go2signals

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GO2SIGNALS
MONITORING
AND ANALYSIS

V **26.1**

go2 signals

GO2SIGNALS IS AN INNOVATIVE SOFTWARE PACKAGE, DESIGNED TO MEET TODAY'S TACTICAL AND STRATEGIC REQUIREMENTS IN THE FIELDS OF RADIO-MONITORING, COMMUNICATIONS INTELLIGENCE AND ELECTRONIC SURVEILLANCE.

GO2SIGNALS IS EXACTLY WHAT YOU NEED

go2signals covers the full spectrum of **software-based** signal processing. From SLF to SHF, specializing in HF and V/UHF signals. It offers functionalities for searching, monitoring, processing and analysis of **radio signals**.

These capabilities are used for the intercept and monitoring of Frequencies and Signals Of Interest in the RF spectrum to derive Indications & Warnings for Situational Awareness. **Automation** features enable the separation of Signals Not Of Interest to focus on those emissions which will deliver the insight required by the decision-maker. You can **optimize** the operator's workload to keep up with the evolving signal environment by focusing on new and unidentified **emissions.**

All of this enables the implementation of extensive use cases and operational scenarios in land, sea and air environments for military and civil use.

PROTECTION THROUGH KNOWLEDGE

Wireless communications signals are an indicator of the current situation. go2signals enables the capture, evaluation and understanding of the surrounding signal environment.
The suite provides all the necessary capabilities for capturing signal parameters, meta-information and content. This knowledge enables confident decision making to develop the intelligence picture and stabilize the security situation; decision quality is enhanced due to trust in the derived results.

go2 signals
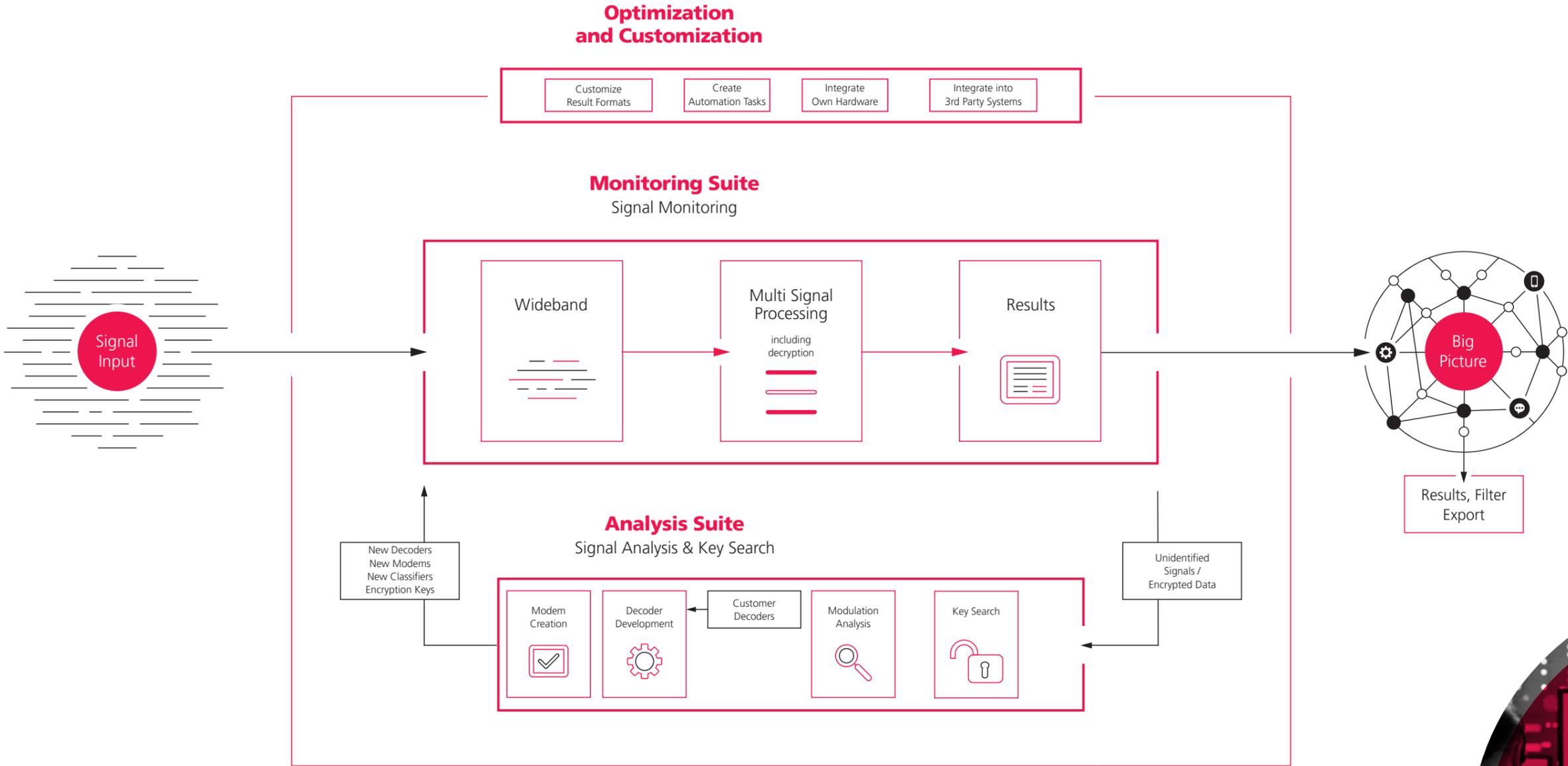### THE MOVIE
www.procitec.com/company

GO2SIGNALS WORKFLOW

With go2signals you have the whole range of communication signal processing capabilities at your disposal.

This workflow starts with the Monitoring Suite which offers the main working environment to determine the 'big picture' from all signals received.

The Analysis Suite helps to adapt to new and unknown signals by creating new classifiers and decoders. With the ability to import them into the Monitoring Suite workflow to improve its capabilities.
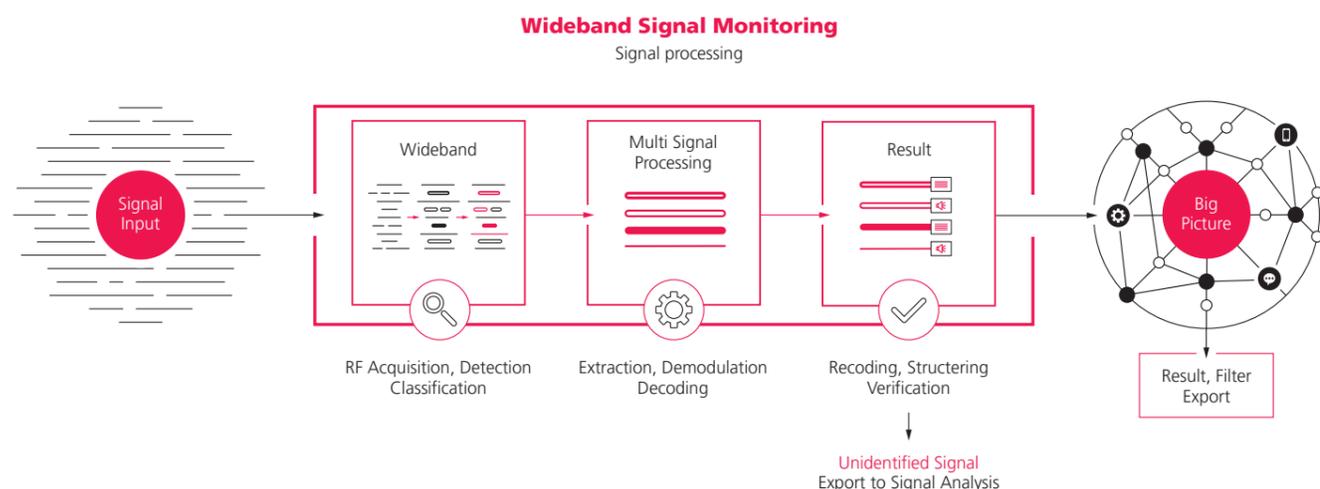
Optimizations and Customizations enable tailoring and automation of the output / results in relation to quality, quantity, and reliability to satisfy the mission-specific needs of the customer. In turn, this enables the management of available resources in the most efficient way, delivering the best possible results.

Optimization and Customization

| Customize Result Formats | Create Automation Tasks | Integrate Own Hardware | Integrate into 3rd Party Systems |

Monitoring Suite
Signal Monitoring

Signal Input

Wideband

Multi Signal Processing
including decryption

Results

Big Picture

Results, Filter Export

Analysis Suite
Signal Analysis & Key Search

New Decoders
New Modems
New Classifiers
Encryption Keys

Modem Creation

Decoder Development

Customer Decoders

Modulation Analysis

Key Search

Unidentified Signals / Encrypted Data

SIGNAL MONITORING

Detect, intercept and process signals automatically or manually. Monitor an entire wideband frequency range and interact with lots of signals and channels simultaneously.

- Identify SOI's faster and react more quickly
- Save time by automation of processing chains and focus on the signal content
- Monitor frequency bands, stay on track
- Save time and system resources

Wideband Signal Monitoring
Signal processing

Signal Input → Wideband | Multi Signal Processing | Result → Big Picture

RF Acquisition, Detection Classification | Extraction, Demodulation Decoding | Recoding, Structuring Verification

Result, Filter Export

Unidentified Signal
Export to Signal Analysis

RF INPUT

Getting the ‚big picture' starts with receiving RF signals. go2signals supports a wide range of common narrow- and wideband receivers. Connect receivers either with existing drivers or based on open interfaces e.g. ExtIO, SoapySDR or VITA 49.

- Start right out of the box: Software adapts to sampling rates and data formats; no manual configuration is required.
- Control multiple wideband receiver models even sourced from different manufacturers, using the same user-friendly GUI. This saves time and reduces operator workload and skill fade.
- Memory Step and Memory Scan enable automated band stepping and sweeping capabilities even on Low Size, Weight and Power hardware platforms such as laptop PCs. This saves money and facilitates mobile use.
- The plugin interface allows integrators and receiver manufacturers to connect their receivers with features such as multichannel inputs, overview spectrum, receiver control and more.

WIDEBAND DETECTION AND CLASSIFICATION

Wideband processing is one of the strengths of go2signals. Signals are detected and classified directly in the band, all in parallel, fast and reliably. Even wideband emissions and short bursts are recognized in this way and complete emissions are tracked. Signals parameters such as frequency, energy, duration, modulation type and modem type etc. are used to filter and clarify results to maintain the Situational Awareness picture.

- Detection and classification of all in-band signals immediately and at the push of a button.
- The use of these signal parameters classified directly from the wideband input makes it easy to identify SOIs.
- Continuous classification and tracking of all emissions in automatic mode.
- Analogue voice and modulation classification of digital modems with an extensive modulation type library: Standard, PMR/SAT and MIL.

MULTI CHANNEL PROCESSING

Signals of Interest are assigned manually or automatically from the wideband spectrum to the multi channel processing capabilities.

Signals are processed according to types: analogue signals are demodulated, digital voice and data transmissions are demodulated and decoded. With multi channel processing no signal is lost, even in the case of highly occupied frequency bands.

go2signals combines 35 different demodulators and around 200 decoders supporting more than 350 available modem types bundled in Standard, PMR/SAT and MIL packages. Custom decoders are easy to develop and integrate using the Decoder Development Environment.

- Each processing channel provides full processing features including classification, recording, demodulation and decoding. Features of the channels are not restricted.
- Extensive decoder library: Standard, PMR/SAT and MIL.

SIGNAL MONITORING SUITE

1. Receiver input overview and control

2. Wideband streaming input spectrogram and spectrum

3. Wideband classifier results

4. Automatic monitoring mission control

5. Selected manual decoding channel:

   a. Input spectrogram

   b. Classifier results

   c. Automatic modem recognition

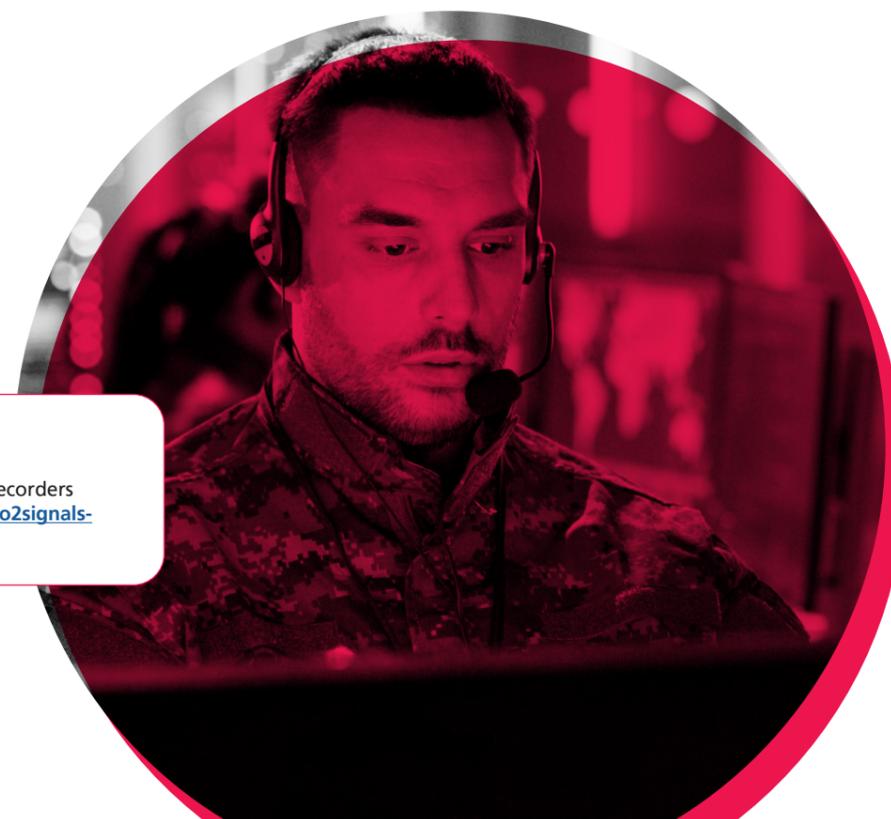   d. Decoded text output and live listening

RESULTS

The internal results database stores every result, meta-data, content and recordings from „Detection and Classification" and „Multi Channel Processing". Modem and protocol specific, automatic post-processing scripts are used to extract important information from decoded text such as sender and recipient IDs or position data. To work on results go2signals includes the ResultViewer, a special tool for filtering, displaying, replaying, tagging, structuring, combining and exporting the results to assist in development of the ‚big picture'.

- All results are automatically stored and structured in a database
- Automatic post-processing is pre-defined or by customer scripting
- Results are in tabular or graphical representation and can be exported to 3rd-party analysis applications
- Powerful filtering, sorting, grouping, marking, audio-monitoring, viewing, editing and exporting options

MANUAL AND AUTOMATIC

Live monitoring or offline processing of results, fully automatic processing or manual control, or a combination of each, go2signals supports different processing modes to meet the users' needs. With AMT (Automatic Monitoring and Tasking), plan your mission in advance, trigger on SOIs and develop the ‚big picture' fully automatically; even full autonomous processing is possible.

- Monitor the entire signal environment in one frequency range automatically (HF/V/UHF)
- Complete input buffering to capture the entire signal (first bit)
- Dynamically shared resources to optimize hardware performance
- Mission and task control using operator-defined prioritization
- Task defining and mission planning including trigger setting and definition of start/stop criteria
- Alert based on signal events (popup display)
- "Scheduling" activating automatic execution of routine tasks at user-defined time periods
- Detection of short-duration and sporadic signals
- Automatic processing of large customer-derived signal recording libraries (Bulk File Processing)

MONITORING SUITE

Technical Specifications Document
www.procitec.com/go2signals-specifications-monitoring

DECODERLIST

List of all available Decoders
www.procitec.com/go2signals-decoderlist

GO2SIGNALS FOR INTEGRATORS

Brochure
www.procitec.com/go2signals-brochure-integrators

SIGNAL ANALYSIS

Identify new SOI activations faster, make signal parameters and content available for further analysis and evaluation, analyze bit streams and create new customer-specific decoders and classifiers. Simulate signals for testing and training purposes.

- All analysis and decoder development tools in a single toolbox
- React to new or changing signals
- As SOIs change, the signal processing solution will adapt
- User expertise flows straight into the application, no knowledge transfers to third parties necessary

Signal Analysis
Adapting to new or unknown signals
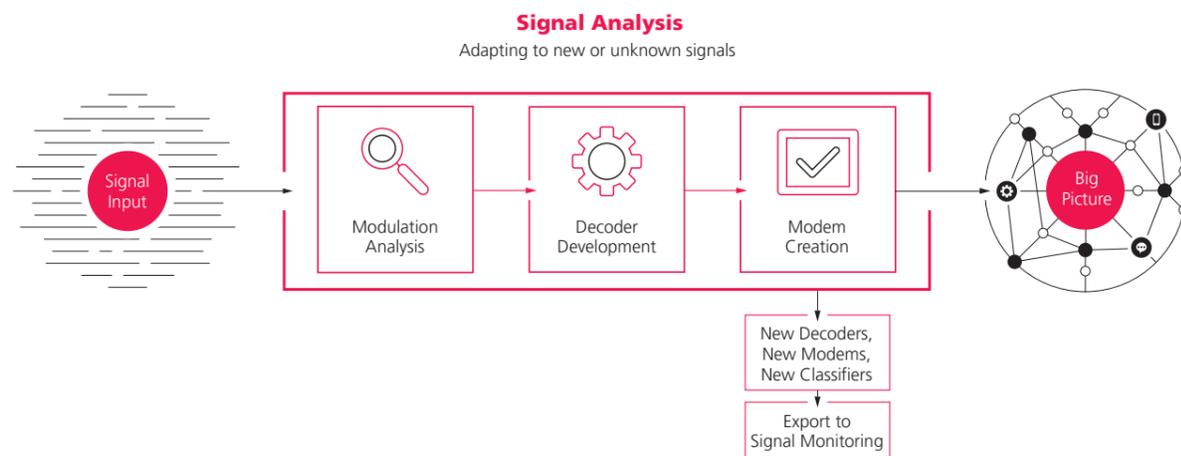
MODULATION ANALYSIS

go2signals Modulation Analysis tools are used to measure technical parameters of unidentified signals and determine new modem and signaling types. With its parametrizable demodulators data content is extracted for further Decoder Development. The signal world is constantly changing, go2signals helps to stay current.

- Comprehensive set of built-in analysis tools
- Special modulation and code analysis features for communications signals
- Individual analysis displays supporting precise, analytic measurements
- Simulate complex signals and signal scenarios

DECODER DEVELOPMENT

go2signals has its own Python-based Decoder Description Language (pyDDL), enabling its users to create their individual decoders, add existing decoders, or customize the output of currently available decoders. Therefore, all decoders are written in pyDDL and the source code is supplied with most. The Decoder Development Environment covers the full range of software development functionality including code editing, code analysis, testing and more.

- React to new or changing signals with flexibility: Create and edit individual decoders
- Employ individual knowledge in customer-specific decoders
- Specialized set of commands for pre-processing, searching, reading, transformation and output formatting
- Visualize, evaluate and process demodulated bitstreams
- Check and verify unidentified bit streams against known / existing decoders
- Search for repeating and non-periodic patterns and recursive sequences
- Utilize a full decoder development environment with an integrated debugger

MODEM CREATION

Save the results (modulation parameters and decoder) as a new modem (,Modem Descriptor File') for go2signals to use for automatic and manual processing.

- Universal, freely parameterizable demodulators
- Free linking of demodulator and decoder
- Use of a generic file format, usable in all go2signal tools
- Stay independent and protect users' decoder expertise

ANALYSIS SUITE
Technical Specifications Document
www.procitec.com/go2signals-specifications-analysis

DECODERLIST
List of all available Decorders
www.procitec.com/go2signals-decoderlist

SIGNAL ANALYSIS DISPLAYS

Smart measurement, analysis and processing methods simplify the manual signals analysis process. Easily derive detailed measurements using configurable display parameters and cursor functions.

- Measure signal-specific parameters such as modulation type, symbol rate, frequency-shift and phase-constellation parameters
- Simplify the analysis process with a variety of technical resources including classification and preset modulation-specific measurement templates
- Choose from various analysis and processing methods (binary, signal squaring, Hellschreiber and I/Q representation, histograms etc.)
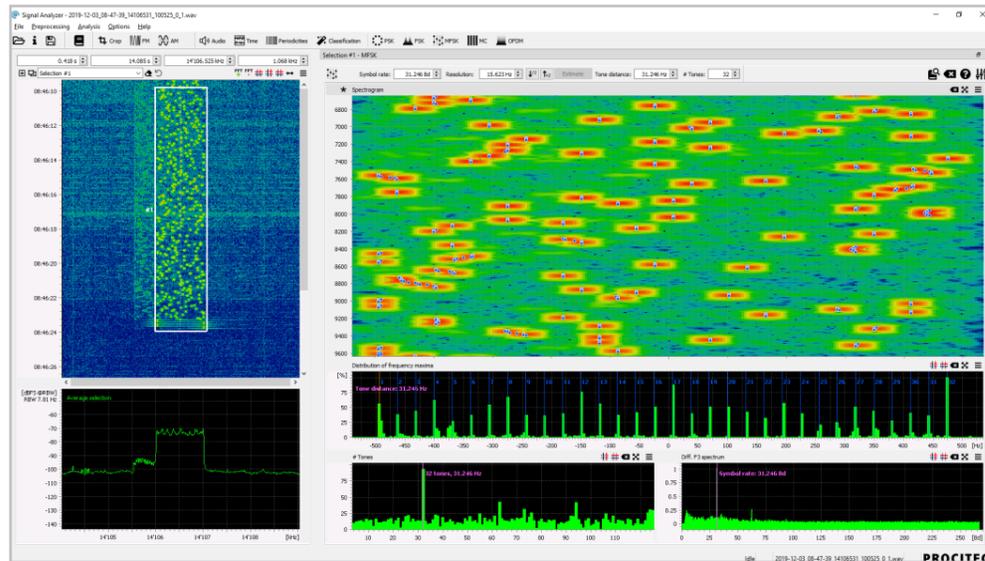
Multitone analysis: Just select the signal in the recording and you get all modulation parameters

KEY SEARCH

Most mobile radios are using encryption methods to protect the communication of their user groups. go2key provides the ability to automatically find the right keys for the decryption of the ARC4 cipher algorithms within a short sample from an emission. In combination with go2signals it is possible to use these keys as parameters in your DMR decoders to decrypt the content of the conversation.

- Uses short samples as input
- Automatically find the keys for ARC4 cipher algorithm (e.g. Motorola Enhanced) of DMR radios
- Add these keys to go2signals DMR decoders
- Listen to encrypted voice, get encrypted data

OPTIMIZATION

go2signals works right out of the box. Nevertheless, it offers many options to customize and optimize results, processing and integration into your sensor and receiver systems.

CONNECT OWN HARDWARE

- Most common receivers are natively supported
- Supports receiver standard interfaces such as ExtIO, SoapySDR and VITA 49
- Adaptable connection to DF (Direction Finding) Sub-systems
- Receiver vendor plugin available (RCM-Plugin)

CUSTOMIZE AUTOMATIC PROCESSING

- Generate and adapt automatic mission tasking
- Manage and organize tasks in missions for fast switching
- Trigger on signal energy, modulation, modem type, etc
- Time and position-dependent task control
- Mass file data processing (Bulk File Processing)

CUSTOMIZE RESULT OUTPUT

- Adapt decoder output using Decoder Development tools
- Add bespoke post-processing scripts to filter and to automate the processing of the decoder output
- Add customer structured result scripts
- Add bespoke export scripts to customize output formats
- Time triggered automatic export scripting

SYSTEM INTEGRATION

- Tailored system integration
- Flexible integration options - GUI based or API based full backend integration
- Scalable in number of channels, bandwidth, level of automation and decoder set up to match and exceed your systems' and customers' requirements

GOOD TO KNOW

Standard training

- Basic training, software training and tactical training courses
- For further details contact sales@procitec.com

Support

- Personalized services at expert levels
- Customizable support levels

Software update service

- 2 updates / year with software update contract
- Keep up with the times in a constantly evolving world of signals

License & export

- Dedicated (hardware based / dongle) or floating license
- Some go2signals product options require export approval prior to supply

PRODUCT GLOSSARY

SUITES

MONITORING SUITE	Bundles all products around monitoring and signal production
ANALYSIS SUITE	Bundles all products around signal analysis, signal simulation and decoder development
COMPONENTS SUITE	Bundles all products around integrable system components

PRODUCTS

GO2MONITOR	Radio monitoring, signal classification, signal decoding and signal recording software solution for complete signal scenario surveillance (HF, VHF, UHF, SAT bands)
GO2MONITOR LOWSWAP	Radio monitoring, signal classification, signal decoding and signal recording software solution for complete signal scenario surveillance (HF, VHF, UHF, SAT bands) optimized for low-SWaP equipment
GO2MONITOR OPERATOR	Application for setting up additional operator stations for manual signal processing and result viewing for an existing central go2MONITOR system
GO2MONITOR RESULT	Application to set up an additional workplace for go2MONITOR result processing
SCL	Software integrable automatic signal modulation and modem classification C++ library
GO2DECODE	Analysis, demodulation and decoding of known and unknown radio signals. Creating and editing of customerdefined modems and decoders
GO2MODEM-STUDIO	Create, edit and test modem definitions files and customer decoders to enhance detection and decoding capabilities in go2MONITOR
GO2SIGNAL-ANALYZER	Manual and automated modulation analysis in an outstanding user-friendly way. Easy and fast analysis of unknown signals.
GO2ANALYSE	Analysis, evaluation and manipulation of bit streams for the determination of coding characteristics
GO2KEY[2]	Automatic key detection for ARC4 (e.g. Motorola Enhanced) of DMR radios

PRODUCT OPTIONS

PMR-DECODERS[1]	Additional set of PMR and SAT recognizers, demodulators and decoders
MIL-DECODERS[2]	Additional set of military demodulators and decoders
WCL-10/20	Enhance coherent wideband input up to 10 and 20 MHz (1 and 2.5 MHz HF)
WBR-10/20	Enhances wideband recording and playback up to 10 and 20 MHz
WMPC-16/32	Extends the number of automatic (option AMT is required) classification, demodulation and decoding channels up to 16, 32 or more (in steps of 32)
AUDIO-32	Add additional channels with analog audio functionality only to the production channels already available in go2MONITOR to a total of 32 channels
AMT	Multi channel full automatic task based monitoring (decoding, recording, classification)
NRC-4/8	Allows input and control of 4 or 8 handoff receivers
HOPPERDETECTION[2]	Recognition and recording of frequency-hopping signals in the complete input bandwidth with AMT (use option WBR-20 to enlarge recording bandwidth)
OFDM ANALYSIS	Provides a set of tools specialized in the analysis and demodulation of Orthogonal Frequency Division Multiplexing (OFDM) modulated signals for Signal Analyzer tool.
RCM FRAMEWORK	Receiver control framework for customer integration of own receiver hardware
REMOTECONTROL API	System remote control C++ library and API interface for go2MONITOR

GO2SIGNALS FOR INTEGRATORS
Brochure
www.procitec.com/go2signals-brochure-integrators

EXAMPLE USE CASES

Additional use cases or product configurations on request.

	Manual monitoring of wideband HF/VUHF signal scenarios	Automatic monitoring of wideband HF/VUHF signal scenarios	Semi-automatic monitoring of wideband HF/VUHF signal scenarios on low SWaP hardware	Signal modulation analysis	Automatic search key for ARC4 encrypted DMR radios	Add customer-defined decoders	Integrate modulation and modem classification in external software	Integrate full signal monitoring in external software
MONITORING SUITE								
GO2MONITOR-1/2/4/8	●	●						●
MIL-Decoders	○	○						○
PMR-Decoders	○	○						○
WCL-10/20	○	○						○
WBR-10/20	○	○						○
AUDIO-32	●							●
AMT		●						○
WMPC-16/32		○						○
NRC-4/8		○						○
Hopperdetection		○						○
RemoteControl API							○	●
RCM Framework								
GO2MONITOR LOWSWAP			●					
MIL-Decoders			○					
PMR-Decoders			○					
RCM Framework								
GO2MONITOR OPERATOR	○	○						○
GO2MONITOR RESULT		○						○
ANALYSIS SUITE								
GO2DECODE STANDARD			●					
MIL-Decoders			○					
PMR-Decoders			○					
GO2DECODE PROFESSIONAL	○	○	○			●		○
MIL-Decoders	○	○	○			○		○
PMR-Decoders	○	○	○			○		○
GO2ANALYSE						●		
GO2MODEM-STUDIO						●		○
GO2SIGNAL-ANALYZER				●				○
GO2KEY					●			○
COMPONENTS SUITE								
SIGNAL CLASSIFIER LIBRARY (SCL)							●	

● = required   ○ = optional