



WAVECOM COMPANY AND PRODUCTS

by Wavecom Elektronik AG

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WAVECOM COMPANY



- Wavecom Elektronik AG is founded in 1985. This year we celebrate the 30 years company establishment.
- Our company is a leading provider of high quality data decoders both in hardware and software.
- Our company is internationally established within this industry and maintains a longstanding, world-wide network of distributors and business partners.
- Our customers are mainly governmental institutions.
- The compliance to the Swiss Export Control Regulations is a part of our company policy.

COMPANY ADDRESS

Wavecom Elektronik AG

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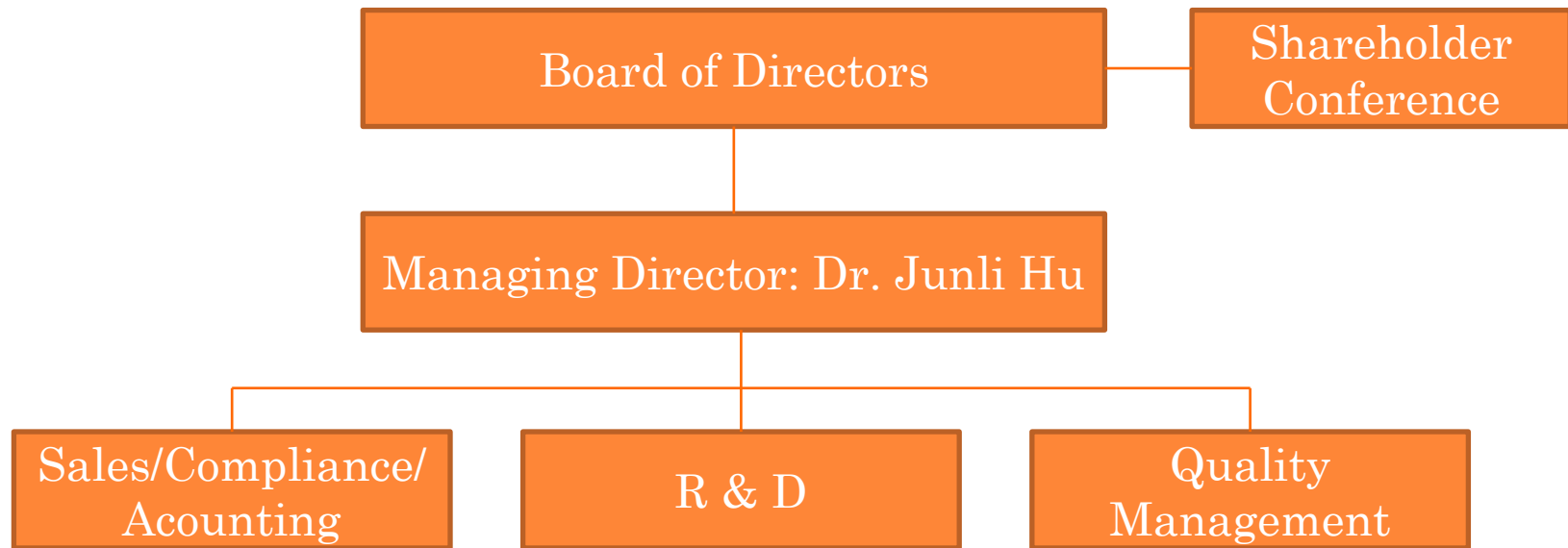
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Wavecom Elektronik AG is a private, joint-stock company.



MAIN PRODUCTS

	Products	Classifier Option	Special Decoders
Hardware decoders and systems	<ul style="list-style-type: none"> • W74PC • W-PCI • W-PCIe • W-PCI-LAN • W-PCIe-LAN 	<ul style="list-style-type: none"> • W-Classifier-NB • W-Classifier-WB 	<ul style="list-style-type: none"> • W-Package HF • W-Package VHF/UHF • W-Package SAT • W-Package FAX & Modem
Standalone software decoder	<ul style="list-style-type: none"> • W-CODE 	<ul style="list-style-type: none"> • W-Classifier-NB • W-Classifier-WB 	
Complete automatic monitoring system	<ul style="list-style-type: none"> • W-SPECTRA 	<ul style="list-style-type: none"> • W-Classifier-NB • W-Classifier-WB 	
Supporting tools	<ul style="list-style-type: none"> • W-BitView • W-Sat-email-Decoder • W-SPEED 		

MAIN PRODUCTS

- All hardware and software products are developed and manufactured in Switzerland
- Decoders (**W-CODE, W74PC, W-PCI, W-PCIe**) over the whole signal bands:
 - HF band > 115 decoders
 - VHF/UHF band > 40 decoders
 - Satellite band > 40 decoders
 - Fax and modem > 15 decoders
 - Latest product documents on www.wavecom.ch

MAIN PRODUCTS

- **Classifier** and Code Check options:
 - Classifier: Narrowband 8 kHz (for HF band) and Wideband 96 kHz (for V/UHF band)
 - Multiple signals in the bandwidth are classified at the same time.
 - Automatic decoder check (Classifier Code Check)
- **Remote Decoding: W-CLOUD**
 - Included in W74PC, W-PCIe, W-PCI and W-CODE.
 - Suitable to classify and decode signals at remote site.

MAIN PRODUCTS

- Complete Automatic Online Monitoring System: **W-SPECTRA**
 - Real-time (online) signal monitoring and decoding
 - Multiple frequency bands: HF and V/UHF
 - Built-in, direct receiver (SDR) control
 - Multi-band signal classification, code check and automatic recording into database
 - Wideband (2 MHz) IQ signal recording, with on-the-fly side information
 - Offline spectrum cut (in time and frequency domains), signal analysis and decoding: Spectra Editing (W-SPEED)

MAIN PRODUCTS

- Various supporting products
- High product quality and warranty: hardware two years warranty and software one year free update
- After sales services, technical support and training
- Competitive pricing

COMPLETE AUTOMATIC MONITORING SYSTEM W-SPECTRA – I

W-SPECTRA is an independent system, suitable for long-time automatic online spectrum monitoring and recording.

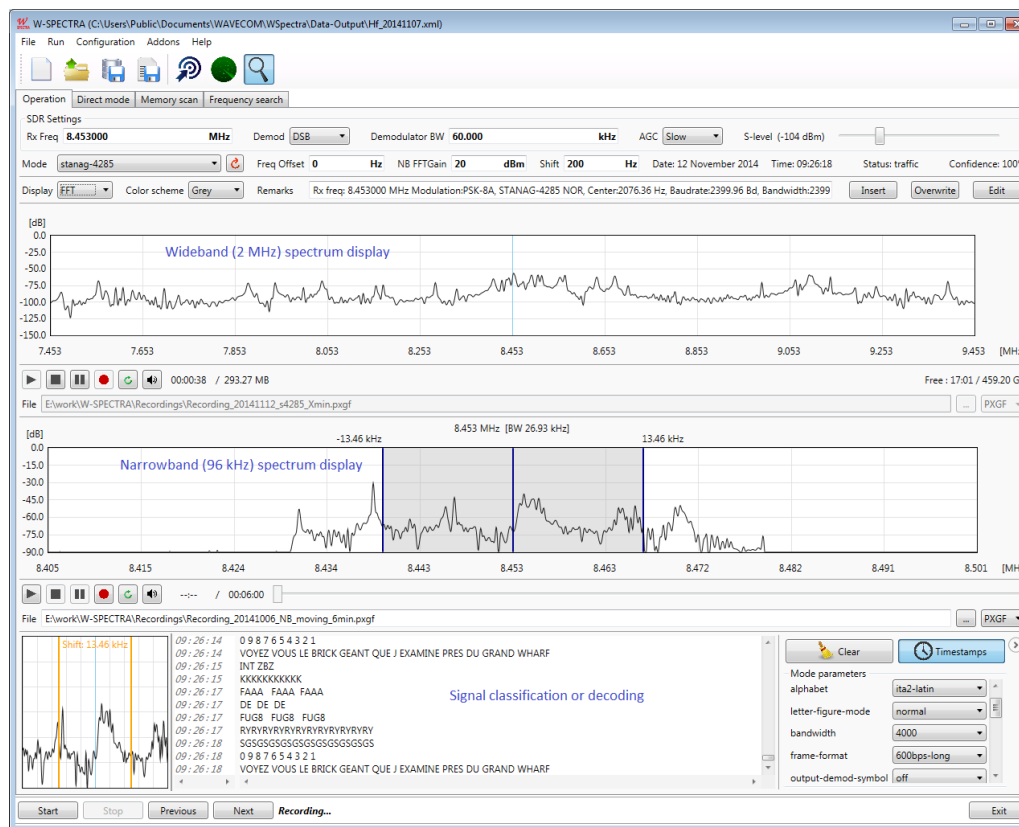
- Covers HF and V/UHF bands.
- Direct receiver control (Winradio SDR G3xDDC).
- Three operation modes: **Direct Mode**, **Memory Scan** and **Frequency Search**.
- Automatic signal classification, code check and result is recorded (inserted) into database (XML format).
- Direct call a decoder (mode).

COMPLETE AUTOMATIC MONITORING SYSTEM W-SPECTRA – II

- Wideband (2 MHz) spectrum display and signal recording (IQ, 16- and 32-bit).
- Narrowband (96 kHz) spectrum display and signal recording (IQ, 32-bit)
- Signal recording with various side information (Rx Freq, bandwidth and timestamp), allow complete and instantaneous information recover during playback.
- Playback recording, classification and decoding.

W-SPECTRA GUI – I

W-SPECTRA „Operation tab“.



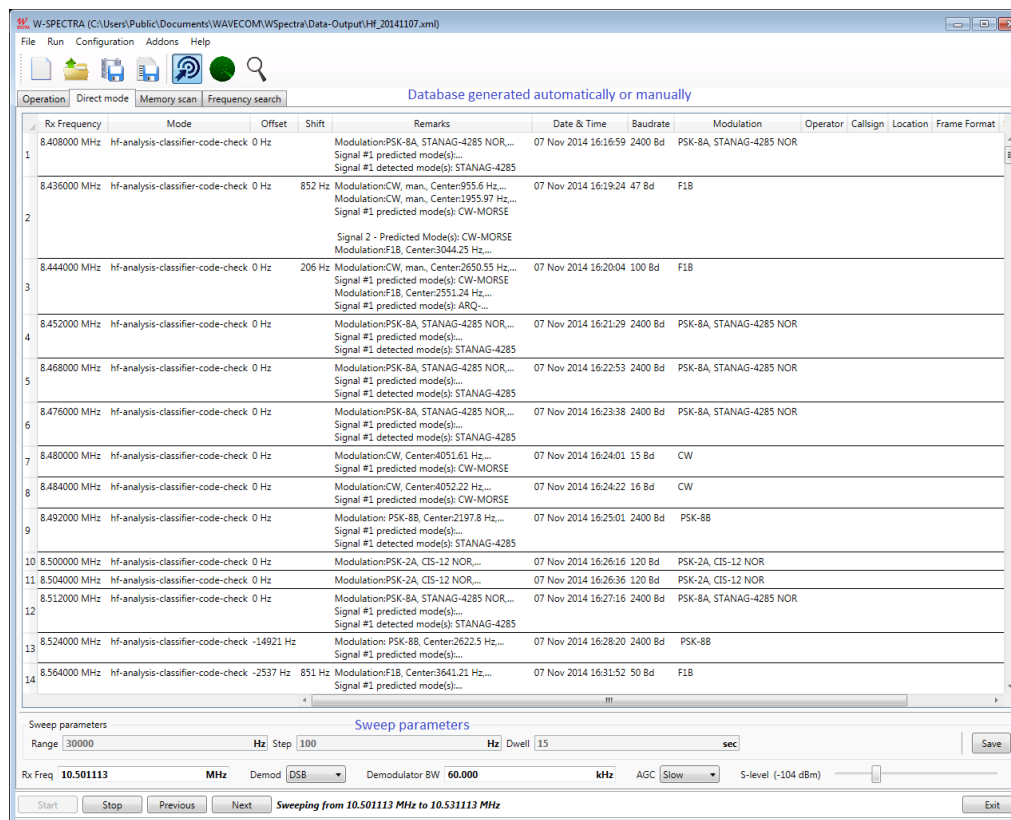
W-SPECTRA GUI – II

Operation tab covers all activities for three operation modes (Direct Mode, Memory Scan and Frequency Search).

- Direct receiver (SDR) control: set Rx frequency, demodulator/bandwidth, AGC and squelch etc.
- Choose a decoder mode, classifier and classifier code check.
- Result automatically stored in a database. Standard XML database format, easy for edit by external programs.
- Wideband (2 MHz) and narrowband (96 kHz) spectrum display and IQ signal recording and playback.
- Frequency fine tuning and decoder parameter setting.
- Four buttons (Start, Stop, Previous and Next) with different functionalities in three operation modes.

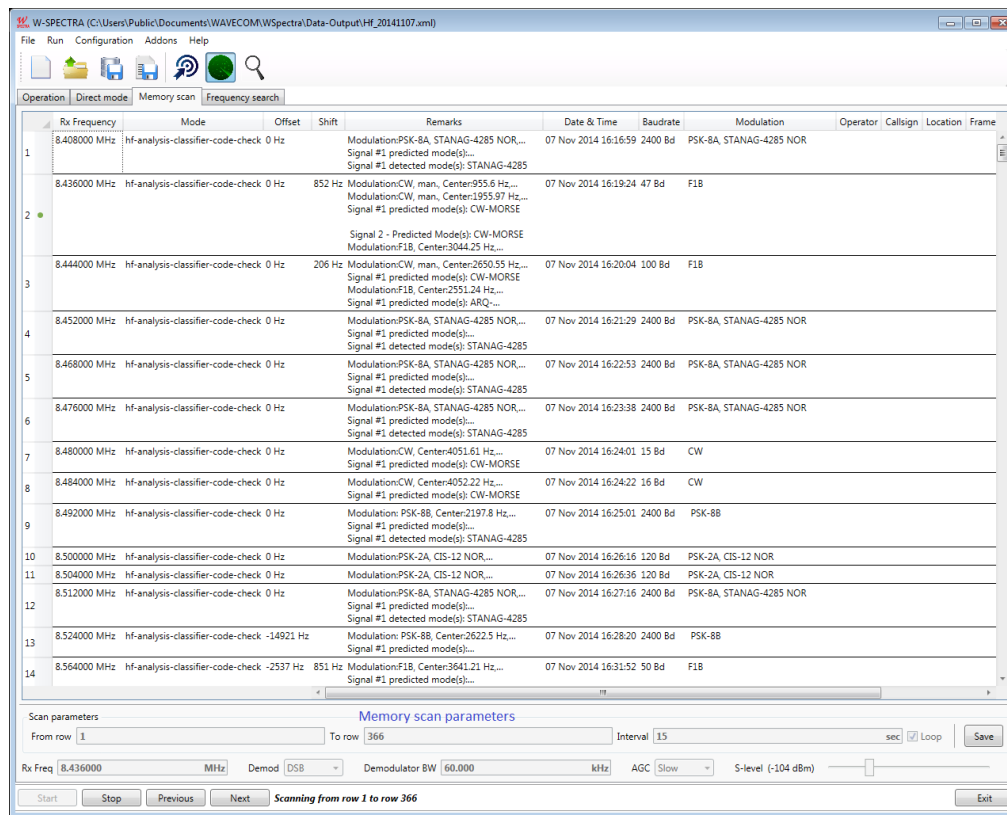
W-SPECTRA GUI – III

W-SPECTRA Direct Mode.



W-SPECTRA GUI – IV

W-SPECTRA Memory Scan Mode.



W-SPECTRA GUI – V

W-SPECTRA Frequency Search Mode.

The screenshot displays the W-SPECTRA software interface in Frequency Search Mode. The main window shows a table of search results with columns for Rx Frequency, Mode, Offset, Shift, Remarks, Date & Time, Baudrate, Modulation, Operator, Callsign, Location, and Fram. The table contains 17 rows of results, with the entry at 8.453000 MHz highlighted in blue. Below the table, the 'Frequency search parameters' section is visible, showing search parameters such as 'From 8.600000 MHz to 20.000000 MHz', 'Step 4000.000 Hz', 'Interval 15 sec', and 'Search strategy hf-analysis-classifier-code-check [Classify]'. The 'Rx Freq' is set to 8.648000 MHz, 'Demod' is DSB, and 'Demodulator BW' is 60.000 kHz. The 'S-level' is (-104 dBm). The status bar at the bottom indicates 'Searching from frequency 8.600000 MHz to frequency 20.000000 MHz'.

Rx Frequency	Mode	Offset	Shift	Remarks	Date & Time	Baudrate	Modulation	Operator	Callsign	Location	Fram
16.204000 MHz	hf-analysis-classifier-code-check	0 Hz	201 Hz	Modulation:F1B, Center:2999.83 Hz... Signal #1 predicted mode(s):... Signal #1 detected mode(s): CIS-50-50...	10 Nov 2014 13:15:45	50 Bd	F1B				
16.236000 MHz	hf-analysis-classifier-code-check	0 Hz	196 Hz	Modulation:F1B, Center:2000.69 Hz... Signal #1 predicted mode(s):...	10 Nov 2014 13:17:07	50 Bd	F1B				
16.328000 MHz	hf-analysis-classifier-code-check	0 Hz		Modulation:CW, auto, Center:3998.82 Hz... Signal #1 predicted mode(s): CW-MORSE	10 Nov 2014 13:21:18	7 Bd	CW, auto.				
16.332000 MHz	hf-analysis-classifier-code-check	0 Hz		Modulation:CW, man, Center:4001.56 Hz... Signal #1 predicted mode(s): CW-MORSE	10 Nov 2014 13:21:28	6 Bd	CW, man.				
16.804000 MHz	hf-analysis-classifier-code-check	0 Hz	199 Hz	Modulation:F1B, Center:3999.42 Hz... Signal #1 predicted mode(s):...	10 Nov 2014 13:41:10	75 Bd	F1B				
12.564029 MHz	hf-analysis-classifier-code-check	3863 Hz		Rx freq: 12.564029 MHz Modulation:PSK-8A... Table check predicted modes for signal no. 1... Code check detected modes for signal no. 1...	11 Nov 2014 14:48:03	2400 Bd	PSK-8A, STANAG-4285 NOR				
12.039082 MHz	vhf-analysis-dir-classifier	-4116 Hz		Rx freq: 12.039082 MHz Modulation:AM... Modulation:AM, Center:31.44 Hz... Modulation:AM, Center:48031.38 Hz... Modulation:VOICE AM (AM, Subcarrier: 0.00... Modulation:VOICE USB (USB)... Modulation:VOICE USB (USB)...	11 Nov 2014 14:49:50	2400 Bd	AM				
10.501113 MHz	hf-analysis-classifier	-209 Hz	103 Hz	Rx freq: 10.501113 MHz Modulation:PSK-2A...	11 Nov 2014 14:53:03	120 Bd	PSK-2A, CIS-12 NOR (USB)				
10.501113 MHz	hf-analysis-classifier	788 Hz	103 Hz	Rx freq: 10.501113 MHz Modulation:PSK-2A...	11 Nov 2014 14:53:47	120 Bd	PSK-2A, CIS-12 NOR (USB)				
10.501113 MHz	hf-analysis-classifier	788 Hz	103 Hz	Rx freq: 10.501113 MHz Modulation:PSK-8A...	11 Nov 2014 14:54:17	2400 Bd	PSK-8A, STANAG-4285 NOR (USB)				
10.099000 MHz	hf-analysis-classifier	289 Hz	448 Hz	Rx freq: 10.099000 MHz Modulation:F1B...	06 Oct 2014 11:09:28	50 Bd	F1B				
8.453000 MHz	hf-analysis-classifier	289 Hz	450 Hz	Rx freq: 8.453000 MHz Modulation:PSK-8A...	06 Oct 2014 11:10:42	2400 Bd	PSK-8A, STANAG-4285 NOR (USB)				
Remarks Rx freq: 8.453000 MHz Modulation:PSK-8A, STANAG-4285 NOR (USB), Center:1515.2 Hz, Baudrate:2400.01 Bd, Bandwidth:2400.01 Hz, Confidence:93%, Level:34 dB											
8.600000 MHz	hf-analysis-classifier-code-check	0 Hz		Modulation: PSK-8B, Center:2953.3 Hz...	11 Nov 2014 15:07:28	2400 Bd	PSK-8B				
8.616000 MHz	hf-analysis-classifier-code-check	0 Hz		Modulation:PSK-8A, STANAG-4285 NOR...	11 Nov 2014 15:08:28	2400 Bd	PSK-8A, STANAG-4285 NOR				
8.632000 MHz	hf-analysis-classifier-code-check	0 Hz		Modulation:PSK-8A, STANAG-4285 NOR...	11 Nov 2014 15:09:28	2400 Bd	PSK-8A, STANAG-4285 NOR				
8.640000 MHz	hf-analysis-classifier-code-check	0 Hz	204 Hz	Modulation:F1B, Center:2484.37 Hz...	11 Nov 2014 15:09:58	100 Bd	F1B				

Search parameters: From 8.600000 MHz to 20.000000 MHz, Step 4000.000 Hz, Interval 15 sec, Search strategy hf-analysis-classifier-code-check [Classify], Rx Freq 8.648000 MHz, Demod DSB, Demodulator BW 60.000 kHz, AGC Slow, S-level (-104 dBm).

W-SPECTRA GUI – VI

W-SPECTRA Settings and Operations.

- Set receiver (SDR) start parameter.
- Set system start parameter.
- User configurable database template.
- Convert recording signal format (wav - pxgf).
- Call W-SPEED for spectrum display and two-dimensional editing of a recording signal.
- Classifier Code Check table setting.

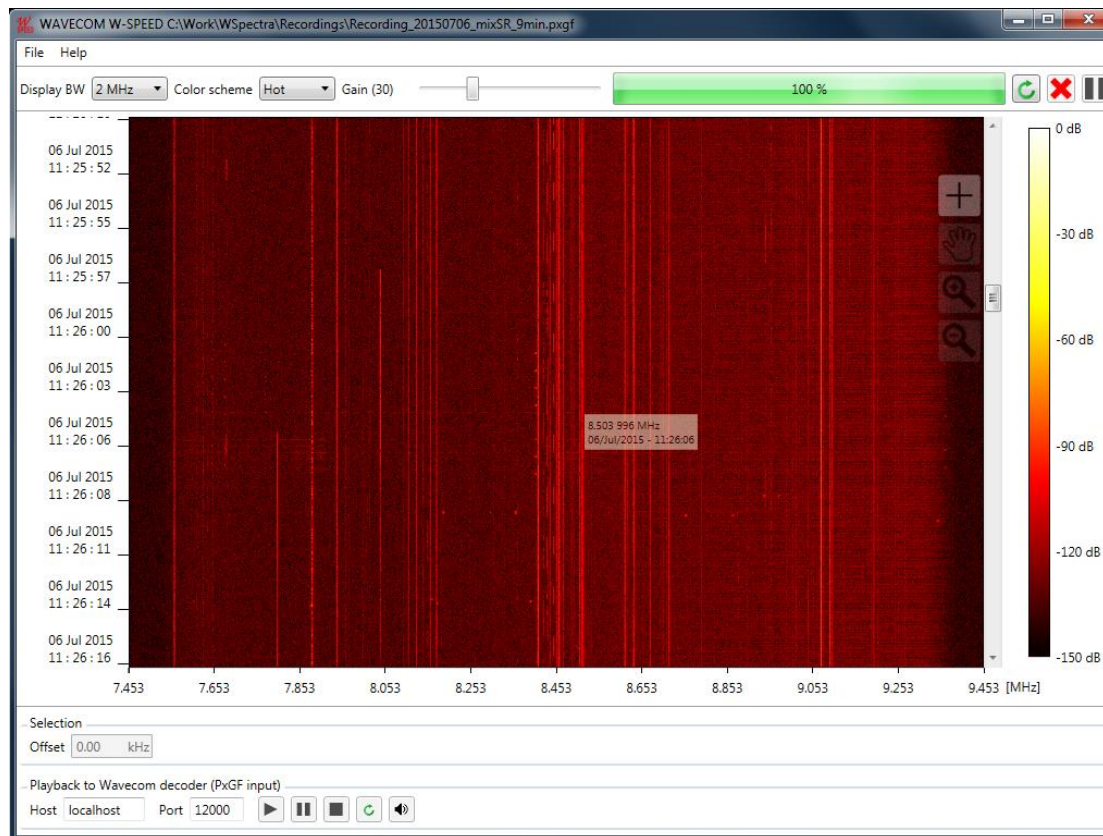
SPECTRA EDITING (W-SPEED) – I

W-SPEED (Spectrum Editing) is a stand-alone tool. Included in W-SPECTRA. Main Functionalities:

- Spectrum display of a recording for offline analysis.
- Two dimensional (time / frequency) display, full recover of side information. Display bandwidth 250 kHz – 24 MHz.
- Spot display of any point in the spectrum. Spectrum zoom (up to 32 times).
- Two-dimensional spectrum cut (BW 96 kHz) and playback.
- W-SPEED is more flexible than media player in W-SPECTRA: random (anywhere) select at signal spectrum.

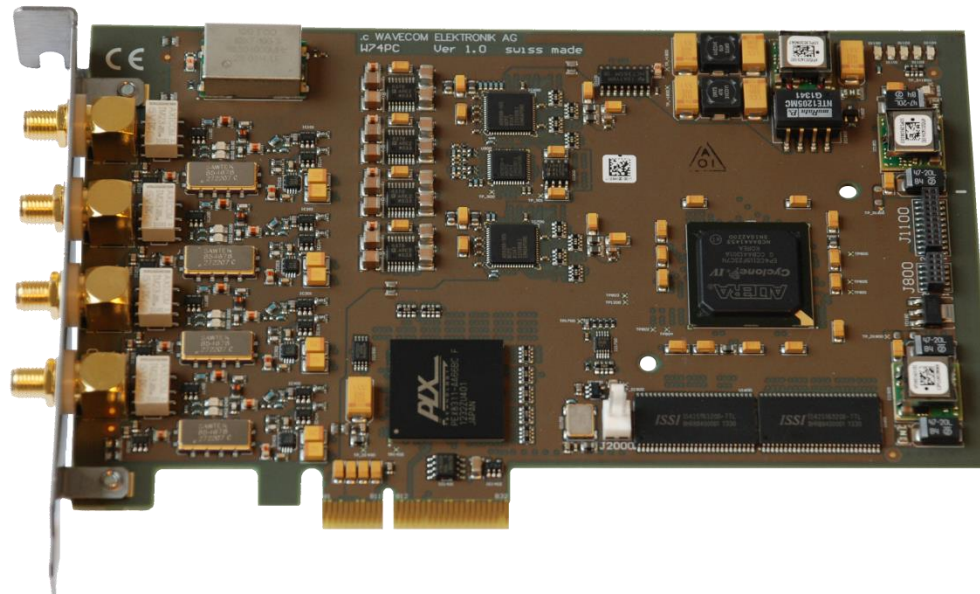
SPECTRA EDITING (W-SPEED) – II

W-SPEED GUI

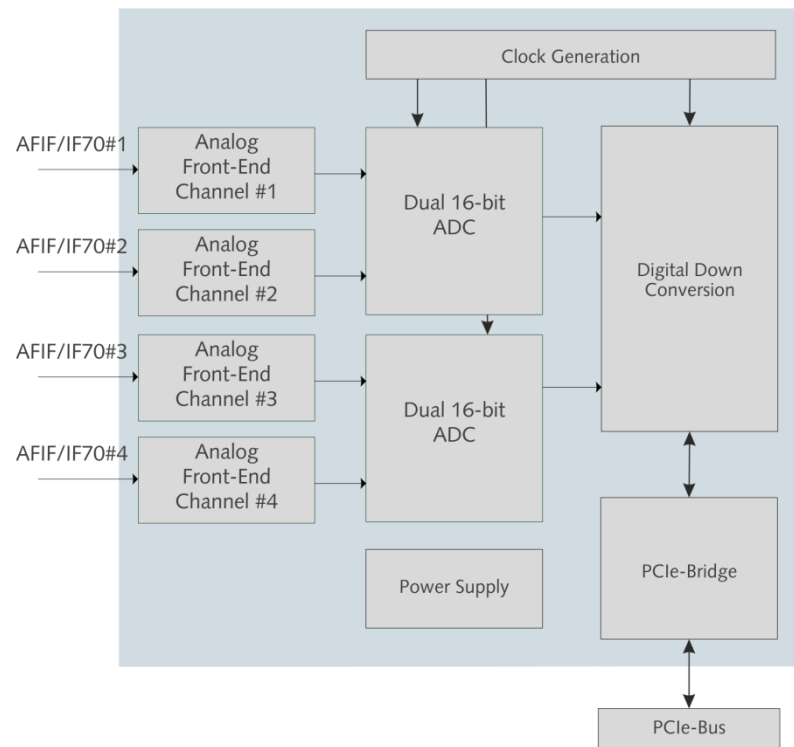


MAIN PRODUCTS

W74PC



W74PC Function Block Diagram



MAIN PRODUCTS

W74PC

- Hardware decoder
- Four physically independent input channels

Input group	AF/IF (50 Hz – 25 MHz)	70 MHz IF (52.5 – 87.5 MHz)
#1 - #4	AFIF#1 – AFIF#4	IF70#1 – IF70#4

- PCI Express x4 half-size, SMA connector

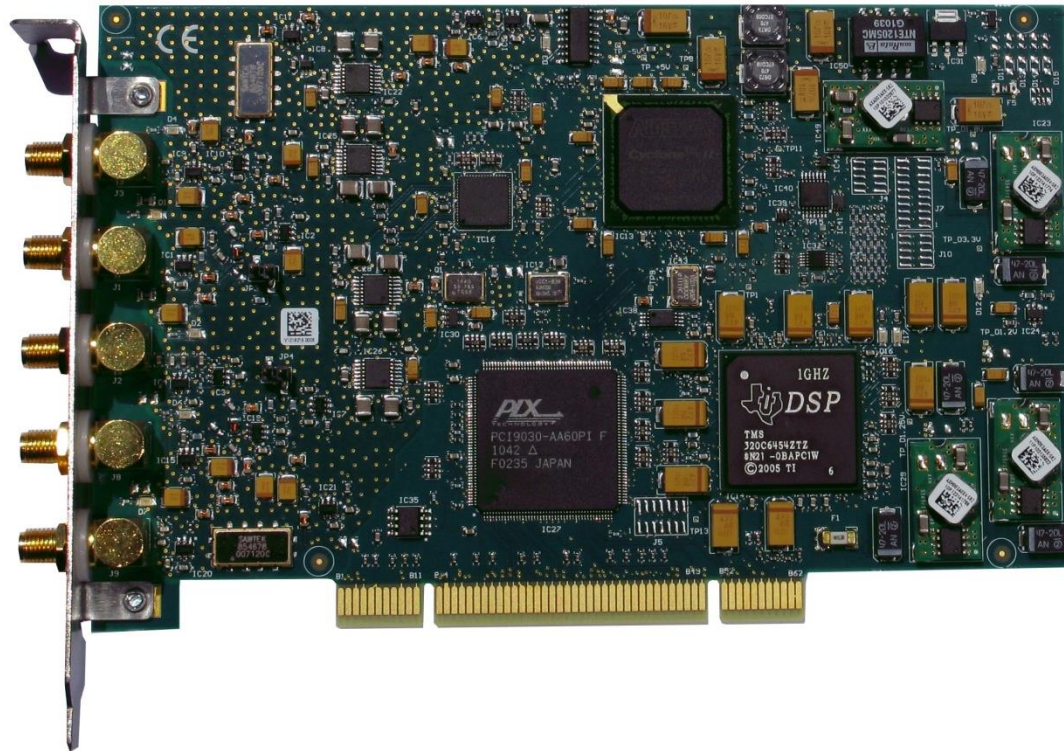
MAIN PRODUCTS

W74PC

- Two separate *dual* A/D converters:
98 MHz sample rate, 16 bits resolution, 96 dB dynamic range
- Digital Down Converter (DDC) in FPGA:
automatic input level control
- Various custom inputs (.wav, TCP/IP IQ or PCM, Virtual Audio Cable VAC)

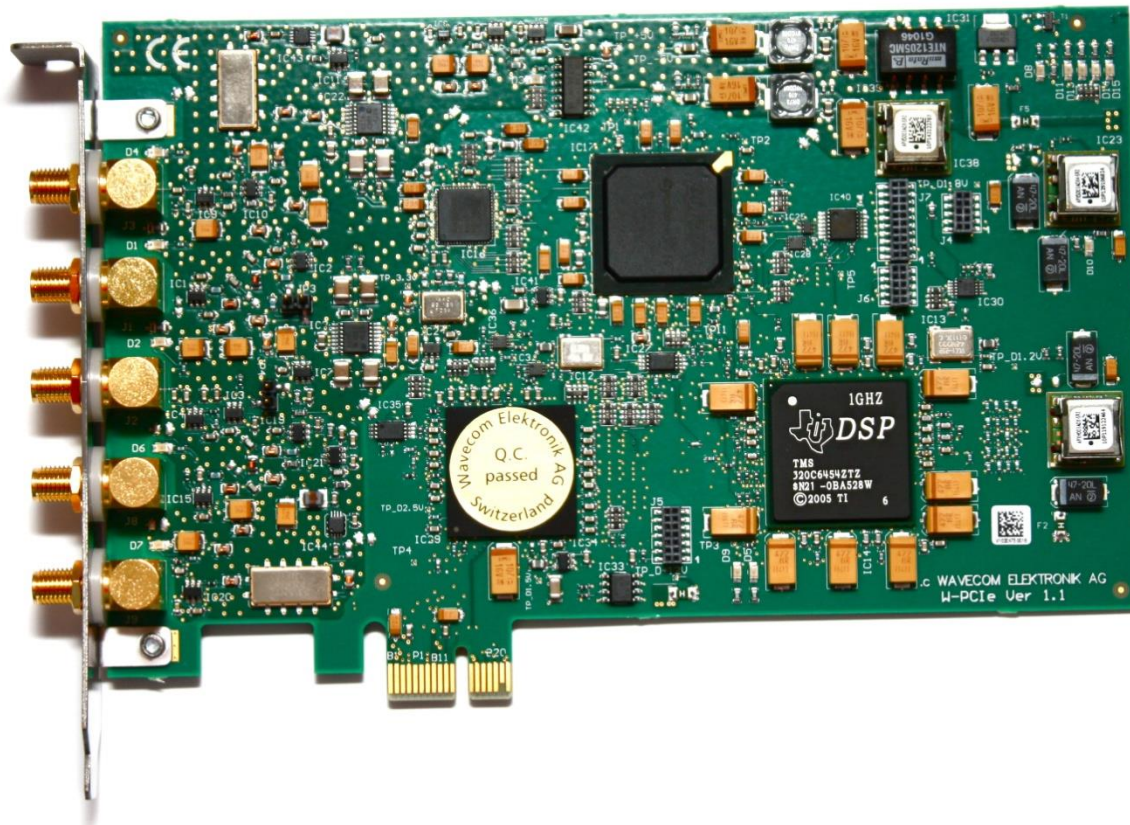
MAIN PRODUCTS

W-PCI

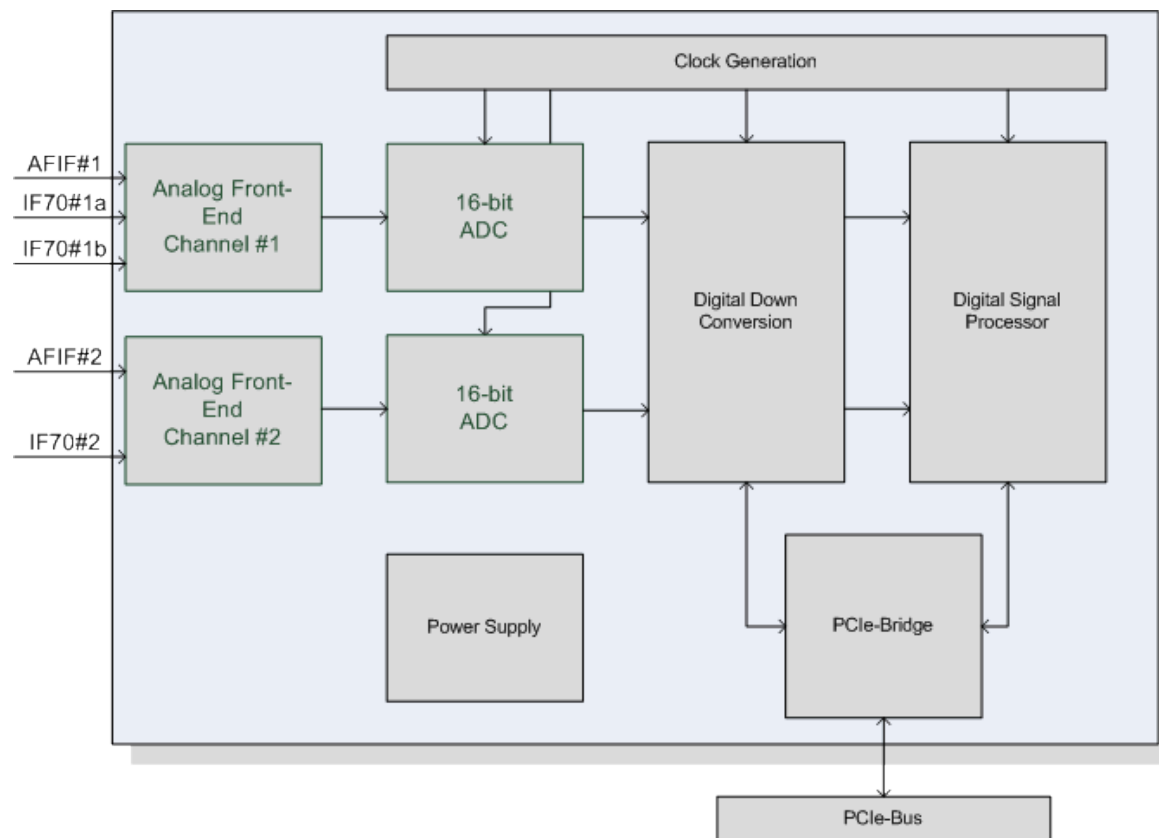


MAIN PRODUCTS

W-PCIE



W-PCI/W-PCIe Function Block Diagram



MAIN PRODUCTS

W-PCI/W-PCIe

- Hardware decoder
- Two physically independent input channels

Input group	AF/IF (50 Hz – 25 MHz)	70 MHz IF (52.5 – 87.5 MHz)
# 1	AFIF#1	IF70#1-a, IF70#1-b
# 2	AFIF#2	IF70#2

- PCI, PCI Express half-size, SMA connector

W-PCI/W-PCIe

- Two separate A/D converters:
92.16 MHz sample rate, 16 bits resolution, 96 dB dynamic range
- Digital Down Converter (DDC) in FPGA:
automatic input level control
- Various custom inputs (.wav, TCP/IP IQ or PCM, Virtual Audio Cable VAC)

MAIN PRODUCTS

W-PCI-LAN: offers all functions of the W-PCI hardware decoder with all advantage of a compact computer system.

W-PCI-LAN is well suited for mobile use.



MAIN PRODUCTS

W-PCIe-LAN: offers all functions of the W-PCIe hardware decoder with all advantage of a compact computer system.

W-PCIe-LAN is well suited for mobile use.



W-CODE

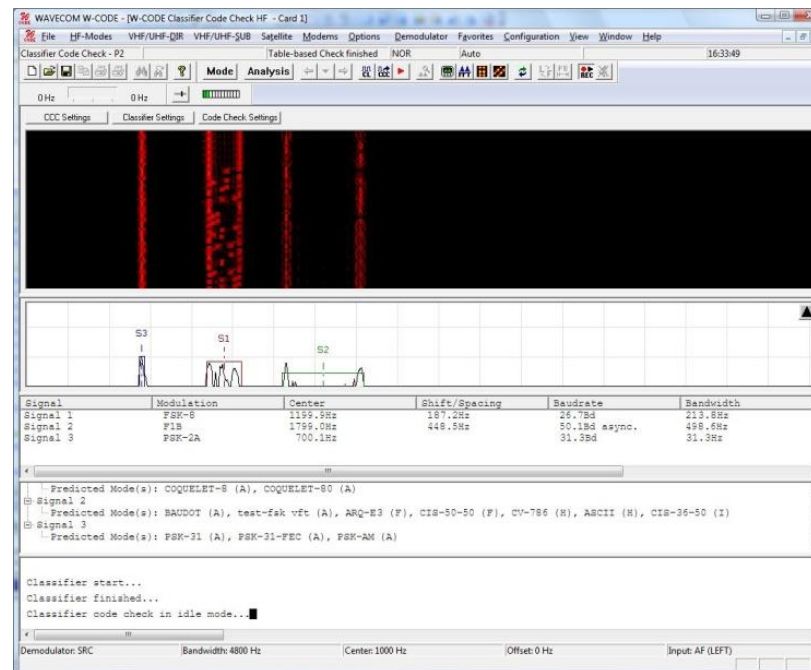
- W-CODE is a standalone software decoder
- Use the existing hardware input device, usually the built-in PC soundcard
- Support IQ input from a Software Define Radio (SDR) and other virtual soundcard (VSC)
- Digital IQ signal input over TCP/IP
- All Wavecom hardware decoders (W74PC, W-PCI, W-PCIE) have the same decoder functions and options as W-CODE.

MAIN PRODUCTS

Classifier

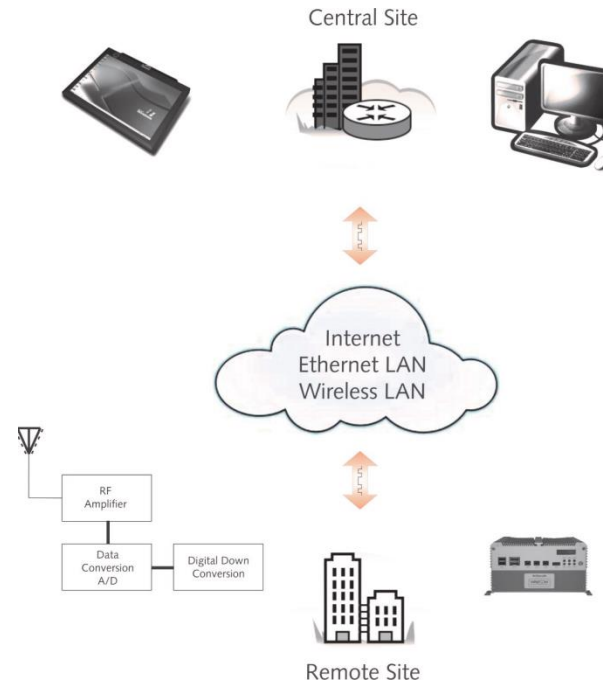
	W-CL-NB (Narrowband)	W-CL-WB (Wideband)
Bandwidth	4 and 8 kHz	4, 8, 24, 48 and 96 kHz
Voice, speech	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Second modulation	<input type="checkbox"/>	<input checked="" type="checkbox"/>
HF, VHF/UHF special decoders	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Classifier Code Check (CCC)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
CW Morse	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FSK/MFSK, 2-FSK to 34-FSK	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
PSK, DBPSK, DQPSK, D8PSK, D16PSK, A and B types	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
OFDM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Classifier Code Check (CCC)



MAIN PRODUCTS

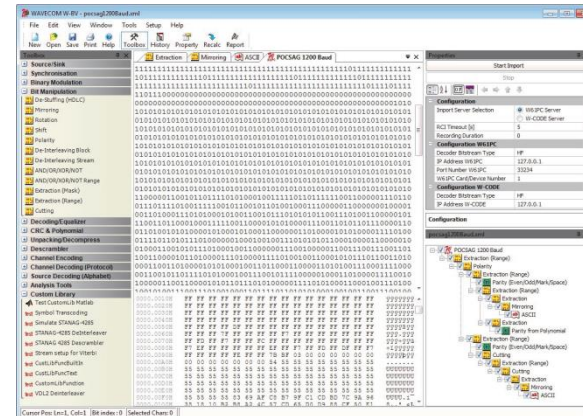
W-CLOUD: works over any Internet, Ethernet or wireless connection with appropriate download bandwidth and allows reliable and input signal true decoding from any location in the world.



MAIN PRODUCTS

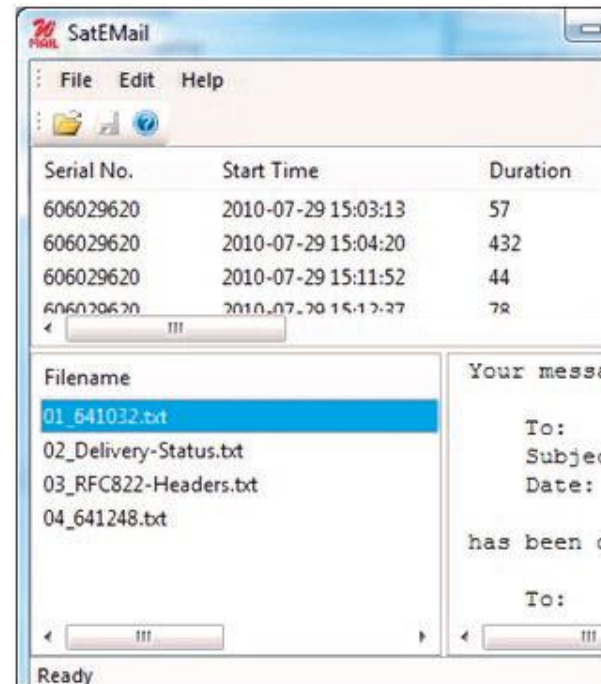
W-BitView: an offline software to analyze unknown bit-stream, hunt unknown protocols and to retrieve transmitted data.

W-BitView can be used as a postprocessor for decoded data from W-CODE.



MAIN PRODUCTS

W-SAT-email-Decoder: a standalone application which decodes data streams from a wide range of different satellite reception equipments, including Wavecom Inmarsat decoders in W-CODE.



MAIN PRODUCTS

- W-CODE Source Code: the complete implementation in source code. For customers to integrate the decoders into their own system and develop further for their purpose, (for governmental institutions only).
- Training and consultancy in digital communication.
- Provide individual solution and modification with much flexibility.