



**Technical
Specifications**

Analysis Suite

Product Version v22.1

January, 2022

ANALYSIS SUITE PRODUCT CONFIGURATIONS	
go2DECODE STANDARD	<ul style="list-style-type: none"> • Software for detection, demodulation, decoding and analysis of known and unknown radio signals • Knowledge based recognition approach • Automatic production of signal content • Speech detection and recording • Standard set of demodulators and decoders HF/VHF/UHF/SAT • Allows parameterization of decoders • Display for signal monitoring • Handling of modem lists • Universal configurable demodulators • Displays and tools for signal analysis
go2DECODE PROFESSIONAL	<ul style="list-style-type: none"> • Software for detection, demodulation, decoding and analysis of known and unknown radio signals. • Integrated decoder development environment for the development of customer decoders or the adaption of existing decoders (based on the decoder description language pyDDL). • Knowledge based recognition approach • Automatic production of signal content • Speech detection and recording • Standard set of demodulators and decoders HF/VHF/UHF/SAT • Allows parameterization of decoders • Display for signal monitoring • Handling of modem lists • Universal configurable demodulators and editable decoders • Displays and tools for signal analysis • Software based modulation generator • Decoder Debugger
go2DECODE LIGHT	<ul style="list-style-type: none"> • Software for detection, demodulation and decoding of known radio signals • Knowledge based recognition approach • Automatic production of signal content • Speech detection and recording • Standard set of demodulators and decoders HF/VHF/UHF/SAT • Display for signal monitoring
go2ANALYSE	<ul style="list-style-type: none"> • Software for analysis, evaluation and manipulation of recorded bitstreams to determine the characteristics of the coding used • Configurable bit displays • Functions for editing, manipulation and analysis • Logical operations • Search of periodics and bit pattern • Handling of LFSR • Complete and partial autocorrelation • Testing against codes • Deinterleaving and demultiplexing • Recording and replay of analysis operations • Configurable code tables • Functionality partly adaptable by a scripting language

go2DECODE	
DATA ACQUISITION	<ul style="list-style-type: none"> • Digital IF stream (complex baseband I/Q); Soundcard (real or complex) • Digital IF/AF recordings (real / complex WAV 8, 16, 32 Bit, TCI cap file format)
LANGUAGE	<ul style="list-style-type: none"> • English or German
RECOMMENDED PC HARDWARE	<ul style="list-style-type: none"> • Notebook or Desktop; CPU: Intel i5 or higher, min. 2.6 GHz; • Memory: ≥ 2 GByte RAM, HDD: ≥ 10 GB, • Screen Resolution min. 1280 x 1024 Pixel, • Soundcard for analogue IF input, 1 GBit/s Ethernet for digital IF input
OS	<ul style="list-style-type: none"> • Windows 10/11 de/en, 64 bit • Windows 7 SP1 (with Microsoft Windows patches KB2999226 and KB2533623, deprecated) de/en, 64 bit • CentOS Linux 7 (7.5 or higher, 7.5 is recommended), 64 bit • Red Head Enterprise Linux RHEL 8 (8.4 recommended), 64 bit
LICENSE	<ul style="list-style-type: none"> • USB-Dongle (CodeMeter) as default • Optional: License sharing with license server • The AMBE+2™ voice coding Technology embodied in this product is protected by intellectual property rights including patent rights, copyrights and trade secrets of Digital Voice Systems, Inc. This voice coding Technology is licensed solely for use within this Licensed Product. The user of this Technology is explicitly prohibited from attempting to extract, remove, decompile, reverse engineer, or disassemble the object code, or in any other way convert the Object Code into a human-readable form. US Patent Nos. #8,595,002, #8,359,197, #8,315,860, #8,200,497, #7,970,606, #6,912,495 B2, #6,199,037.
ISO 9001:2015	<ul style="list-style-type: none"> • Company is certified

go2DECODE PRODUCT FEATURES

ALPHABETS	<ul style="list-style-type: none"> • Can be added to the decoder source code, free configurable (requires go2DECODE Professional)
DECODERS	<ul style="list-style-type: none"> • Our list of standard, military and PMR decoders is subject to continuous development. See the list of available decoders: www.procitec.com/go2signals-decoderlist <ul style="list-style-type: none"> - MIL and PMR decoders may need an End-User-Certificate (depending on the country of the user) - If not implemented automatic sideband detection can be achieved via two modems set to inverse sidebands - A gap between message bursts and acknowledge burst must be detectable - Separation of slow selcall types cannot be guaranteed - Slow multitone modems are recommended to operate with fixed nominal frequency
VOICE DETECTION, DEMODULATION, RECORDING	<ul style="list-style-type: none"> • Modulation types: AM, FM, USB, LSB • Detection: voice yes / no • Nominal frequency • Voice Pitch • Automatic audio demodulation and recording
DEMODULATORS	<ul style="list-style-type: none"> • Automatic frequency, amplitude and symbol rate control • Fast equalizer using known training sequences (via DDL/pyDDL) • Primary demodulation USB/LSB/AM/FM • Automatic burst synchronization • List of demodulators see further back in this brochure
GUI	<ul style="list-style-type: none"> • Easy and intuitive to operate • Input spectrogram with live audio • Manual and automatic demodulator and decoder control • Different analysis displays for manual signal analysis • Specialized signals analysis cursor measurement functions • Modem editor with demodulator and decoder settings • Decoder editor and debugger (DDL/pyDDL, Option Professional)
INPUT FILES (DANA)	<ul style="list-style-type: none"> • Digital IF (complex baseband I/Q 32 Bit), Sampling rate \leq 10 MHz • (note: functionality may be limited for sampling rates higher than 2 MHz) • Playback of standard wav files. • Digital IF/AF (real / complex WAV 8, 16, 32 Bit) • Playback of Perseus and WinRADIo WAV recordings with correct frequency display
INPUT AUDIO (DANA)	<ul style="list-style-type: none"> • Playlist (files) • Loop mode • Complex IQ / • Audio files • Remove DC • Filtering • Mirror • FM demodulation • Time source (File / System clock) • Sample rate converter • Centre frequency tuning • Streaming TCP/IP • Configurable replay speed

go2DECODE PRODUCT FEATURES

INPUT, TCP/IP STREAMING	<ul style="list-style-type: none"> • From 2 kHz up to 10 MHz sampling rate (note: functionality may be limited for sampling rates higher than 2 MHz) • Generic PROCITEC / PLATH format • VITA 49 • PXGF
SIGNAL RECORDINGS	<ul style="list-style-type: none"> • Types: IF/AF • Start / Stop <ul style="list-style-type: none"> - Manual by operator - Automatic by trigger • Trigger types <ul style="list-style-type: none"> - Configurable squelch level - Signal detected - Transmission method recognized - Transmission method unknown - Voice / Morse detected • File formats: WAV, TCI cap
OUTPUT	<ul style="list-style-type: none"> • Decoding results • TXT-File with decoded text • XML-File with decoded text and metadata • Signal recordings • Voice recordings • Bitstream *.rec files (bits and quality of each bit) • Bitstream *.txt files (bits)
SONAGRAM VIEWER (SOVI)	<ul style="list-style-type: none"> • Standalone application for spectrum / spectrogram display
RESULT VIEWING (PMO)	<ul style="list-style-type: none"> • Display of: <ul style="list-style-type: none"> - Decoder output - Demodulated audio files (CW, TETRA etc.) - Text output (ALE, HFDL, etc.) - Binary files
SIGNAL GENERATOR (SOMO)	<ul style="list-style-type: none"> • For standard test signals. Requires go2DECODE-Professional; • Detailed description see further back in this brochure
DECODER DEVELOPMENT	<ul style="list-style-type: none"> • Modification of standard decoders • Definition of new decoders • Integration of existing decoders, requires go2DECODE-Professional; • Detailed description see further back in this brochure
SOUNDCARD INTERFACE (DANA)	<ul style="list-style-type: none"> • Analogue input • WiNRADiO VSC • Virtual-Audio-Cable (VAC) etc.
THIRD PARTY DECODER	<ul style="list-style-type: none"> • Interface to the DDC channel output • Interface to the bitstream output • Streaming and control interface with DDL/pyDDL

go2DECODE SIGNAL ANALYSIS FUNCTIONS

DISPLAYS	<ul style="list-style-type: none"> • Spectrum • Spectrogram / Sonagram • Autocorrelation • I/Q Constellation • Eye pattern • Time domain (oscilloscope) with additional histogram • Analysis (magnitude, frequency and phase) with additional histogram • Hell • Bit
SIGNAL SQUARING	<ul style="list-style-type: none"> • Squaring: 0, 1, 2, 3
WINDOWING	<ul style="list-style-type: none"> • Rectangle • Hanning • Hamming • Kaiser • Flat Top • Blackman
CURSORS	<ul style="list-style-type: none"> • Harmonic • Crosshair • 2 cursor modes
CENTRE FREQUENCY	<ul style="list-style-type: none"> • Adjustable
OPERATION MODES	<ul style="list-style-type: none"> • Online • Offline

go2DECODE DEMODULATORS

AM/A3E (Voice)	OFDM
Analogue Selcal	OQPSK
ASK 2 (OOK), 4, 8	Pactor II, III, 4
Chirp	PSK 2, 4, 8, 16 A/B
Clover II	PSK data aided
Clover 2000	QAMn 16, 32, 36, 64, 128, 144, 256
Clover 2500	QAMn var: <ul style="list-style-type: none"> • APSK16_dvbs2 • ASK2PSK2 abs/diff • ASK2PSK4 abs/diff • ASK2PSK8 abs/diff • ASK2PSK16 diff • QAM 8 • QAM 16 circle/square • QAM 16 v17 abs/diff • QAM 16 v22 abs/diff • QAM 32 circle • QAM 64 circle/square • QAM 256 square
Coquelet	
DPSK 2, 4, 8, 16 A/B	
F1A	
FM/F3E (Voice)	
F6/F7B	
FSK 2 matched	
FSK 2, 4, 8 disc.	
FSK 2,3 auto shift	
MSK/GMSK	
J3E (USB, LSB) (Voice)	
LINK11*	
MDPSK 2, 4, 8, 16 A/B	
MCFSK 2	
Morse	Robust Packet
MPSK 2, 4, 8, 16 A/B	TFM3
MT63	THROB / THROBX
MultiModem	Wideband HF*(MIL 110 App.D)
MultiTone (FSKn, single or simultaneous tones)	

* requires optional product feature MIL decoder package

go2DECODE SUPPORTED RECEIVERS		
Receiver	Windows supported	Linux supported
AirSpy	•	
CommsAudit CA7851	•	•
Grintek GRX Lan	•	
IZT R3xxx series	•	•
IZT R4000 (SignalSuite)	•	•
Microtelecom PERSEUS	•	
narda® NRA-3000 RX	•	•
narda® NRA-6000 RX	•	•
narda® IDA 2	•	•
narda® SignalShark® 3310	•	•
PLATH SIR 5110/5115	•	•
R&S EB 500/510	•	•
R&S EM100/PR100	•	•
R&S ESMD	•	•
RFSPACE NetSDR	•	•
RFSPACE SDR-14	•	
RTLSDR/Noxon USB-sticks	•	
SDRplay RSP1 & RSP2	•	
SignalHound BB60C	•	•
SignalHound SM200 A/B	•	•
ThinkRF R5500-408	•	•
ThinkRF R5500-427	•	•
ThinkRF WSA5000-408	•	•
ThinkRF WSA5000-427	•	•
USRP X310	•	•
WiNRADiO G31DDC, G33DDC, G35DDC, G39DDC	•	
Generic VITA 49 receiver support	•	•
Other generic „Winrad ExtIO“ supported receivers	•	

DECODER DEVELOPMENT (INCLUDED ONLY IN GO2DECODE PROFESSIONAL)

BASIC FUNCTIONS	<ul style="list-style-type: none"> • Modification of standard decoders • Definition of new decoders • Integration of existing decoders
FUNCTION LIBRARY	<ul style="list-style-type: none"> • Preprocessing • Symbol conversions • Descrambling procedures • Channel selections • Pattern search • Burst detection • Forward/backward time jumps • Deinterleaving • Check and correction procedures: <ul style="list-style-type: none"> • CRC, Hamming, Viterbi, BCH, Reed-Solomon • Elementary arithmetic and bit manipulations • Table handling • Various output formats, alphabets, channels • Control of demodulation and decoding • Setting of demodulator parameters • Selected voice codecs • Branches and sub-routines • Soft decision • Expandable with third party Python modules or C libraries (pyDDL only)
DECODER EDITOR SPYDER	<ul style="list-style-type: none"> • Automatic command completion • Content related help • Syntax highlighting
DEBUGGER SPYDER	<ul style="list-style-type: none"> • Debugging <ul style="list-style-type: none"> - Breakpoints on lines of code - Single-step mode for lines of code - Display of variable contents in various formats and displays - Editing of variable contents - Display of all input data packages - Display of internal data buffer and current read position • Advanced analysis of recognition, demodulation and decoding <ul style="list-style-type: none"> - Breakpoints in several decoders for one modem list - Comparison of the decoder behavior in search phase / decoding phase - Monitoring the current demodulator state

SOMO SIGNAL GENERATOR (INCLUDED ONLY IN GO2DECODE PROFESSIONAL)

MODULATION GENERATION	<ul style="list-style-type: none"> • Single and multichannel, continuous and short-duration / burst signals • Waveform and digital modulation (using ITU emission designators): <ul style="list-style-type: none"> - ASK_n - PSK_n (single and multi channel) - QAM_n (single and multi channel) - ASK_nPSK_m (single and multi channel) - NCPFSK_n (Non-Coherent-Phase FSK) - FSK_n (single and multi channel) - MSK (single and multi channel) - GMSK (single and multi channel) - OFDM - F7B (FM with 2 or more digital channels) - TFM 3/5 (Tamed Frequency Modulation) - Morse - Sine - Rectangle - Sawtooth - Triangular • Analogue modulation: <ul style="list-style-type: none"> - AM, SSB (LSB / USB), FM • Variable modulation parameters: <ul style="list-style-type: none"> - Attenuation - Center frequency - Baud rate - Pulse shapes: RC pulse, RC/RRC spectrum, Gauss pulse - Short-duration / burst parameters
CODING GENERATION	<ul style="list-style-type: none"> • Binary, Baudot, ASCII, HC ARQ, ITA2 • Differential / absolute coding • Convolutional encoding / Viterbi • CCITT standards V.17 ... V.33 • Variable bitstream, bit order, parity • Various scrambling algorithms and recursive sequences
CHANNEL SIMULATION	<ul style="list-style-type: none"> • AWGN • Multipath propagation: Watterson (ITU) and enhanced ITS model
OUTPUT	<ul style="list-style-type: none"> • Soundcard • Wav Files • Network stream

FEATURE COMPARISON TABLE go2DECODE

FEATURE	go2DECODE LIGHT	go2DECODE STANDARD	go2DECODE PROFESSIONAL
Automatic processing	•	•	•
Signal Analysis functions		•	•
Decoder Development			•
SOMO Signal Generator			•
Recording / replay	•	•	•
Standard decoder package	•	•	•
PMR decoder package¹	◦	◦	◦
MIL decoder package²	◦	◦	◦

• = included

◦ = as option available

EXPORT CONDITIONS:

- 1) In case of an export from the Federal Republic of Germany an export permission must be granted by the German authorities. Enduser certificate is required.
- 2) In case of an export from the European Union an export permission must be granted by the German authorities. Enduser certificate is required.

go2ANALYSE	
DATA ACQUISITION	<ul style="list-style-type: none"> • Text-based bitstream file • Packed binary file • Bitstream recording from go2DECODE and go2MONITOR
LANGUAGE	<ul style="list-style-type: none"> • English; Others on request
RECOMMENDED PC HARDWARE	<ul style="list-style-type: none"> • Min. Intel I5 or higher, 2 cores, 2.6 GHz • Min. 4 GB RAM, 16 GB recommended • HDD: min. 50 GB recommended (depends on binary file input) • Screen Resolution: min. 1280 x 1024 pixels
OS	<ul style="list-style-type: none"> • Windows 10/11 de/en, 64 bit • Windows 7 SP1 (with Microsoft Windows patches KB2999226 and KB2533623, deprecated) de/en, 64 bit
LICENSE	<ul style="list-style-type: none"> • USB-Dongle (CodeMeter)
ISO 9001:2015	<ul style="list-style-type: none"> • Company is certified

go2ANALYSE FEATURES

BITSTREAM VISUALIZATION	<ul style="list-style-type: none"> • x/-, L/H, .1, 1/0 • Font size changeable • Graphical bit display • Circulation length • Bit offset • Tag bits with different colors • Show difference of two bitstreams • Alignment: Burst/Circulation length • Cut • Copy / Paste • Undo / Redo • Bits with quality • Symbols of bits
ANALYSIS	<ul style="list-style-type: none"> • Autocorrelation • Crosscorrelation • Bit length analysis • 0/1 ratio • Automatic search for periodic sequences • Automatic search for non-periodic sequences • Repeated patterns • Mark start, stop and parity bits • Testing against codes: Hamming, Reed-Solomon, BCH, Golay, CRC
MANIPULATION / TRANSFORMATION	<ul style="list-style-type: none"> • Deinterleaving • Decimation • Demultiplexing • Logic: AND, OR, NOT, XOR selected bits, XOR two bitstreams • Inversion: Mirror / NOT • Cutting • Viterbi correction • Descrambling • Destuffing
TOOLS FOR LFSR	<ul style="list-style-type: none"> • Analysis and handling of linear feedback shift registers • Berlekamp-Massey • Linear complexities
BINARY MODULATION	<ul style="list-style-type: none"> • NRZ-M • NRZ-S • BIPH-L Manchester • BIPH-M • BIPH-S

go2ANALYSE FEATURES

MAP BITS TO TEXT	<ul style="list-style-type: none"> • MSB/LSB • Normal / Inverse • predefined code tables e.g.: <ul style="list-style-type: none"> - ASCII8 - Baudot - Baudot-3 - Shift-CYR - HEX - Morse - ITA2P • User defined code tables
WORKFLOW MANAGEMENT	<ul style="list-style-type: none"> • Complete workflow recorded • Displayed as tree of commands and results • Undo / Redo (several steps) • Save / Load workflow • Replay saved workflow with different bitstreams • Change command parameters in workflow • Delete individual commands
INTEGRATE EXTERNAL TOOLS	<ul style="list-style-type: none"> • Open selected bits in external tool (configurable)

PROCITEC[®]
HOUSE OF SIGNALS

PROCITEC GmbH
Rastatter Strasse 41
75179 Pforzheim
Germany

Phone +49 7231 155 61-0
Fax +49 7231 155 61-11
sales@procitec.com
www.go2signals.de / www.procitec.com