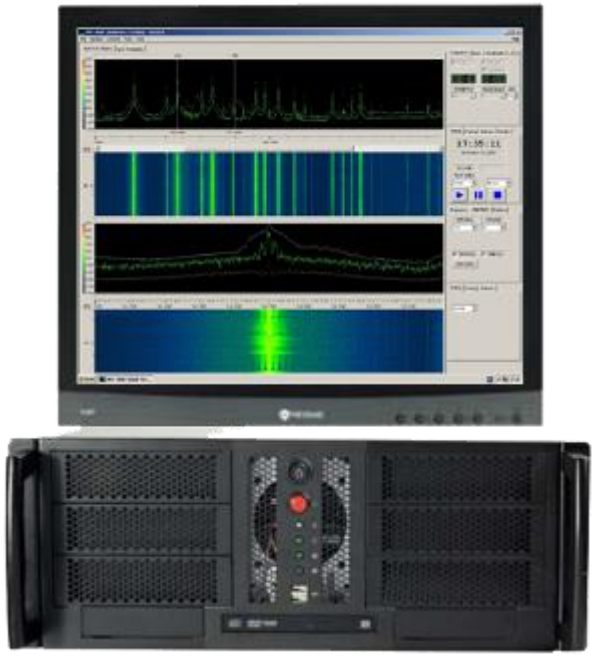
SRS-3000 HF/VHF Wideband Search and Intercept Receiver

Features

- **Compact design with graphical user interface**
- **Up to 40MHz wide instantaneous real-time bandwidth**
- **Down to 1ms time resolution**
- **Down to 1kHz frequency resolution**
- **Quasy real-time frequency spectrum by complex FFT algorithms**
- **High probability due to wide bandwidth and high-speed scanning**
- **Wide-band direction finding processor**
- **Flexible compatibility for system integration**



Product description

The receiver consists of the usual components of digital fast-scanning intercept receiver:

- RF front-end,
- HF/VHF digitizer,
- Digital filtering and
- Digital signal processor.

The SRS-3000 is a frequency-agile, lightweight HF/VHF/UHF receiver designed for limited space and high-mobility application for ground and air environment. Its compact size, broad tuning range and high-level remote control functionality make it ideal for multitude of system application, including commercial frequency management and military EW/SIGINT/COMINT missions. The receiver couples high scan speed, high frequency and time resolution, high dynamic range, and excellent selectivity to provide superior performance over many much other receivers. It achieves an outstanding in-band input third-order intercept point of +6 dBm, while maintaining a typical noise figure of less than 10 dB. The equipment can be used for high-speed spectrum management missions as a stand alone receiver system or as a building block of high-grade multifunctional integrated systems.

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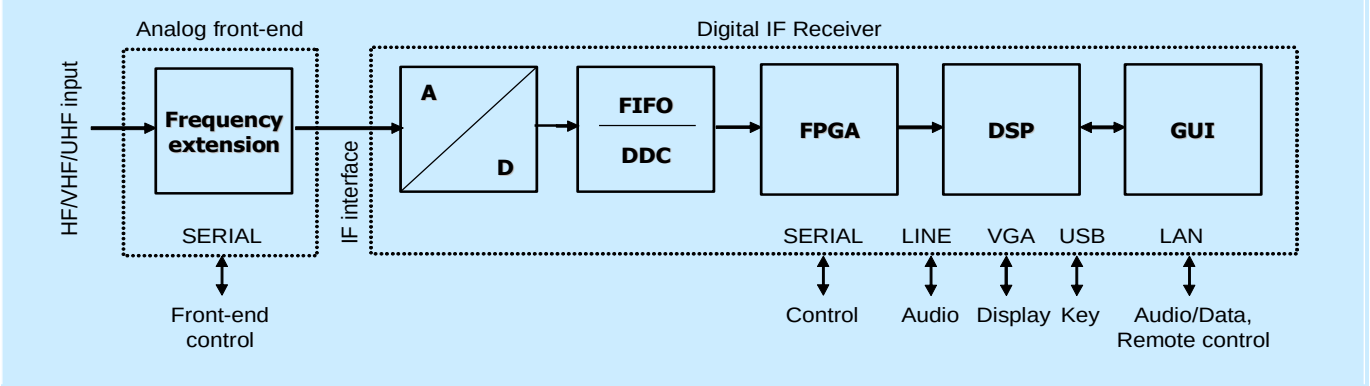
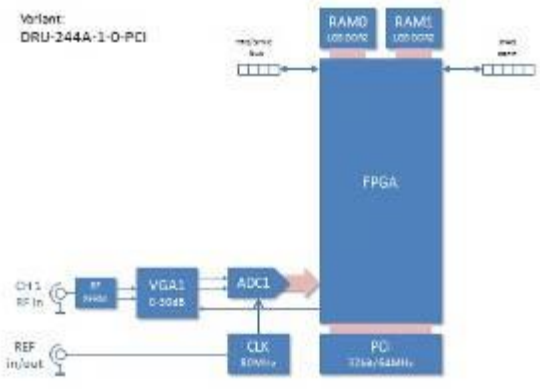
Digital receiver concept

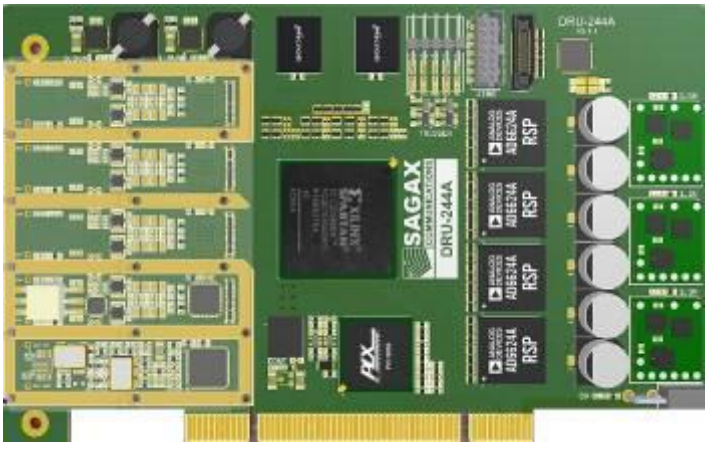
Our digital receiver concept based on the Software Defined (SDR) technology, which means to digitize the data as earlier in the signal path as possible and do all of the functionality in digital domain. Before the analog to digital conversion the required analog signal processing contains band limiting and pre-selection, variable amplification and frequency conversion in higher VHF/UHF bands. After the digitization burst memory (FIFO) or digital down-converter (DDC) is used depending on the application which could be a wide-band scanning or narrow-band monitoring reception. Programmable logic (FPGA) is used for on-board data processing and routing before the data is passed to digital signal processing (DSP) algorithm. The whole receiver is handled trough graphical user interface (GUI) which is running on the platform computer. External connections are provided by the platform computer for local and remote control.



High-tech hardware implementation

We use the latest state of the art analog processing and digital conversion technology available in the market to provide high-dynamic range, wide-bandwidth front-ends and digitizers for our receivers with 16bit resolution and 80MHz sampling rate. All of our digital signal paths are designed for +16bit sample handling.





The front-end of the receiver transform the interested frequency sub-band to the IF with maximum bandwidth, which is equal with real-time instantaneous bandwidth of the receiver. This full-band signal can be used for fast scanning, parallel processing algorithm for finding signal components in the spectrum. But it is possible to use limiting the frequency range in the digital domain too to achieve higher frequency resolution or more accurate bandwidth estimation.

Advanced signal and data processing

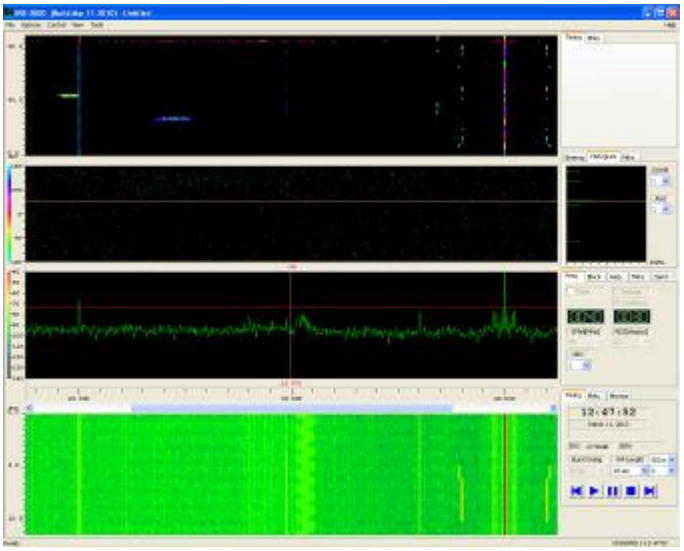
The intercept receiver is further enhanced with record and replays of raw data (optional), support libraries with predefined scanning tasks for random and systematic frequency list and provide statistical database of the results. (optional)

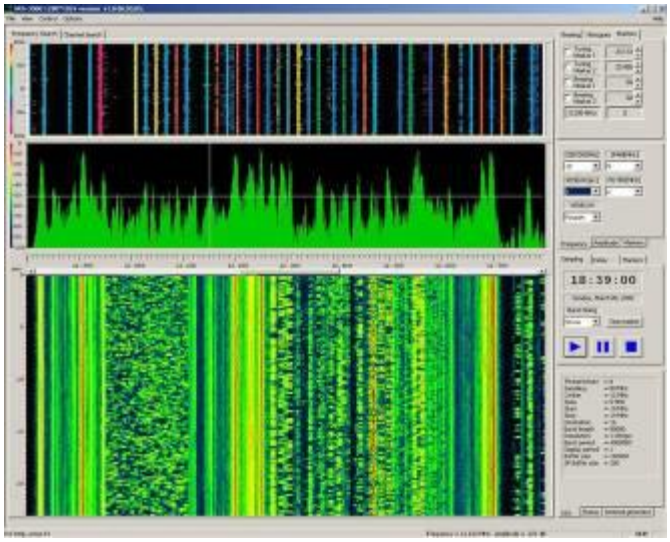
Result database

The results of the task are presented in the form of result log records for further processing by external command and control posts. Each log record contains the basic parameters of the emission. Basically the main parameter of the record is the carrier frequency of the signal. The record contains a sub record of signal timing which shows the signal activity by recording the time of signal emission using the GPS synchronized time stamp. (optional) The result log can be used for further higher-level analysis. (preliminary)

Wide-band direction finding signal processing

The intercept receiver is able to process the angle of arrival (AOA) for all of the incoming signal components in the spectrum to provide bearing spectrum.





Unlike traditional narrowband direction finding (DF) systems, the SRS-3000 ***wideband*** DF capability provides simultaneous real-time direction information for each and every signal within the actual receiver search range. This is comparable to having thousands of parallel narrowband DF subsystems which can be simultaneously tasked to determine direction on all detected signals within the search range. This allows the search process to be qualified by direction providing search and collection of signals only from directions of interest. This is an essential capability for the identification and location of

some low probability of interest signals, such as frequency agile signals. The integrated wideband direction data is propagated throughout the receiver programming interface (API) and is integrated into new bearing spectrum and mapping displays. The new displays include a spectrogram color-coded by direction.

DF Antenna systems (optional)
The receiver can control the Adcock DF antenna consists dual loops and sense (HF) and 8-element circular array with derived reference. (VHF/UHF) The receiver can be connected to a separate GPS receiver and antenna for location and time reference. Mobile versions of the system can contain fluxgate compasses to provide antenna orientation data to the DF system.

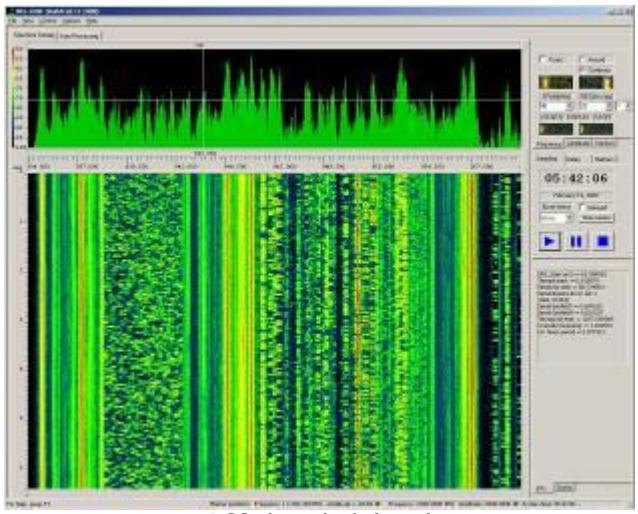
Mapping functions (optional)
The new integrated mapping facility links to the bearing displays and mapping server allowing signals of interest to be instantly located on a map. An integrated internal mapping facility sends a data message to the map server component which is connected to the third party map visualization program to display a line of bearing. Multiple SRS-3000D WDF systems provide multiple DF overlays allowing signal location by crossing lines of bearing. The triangulation function is implemented in the map server. In addition, an API is available for customer specific mapping packages.

Essential features

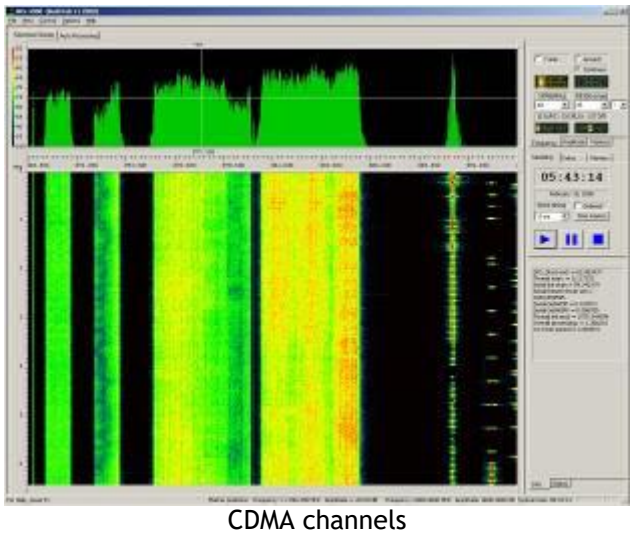
- High speed integrated wideband search, collection and wideband direction finding for 20 - 3000 MHz (front-end and tuner dependent)
- Equivalent to thousands of simultaneous parallel narrowband direction finding systems
- Allows search and collection processes to be qualified by direction-of-interest
- Integrated mapping facility plots emitter lines-of-bearing on different map-ware toolsets
- Variety of wideband DF subsystems to provide solutions for mobile, portable and stationary fixed-site site applications.

Graphical user interface

The receiver could be handled by the graphical user interface implemented as standard Windows based program with usual control elements and high resolution graphics.



PCS downlink band



CDMA channels

Specification summary

Signal capturing	
Frequency settings	
Digitizer frequency range	9kHz - 320MHz (3dB)
Digital instantaneous bandwidth	40MHz (Nyquist)
Tuning resolution	1MHz synthesized
Input frequency range (LF/HF front-end)	9KHz-32MHz (typical)
Input frequency range (VHF/UHF front-end)	20-3000MHz (optional 6GHz)
Instantaneous bandwidth (VHF/UHF front-end)	20MHz
Instantaneous bandwidth (HF front-end)	40MHz
Frequency settings	Keypad, roll key, remote control
Frequency readout	Digital read out on control software
Internal reference accuracy	≤ +/- 1 part in 10E6
Internal reference aging	≤ +/0.5 part in 10E6 /year
External reference frequency	10MHz, 0dBm nominal level

Receiver parameters	
Antenna input	
RF input impedance	50 ohm, nominal
Pre-selection	12 sub-octave filters (optional)
Input VSWR	2.0:1 typical
Maximum input power	20dBm
Sensitivity	
Noise figure	10dB typical @ max. gain
Sensitivity @1KHz resolution	-120dBm @ 10dB S/N typ.
Interference rejection	
Spurious free dynamic range	≥ 70dB, typ. 80dB
Internal spurious signals	≤ -100dBm equivalent input
Image rejection:	≥ 80dB
Gain control	
Maximum gain	30dB
Maximum attenuation	30dB
Attenuator step size	2dB
Gain control	Automatic/Manual

Signal processing		
Spectrum estimation algorithm		24 bit complex radix2 and radix5 FFT
Digital bandwidth		40MHz, 20MHz, 10MHz, 5MHz, 2MHz, 1MHz
Time resolution (waterfall)		1ms, 2ms, 5ms, 10ms, 20ms, 50ms, 100ms, 200ms, 500ms, 1s, 2s, 5s, 10s
Frequency resolution	In the band 1.5-30MHz:	1Hz, 2Hz, 5Hz, 10Hz, 20Hz, 50Hz, 100Hz, 200Hz, 250Hz, 500Hz, 1kHz, 2kHz, 5kHz, 6.25kHz ,8.33kHz, 10kHz, 12.5kHz, 20kHz, 25kHz
	In the band 30-100MHz:	10Hz, 20Hz, 50Hz, 100Hz, 200Hz, 250Hz, 500Hz, 1kHz, 2kHz, 5kHz, 6.25kHz ,8.33kHz, 10kHz, 12.5kHz, 20kHz, 25kHz
	In the band 100-3000MHz:	1kHz, 2kHz, 5kHz, 6.25kHz ,8.33kHz, 10kHz, 12.5kHz, 20kHz, 25kHz
Windowing		Built-in, high dynamic range, selectable.
Averaging		1…100 samples, maxhold
Interception scanning speed		20 GHz/sec @25KHz resolution on the entire frequency range (VHF/UHF)
		2GHz/sec @250Hz resolution on the entire frequency range (HF)
Memory scanning speed		1000 channel/sec
Automatic scan memory		25000 definable channels in banks
Transmission detection		Burst type detector
Capability to detect signals		1 milli sec. (typ)
Capability to detect FH signals		1000 hops/sec (typ)

General data	
Interfaces	
User interface	Graphical operating software
Operating system	Windows 7
Data and control interfaces	LAN IEEE 802.3 (TP Ethernet)
Remote control	TCP/IP based control interface
General data	
Environmental requirements	MIL STD 810D
Electromagnetic compatibility	MIL STD 461E
Operating temperature	0°C to +45°C
Storage temperature	-10°C to +70°C
Vibration	For vehicle based application only in amortized rack.
Power supply	230 VAC +/-10%, 50Hz +/-5% power supply
Power consumption	450 W max.
Packaging	4U 19”
Weight	25 kg (without monitor)
Relative humidity	95% maximum non condensing at 40°C