DECODIO

ITU
Measurements

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DECODIO **ITU** *Measurements*

HIGH-LIGHTS

➜ Inline with ITU R SM.328, 377, 443, 854, 1600, 1880 and 2117
➜ Working on live signals as well as signal recordings in different formats
➜ Wide range of supported measurement receivers (SM.377/SM.378)
➜ Supporting different DF systems
➜ Seamlessly integrated in Decodio RED
➜ User-friendly logging and visualization

Decodio extended its wide range of measurement functions with new features and modules to provide measurement and analysis capabilities inline with ITU requirements defined in ITU R SM.328, 377, 443, 854, 1600 and 1880.
This includes tools for manual signal analysis like measurement-cursors for different displays as well as semi-automatic functions for spectrum-occupancy measurement and signal parameter estimation.

Decodio RED receives a wideband signal from a connected receiver or from a replayed file (e.g. .wav/.rf64, raw or in HDF5/ITU SM.2117). Narrowband signals are extracted and used for further analysis.

Their raw IQ data is used as **source for different displays** like time-domain to measure burst durations, zero-crossing for symbol-rate estimation, autocorrelation, DFT or cepstrum. Signal cursors are used to measure and display the estimated values.

Decodio RED is capable of importing **spectrum markers** with center frequency, bandwidth and description from various spectrum management databases.
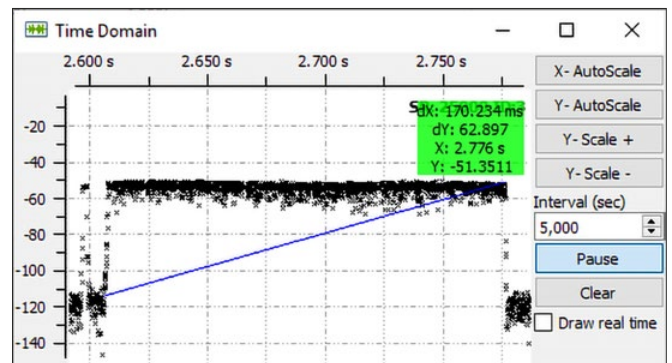
Thanks to the **open interfaces** it can interact with 3rd party systems for radio regulation and spectrum management.
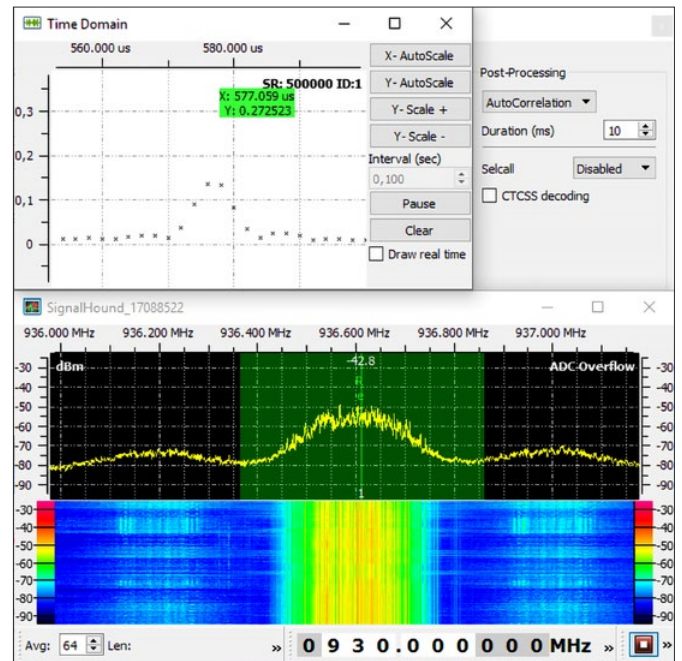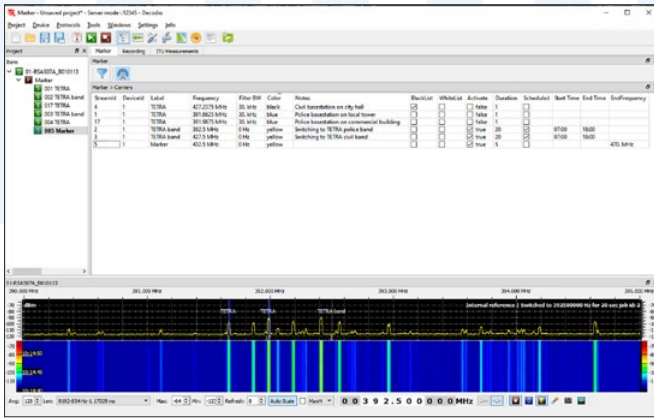

Autocorrelation is used to find the distance between repeating sequences within a signal
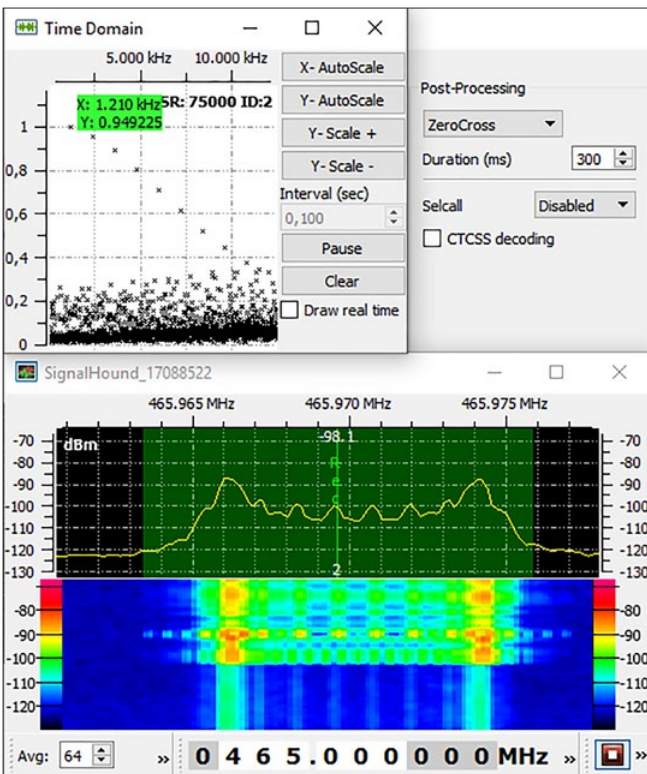
Symbol rate estimation can be performed using the Zerocrossing display

Burst-durations and signal-level measurements are available in the Time Domain window

Loadable spectrum markers for easy identification of known emitters

Spectrum markers with different colours and individual text are saved in an user-editable text-file. They can be used to mark and describe know signals for easier identification.
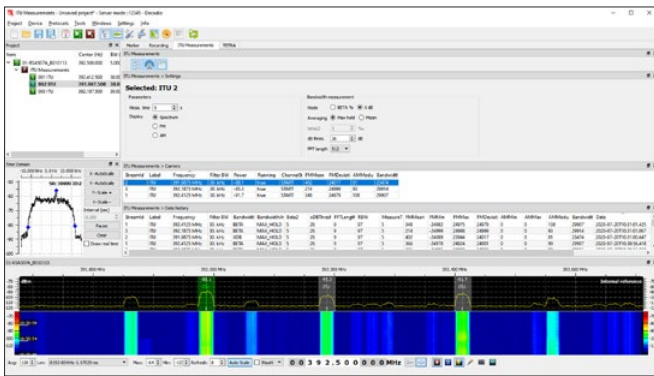
Thanks to the open .csv dataformat markers can be loaded from spectrum management databases.
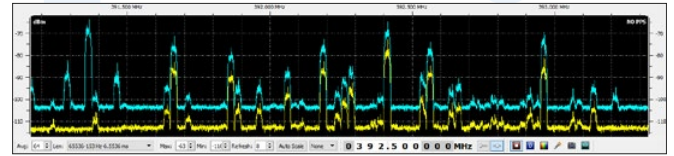
Spectrum overlay

The currently measured spectrum can be overlayed by previous measurements to determine changes due to new or missing emitters.

Additional power or frequency offsets can be applied for better visibility.

Multichannel ITU measurement functions

Narrowband IQ-streams in Decodio's ITU Measurement module are used to estimate the FM Deviation, AM Modulation depth as well as the signal bandwidth based on the x dB and ß % methods in one single step. These measurements can be performed for several channels in parallel.

All results are not only displayed in the GUI but also stored in user-friendly log-files for further processing.
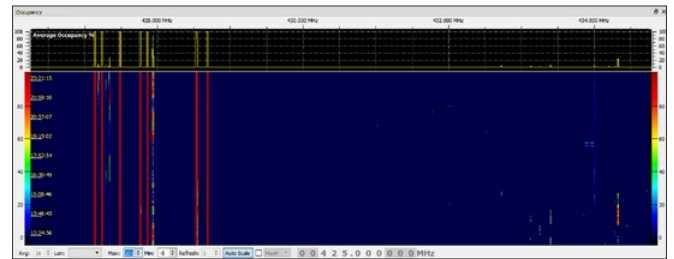
Wideband spectrum occupancy

Wideband occupancy measurements are performed based on Decodio's noise-floor estimation. Output files for received signal power over time as well as percentage occupancy can be displayed and analyzed using the integrated measurement cursors and zoom-functions.

Additionally channel occupancy measurements can be performed and all results are provided in easy to process reports.
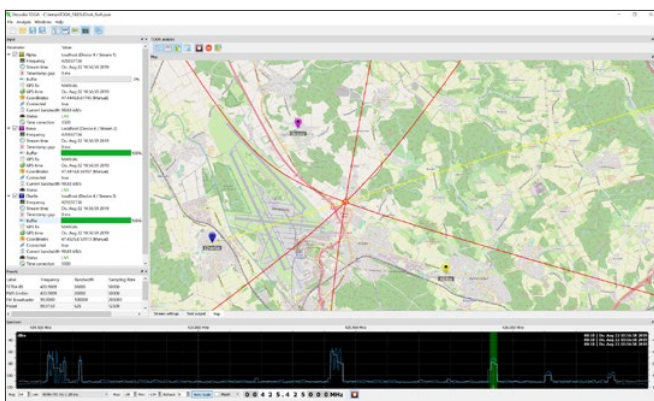

Hybrid AoA-TDoA system for emitter localization

Beside the measurement of signal parameters according to the relevant ITU recommendations Decodio also integrated the support for several direction finding systems.

These devices are completely remote controlled by Decodio's application and the measured results are displayed on the internal maps.

A TDoA solution for emitter localization as well as hybrid systems combining the advantages of both techniques are available.
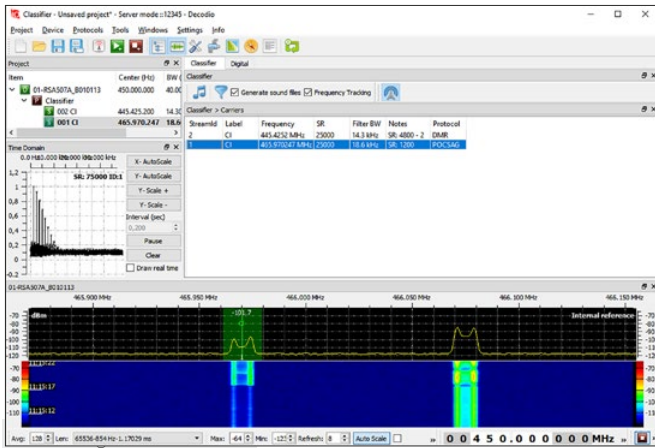
Classification and parameter estimation
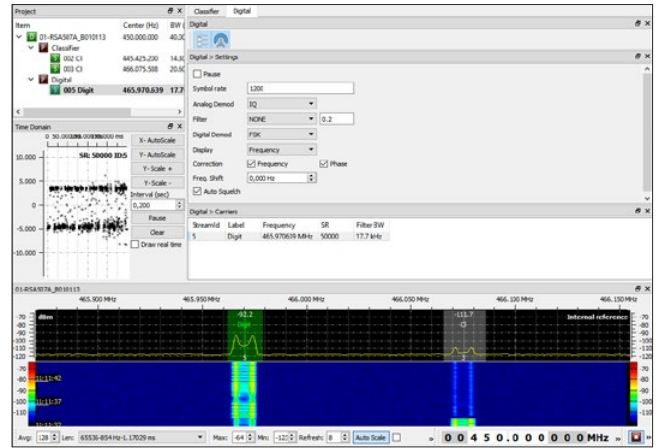
Generic digital demodulator

Measurements according to ITU-R SM.1600 can be performed using the integrated classifier and generic digital demodulation module.

User-defined templates are used to map classification results to different transmission modes. The user can select modulation parameters (demodulator, symbol rate, filter) and can evaluate the demodulated symbol output in an eye or constellation diagram.

The reference parameters can be saved and recalled in order to compare signals against known templates.

Demodulation of QAM16

TECHNICAL DATA

Analysis and post-processing features	Zerocrossing, DFT, Pow2DFT, Pow4DFT, Pow8DFT, Cepstrum, Autocorrelation, Selcall decoding,Time and frequency domain measurements

MODULATION ANALYSIS AND DEMODULATION		
	Analog Demodulator	IQ, AM, FM, LSB, USB
	Filter	None, RRC, SRRC, InvSincSRRC
	Digital Demod	BPSK, PI2DBPSK, QPSK, PI4DQPSK, 8PSK, 16PSK, QAM, OQPSK, FSK, ASK
	Display	IQ, Frequency, Amplitude, Phase, Symbols, DiffSymbols, IQvsTime, FrequencyEstimate, TimingEstimate, FMZeroCross, AMZeroCross, FMHistogram, DFT
	Correction	Frequency, Phase
	Output	Eye, Constellation, Symbols to File, Symbolstream via TCP/UDP

CLASSIFIER		
	Supported transmission modes	TETRA, DMR, TETRAPOL, dPMR, NXDN, P25, D-STAR, C4FM, MPT 1327, AIS, ACARS, VDLM2, POCSAG
	Additional features	Automatic symbol rate estimation

ITU MEASUREMENT		
	Settings	Measurement time, Display (Spectrum, AM, FM), Mode (BETA %, X dB), Averaging (Max. Hold, mean), beta/2 percentage, dB threshold, FFT length
	Measured parameters	FM Mean, FM Deviation (FM Min, FM Max), AM Modulation Depth (AM Min, AM Max), Bandwidth

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