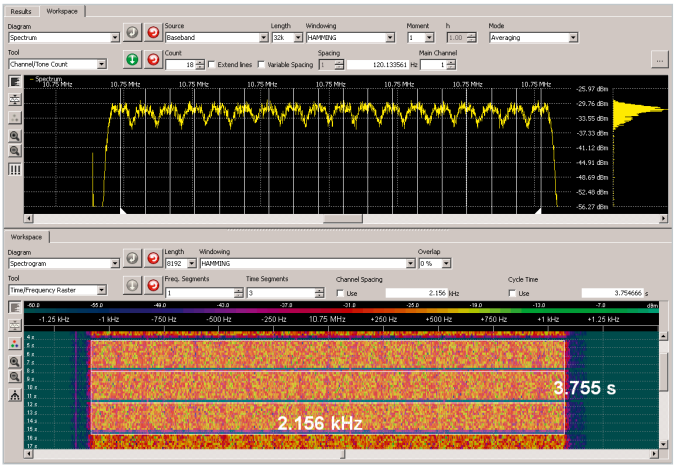
Advanced visualization

Time/frequency segmentation including filtering makes multichannel methods, noncontinuous emissions (bursts) and densely occupied signal scenarios easy to handle. (Coded) orthogonal frequency division multiplex ((C) OFDM) signals and methods using multiple modulation (e.g. AM-FSK, FM-FSK) can be easily measured and analyzed. I/Q constellation diagrams and eye patterns are available for evaluating the measured parameters and the equalizer settings.

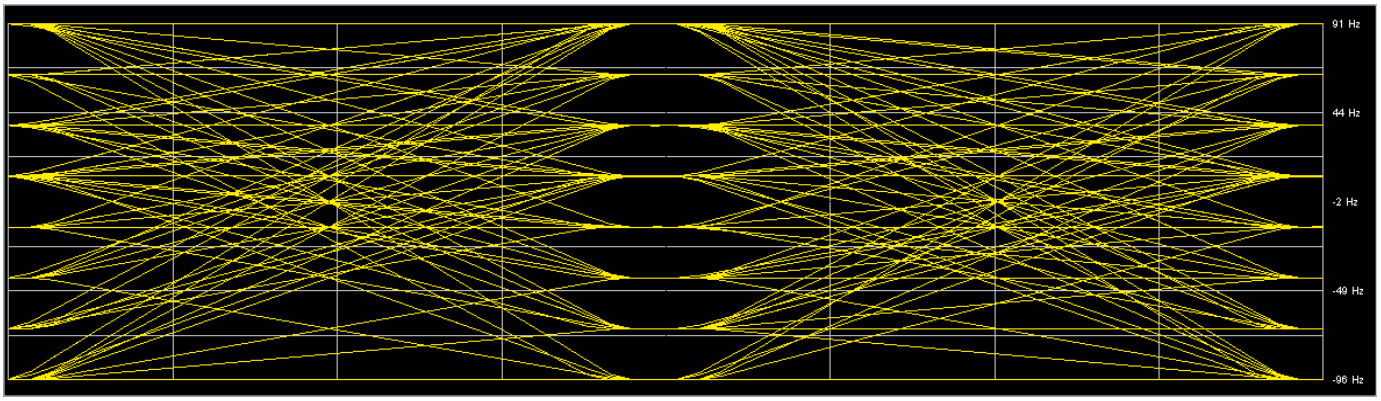
Spectrum and autocorrelation diagram



Counting the channels of a PACTOR III signal



Eye diagram of a multitone signal



DIVERSE OPPORTUNITIES FOR USER-SPECIFIC EXPANSION

R&S®CA100 provides the user with many ways to integrate user-programmed modules for signal processing (receiver driver, classifier, demodulator, decoder). As a result, users can deploy their own expertise in solutions in an independent manner.

Open programming interface for integration of user-specific modules

R&S®CA100 supports various Rohde&Schwarz monitoring receivers/digital direction finders and has a comprehensive library of universal demodulators, decoders and transmission systems. Moreover, the user can program diverse signal processing modules for integration into and use with R&S®CA100.

R&S®CA100 provides a C++ interface for integrating user-specific modules. Internally, user modules can contain components written in other programming languages such as C or MATLAB.

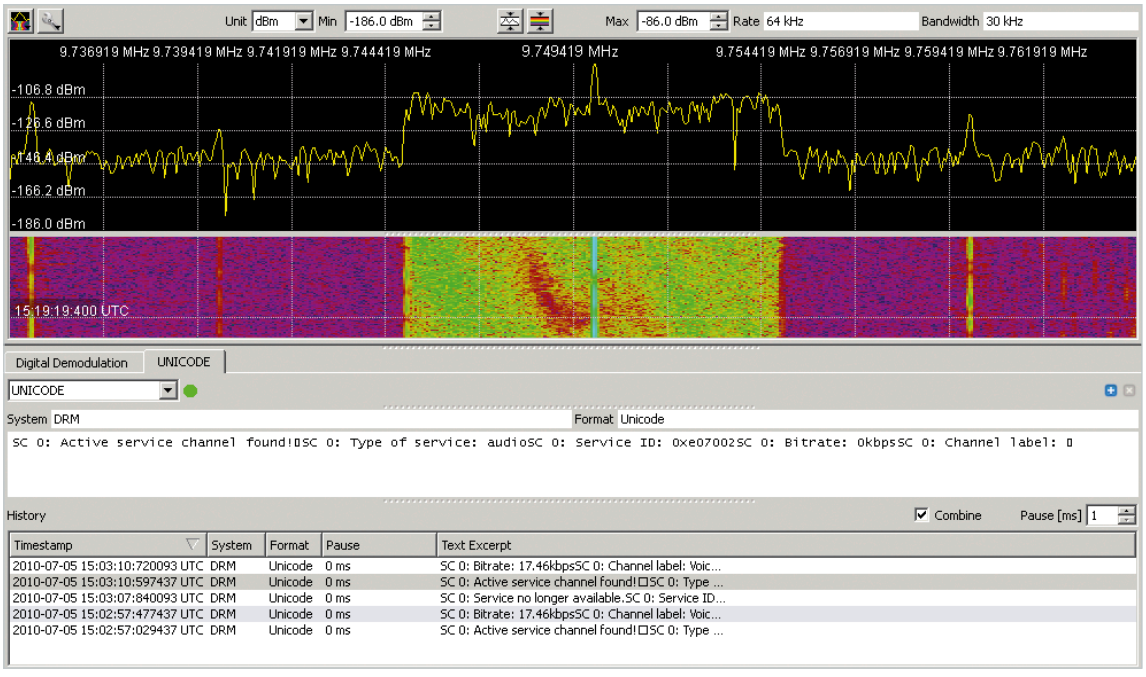
The user can program and integrate user-specific decoders in C++ programming language.

```
//! Create and send a "transmission system result" frame (text message)
int dd_send_text_data(typDDParams *ptrTypDDParams,
                                          typOwnParams *ptrTypOwnParams,
                                          ptypBIGTIME bigtimeTime,
                                          void *voidPtrParent)
{
    char strMsgBuf[80];
    unsigned int uMsgLen, uMsgLen32Bit, uFrameSize;
    char *cDest;

    typTRANSMISSION_SYSTEM_RESULT_FRAME *ptrTextDataFrame;


    // ---------------------- Prepare data ------------------------------------
    uMsgLen = sprintf(strMsgBuf, "Configuring. Audio: %s  Decimation step: %3u",
        (ptrTypDDParams->eAudioOnOff == GX_AUDIO_ON) ? "On " : "Off",
        ptrTypDDParams->uDecimation);

    // Length of the text message in bytes after 32-bit alignment
    uMsgLen32Bit = uMsgLen/pdemSIZEOF(ptypUINT);
  if(uMsgLen % pdemSIZEOF(ptypUINT))
    uMsgLen32Bit++;  // there a still less than 4 chars available - you need one more 32 Bit Word
```

Integration of a wide variety of user-programmed module types

The following types of modules can be integrated:

- Receiver control: The user module functions as a receiver driver for a third-party monitoring receiver. It converts the receiver commands from R&S®CA100 into commands for the other receiver and converts the receiver's digital IF into a format that R&S®CA100 can process
- Universal demodulation: The user module expands the universal demodulator library available with R&S®CA100. Based on the IF data stream for a signal, it performs demodulation and provides a symbol stream for further processing
- Decoding: The user module expands the decoder library available with R&S®CA100. Using a universal demodulator in R&S®CA100, the user module functions as a decoder, i.e. it decodes the demodulated symbol data stream and recovers information content. This is applicable to decoders that have fixed modulation parameters but different encoding types for the content
- Transmission system: The user module expands the transmission system library available with R&S®CA100. It functions as an independent transmission system in order to demodulate/decode the IF data stream from a monitoring receiver and recover the content. This is necessary with signal types for which a solution involving a universal demodulator and decoder is not feasible. This includes adaptive transmission systems (e.g. CLOVER 2000 and PACTOR III) in which certain information in the decoded data stream must result in immediate changes to the demodulator settings, as well as transmission systems that require specific equalization/synchronization
- Classification: Instead of a universal demodulator module, the user can integrate a signal classification module. This user module functions as a modulation type/transmission system recognizer in addition to the Rohde&Schwarz classifier. Limitations: The output of the classifier is used for result visualization only



Results delivered by the user-specific modules (here a decoder) are visualized in the graphical user interface.

RELATED SOLUTIONS

Comparison of R&S®CA100 versus R&S®CA120: The R&S®CA120 multichannel signal analysis solution and R&S®CA100 have similar features but are designed for different applications. R&S®CA120 is a flexible and automatic multichannel solution for detecting, classifying and processing radio communications signals. R&S®CA120 supports a wide spectrum of applications ranging from manual signal processing and analysis of an individual signal to fully automatic recognition and processing of all the signals in a wideband signal scenario.

Criteria	R&S®CA100	R&S®CA120
Detection mode	▶ only receiver scan ▶ detection and processing of signals is always sequential	▶ in FFM and receiver scan ▶ if the receiver is set to a fixed frequency range, detection and processing of signals is simultaneous
Maximum number of monitoring receivers supported in parallel	1	multiple
Maximum number of channels processed per monitoring receiver or DDF	4	128
Maximum number of channels processed while replaying a recorded signal scenario	1	128
Remote controllable via LAN or WAN	no	yes (with R&S®RAMON)
Integrated in typical R&S®RAMON workflows	limited integration with interfaces to R&S®RAMON system software	yes, full integration
Installed on	user PC, minimal required hardware configuration see R&S®CA100 specifications (PD 3606.9340.22)	R&S®CA120PU-S, R&S®CA120PU

TRAINING COURSES

The R&S®CA100 training courses offer a combination of classroom based theory lessons and practical exercises. Covering the most important topics, they help operators to effectively use the R&S®CA100 for signal analysis. The courses provide participants with the necessary knowledge to understand the workflow concept of R&S®CA100 for analysis of live and recorded signal scenarios. All courses are instructor-led with an interactive approach. The instructor uses a mixture of question and answer sessions, continuous assessment and a final exam to ensure effective knowledge transfer.

Course title (duration)	Target audience	Aim
R&S®CA100-TI R&S®CA100 introduction, (1 day/5 hours)	Decision-makers for signal analysis products	Attain basic product familiarity
R&S®CA100-TO R&S®CA100 operator training (5 days)	COMINT users, operators, supervisors, technical analysts	Attain operational familiarity with R&S®CA100
R&S®CA100-TS R&S®CA100 operator training ITU-R SM.1600 (3 days)	COMINT operators that want to use ITU-R SM.1600 measurement functions	Attain operational familiarity with R&S®CA100IS option for analysis of signal scenarios, in line with ITU-R SM.1600
R&S®CA1X0-TTU R&S®CA100/R&S®CA120 developer training for third-party tuner integration (5 days)	COMINT signal analysis module developers and integrators	Assist integrating third-party tuners with R&S®CA100/R&S®CA120
R&S®CA1X0-TDM R&S®CA100/R&S®CA120 developer training for third-party demodulator integration (4 days)	COMINT signal analysis module developers and integrators	Assist integrating third-party demodulators with R&S®CA100/R&S®CA120
R&S®CA1X0-TDC R&S®CA100/R&S®CA120 developer training for third-party decoder integration (5 days)	COMINT signal analysis module developers and integrators	Assist integrating third-party decoder with R&S®CA100/R&S®CA120
R&S®CA1X0-SAF signal analysis fundamentals training (5 days)	Decision-makers about COMINT solutions, COMINT operators and COMINT technical analysts	Attain basic knowledge about COMINT signal waveforms, signal processing devices (antennas, receivers, direction finders) and signal analysis concepts. Build-up pre-knowledge for signal analysis product operational trainings

ORDERING INFORMATION

Designation	Type	Order No.
PC-based signal analysis and aignal processing software (requires one of the following licensing options)	R&S®CA100	4102.0004.02
Licensing options		
Licensing of R&S®CA100 with USB dongle	R&S®CA100-U	4102.0062.02
Licensing of R&S®CA100 with SD card dongle	R&S®CA100-S	4102.0079.02
Licensing of R&S®CA100 with mini USB dongle	R&S®CA100-M	4102.0085.02
Options for single-channel processing		
Processing of digital signals	R&S®CA100DM	4102.0091.02
Classification [1]	R&S®CA100CL	4102.0104.02
Decoder package professional [1]	R&S®CA100DEC	4102.0110.02
Decoding of PACTOR II, PACTOR III and PACTOR IV [1]	R&S®CA100PIII	4102.0133.02
Decoding of CLOVER [1]	R&S®CA100CV	4102.0140.02
Decoding of CODAN 3012 [1]	R&S®CA100CO	4102.0156.02
Correlative detector [1]	R&S®CA100CDT	4102.0256.02
Wideband snapshot access [2]	R&S®CA100WSN	4102.0240.02
Options for multichannel processing		
Multichannel processing	R&S®CA100MCP	4102.0179.02
Detection, search and classification of fixed frequency signals	R&S®CA100DSC	4102.0185.02
Spectral shape detector [3]	R&S®CA100SDT	4102.0204.02
Automatic processing of detected signals [3]	R&S®CA100AP	4102.0191.02
Option for signal analysis		
Analysis of signal scenarios, in line with ITU-R SM.1600	R&S®CA100IS	4102.0210.02
Service option		
Service package, for R&S®CA100, software update (1 year)	R&S®CA100-SP	3705.8134.02

[1] Requires R&S®CA100DM option.
[2] Requires R&S®CA100CL, R&S®ESME or R&S®DDF260/DDF255/DDF205 with corresponding R&S®xx-RR option.
[3] Requires R&S®CA100DSC option.

Note:
Rohde&Schwarz licenses for R&S®CA100 are stored on a USB dongle, USB mini dongle or SD card. If the dongle or SD card is lost, stolen or misplaced, Rohde&Schwarz will not provide a replacement. All licenses stored on the missing device will have to be purchased again at full price.
In the unlikely event that a USB dongle, USB mini dongle or SD card is corrupt or broken, it will be replaced by Rohde&Schwarz only if the defective device is returned to Rohde&Schwarz. A moderate fee will be charged for producing and sending the replacement.

All options require the R&S®CA100 base version.

Operator training courses		
Designation	**Type**	**Order No.**
R&S®CA100 introduction	R&S®CA100-TI	3637.2518.02
R&S®CA100 operator training	R&S®CA100-TO	3637.2682.02
R&S®CA100 operator training ITU-R SM.1600	R&S®CA100-TS	3637.3895.02
R&S®CA100/R&S®CA120 developer training for third-party tuner integration	R&S®CA1X0-TTU	3637.2482.02
R&S®CA100/R&S®CA120 developer training for third-party demodulator integration	R&S®CA1X0-TDM	3637.2499.02
R&S®CA100/R&S®CA120 developer training for third-party decoder integration	R&S®CA1X0-TDC	3637.2501.02
Signal analysis fundamentals training	R&S®CA1X0-SAF	3637.4685.02

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PD 3606.9340.12 | Version 10.00 | May 2025 (ch)
R&S®CA100 PC-Based Signal Analysis and Signal Processing Software
Data without tolerance limits is not binding | Subject to change