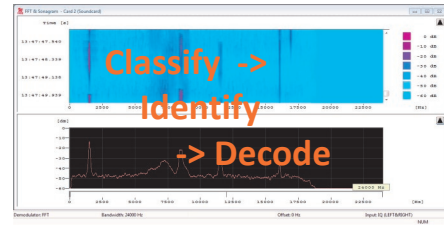


The W-PCI-LAN decoder offers all the functions of the W-PCI hardware and W-CODE software decoder plus all the advantages of a compact computer system.



The device is implemented in a ruggedized aluminium box. It can be connected to a PC or notebook via LAN or may operate as a stand-alone system. As the W-PCI-LAN operates from 9-30 V DC power sources, it is very well suited for mobile use.

W-PCI-LAN offers two completely independent DDC (Digital Down Converter) inputs at AF and IF level. The DDCs extract the narrowband signal of interest from a broadband input signal. Each input has its own independent bandwidth and center frequency control.

## W-PCI-LAN FEATURES

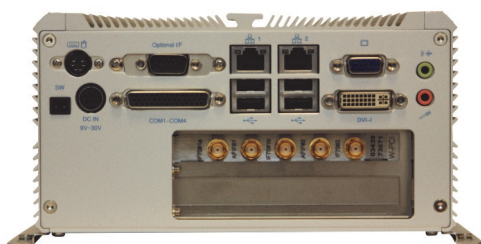
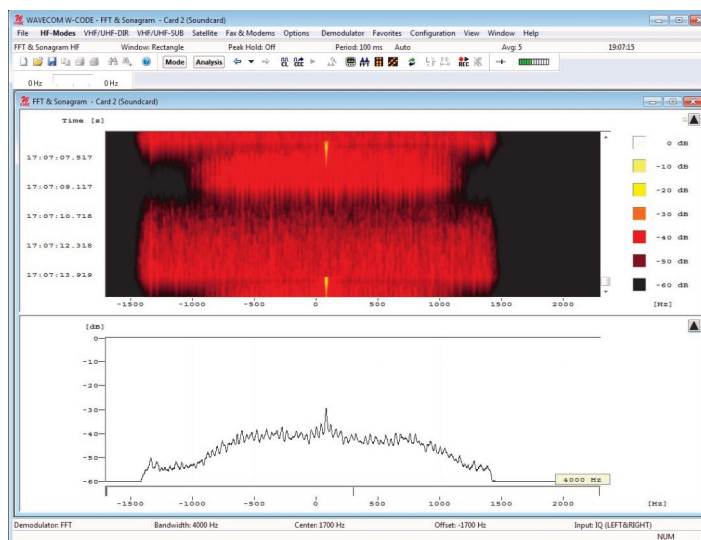
- Automatic classification, code check, demodulation and decoding to content level of known signals
- Automatic classification and code check of unknown predefined signals
- A signal overview using real-time spectrum, waterfall displays and manual signal measurements
- Supports SDR (Software Defined Radio) I/Q data or digital input
- Supports TCP/IP input streams using IP-CONF, IP-PxGF, VITA-49, Virtual Audio Cable (VAC), WinRadio Digital Bridge
- Virtual Sound Card (VSC) and built-in soundcard input with sampling rates of up to 192 kHz
- Tested with a number of SDRs, e.g. WinRadio WR-G39DDC, Grintek GRXLAN, Perseus, netSDR, SDR-IP, Rohde & Schwarz and MEDAV LR2.
- Supports direct input and output of WAV files with integrated Wavecom Media Player/Recorder
- Decoded output can be saved to files or picked up from the XML remote control interface

## W-PCI-LAN FUNCTIONS

High portability and quick setup makes this stand-alone Wavecom decoder the first choice for:

- Notebook or netbook users requiring full W-PCI capabilities
- Remote, unmanned and mobile monitoring
- Outdoor monitoring
- Mobile use in planes, ships, cars etc.
- Networking of monitoring stations

The easy-to-use graphical user interface (GUI) with well-structured pull-down menus allows an operator to become rapidly familiar with W-PCI-LAN.



These features allow the system to be adapted to the client's requirements and applications. The implementation of complex systems for monitoring on a large scale is limited only by the number of decoders.

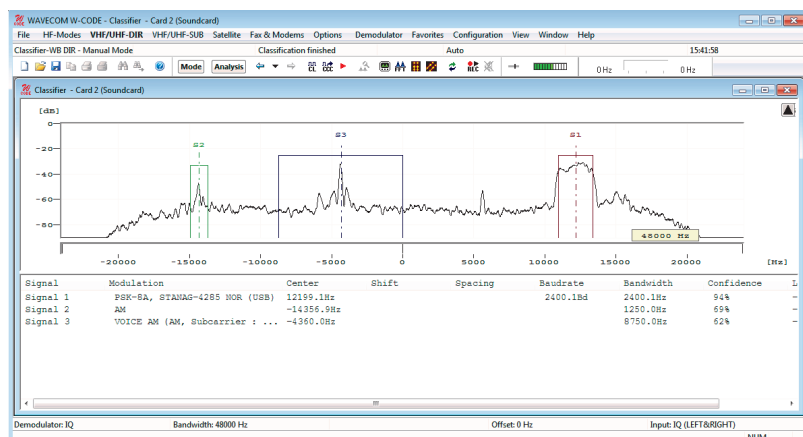
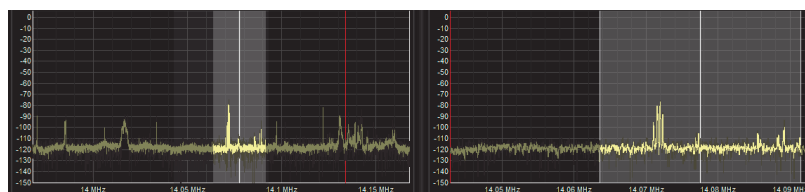
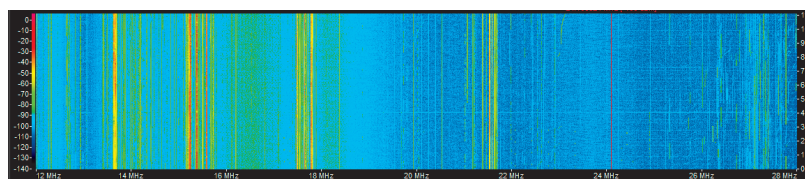
System components can be individually configured according to the requirements of the customer. A wide range of system default settings can be configured, e.g., input signal level, measuring interval, center frequency and demodulator type.

A W-PCI-LAN decoder may be controlled from anywhere across the network, and its output can be sent to one or more applications on the network.

In order to process the data output, manage the decoder and signal parameters, an integrated remote control interface allows easy control of W-PCI-LAN from a customer application.

## W-PCI-LAN APPLICATIONS

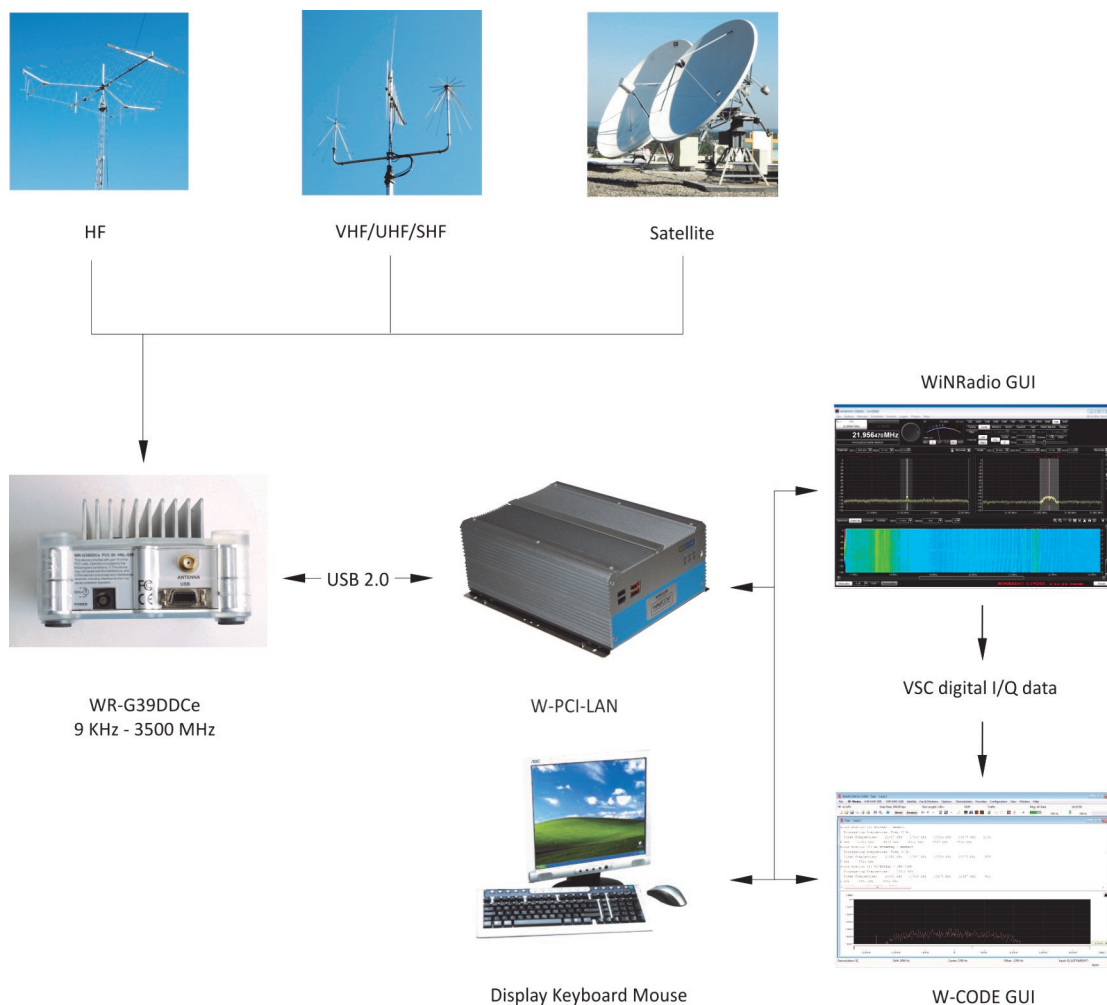
- Automated or manual monitoring of radio data and voice communications from HF to SHF bands
- Signal and communication intelligence
- Signal analysis and classification
- Spectrum monitoring
- Automatic analysis and classification of transmission type and protocol
- Audio and IF recording for subsequent analysis and transcription
- Wide range of universal demodulators and standard decoder
- Data decoding



The W-PCI-LAN applications range from stationary monitoring of one transmission of a single system to fully automated broadband monitoring employing many systems.

The determination of signal characteristics is assisted by a large number of analysis and measurement functions, operating over a wide range of signal parameters. The numerous integrated analysis tools contain several different methods and viewing options.

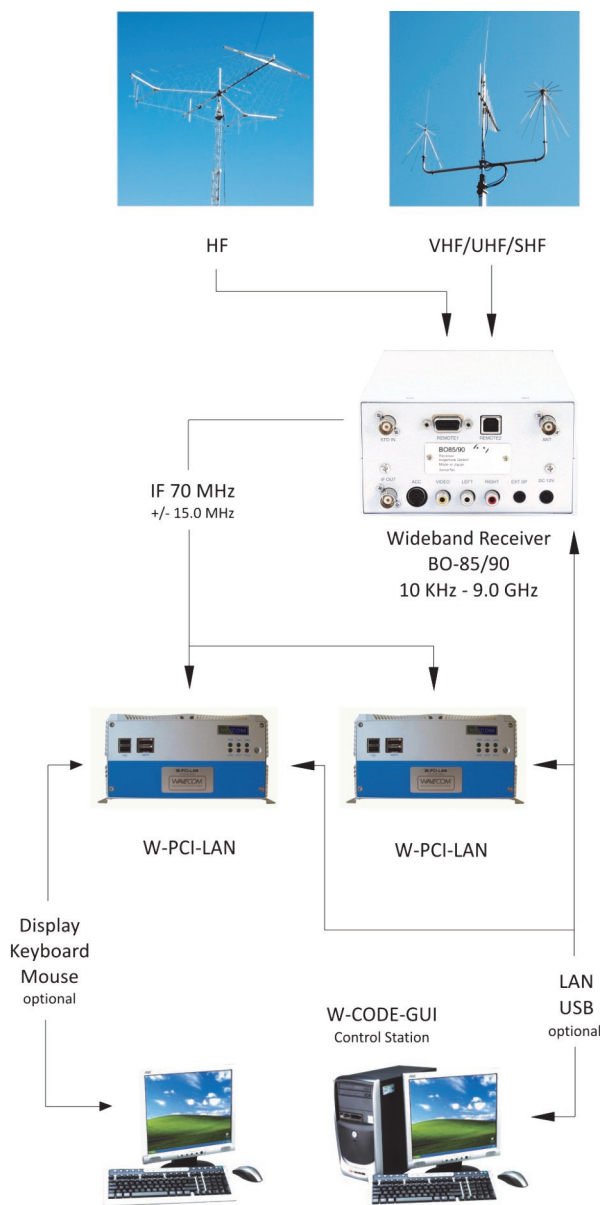
The intuitive GUI assists the operator in analyzing the important signal parameters. Dynamic zoom functions allow magnification of details in any selected window.



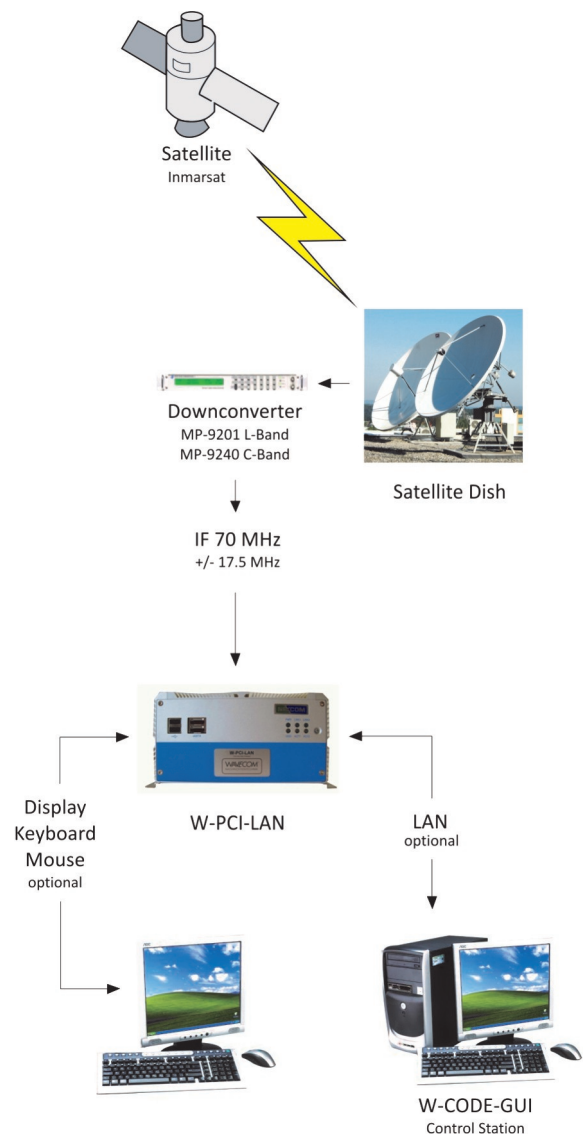
#### A W-PCI-LAN and WinRadio SDR configuration

W-PCI-LAN accepts input from the host built-in sound card, a number of SDRs, digital audio outputs, WAV files, I/Q data or TCP/IP streams. W-PCI-LAN provides all functions required to

analyze, decode and process radio data communications throughout the radio spectrum from HF, VHF, UHF to SHF.



**W-PCI-LAN and wideband receiver configuration**



**Basic satellite monitoring station**



### HF - Protocols

ALE-400
ALF-RDS
ALIS
ALIS-2
ARQ6-90
ARQ6-98
ARQ-E
ARQ-E3
ARQ-M2-242
ARQ-M2-342
ARQ-M4-242
ARQ-M4-342
ARQ-N
ASCII
AUM-13
AUTOSPEC
BAUDOT
BR-6028 (ITA-2 and ITA-5)
BULG-ASCII
CHU
CIS-11
CIS-12 (HEX output)
CIS-14
CIS-36
CIS-36-50
CIS-50-50
CLOVER-2 (ARQ, all CRCs)
CLOVER-2000 (ARQ, all CRCs)
CODAN-SELCAL
CODAN-9001
COQUELET-8
COQUELET-13
COQUELET-80
CV-786
CW-MORSE
DCS SELCAL
DGPS
DUP-ARQ
DUP-ARQ-2
DUP-FEC-2
EFR

FEC-A
FELDHILL
FM-HELL
GMDSS/DSC-HF
G-TOR
GW-FSK
GW-OFDM
GW-PSK
HC-ARQ
HF-ACARS (HF-DL)
HNG-FEC
ICAO-SELCAL (ANNEX 10)
LINK-11 (CLEW)
MD-674
MFSK-16
MFSK-20
MFSK-8
MIL-188-110-16TONE (-110A/B App. A)
MIL-188-110-39TONE (-110A/B App. B)
MIL-188-110A Serial Tones, 75-4800 bps
MIL-188-110B (App. C) STANAG 4539
MIL-188-110B 3200-12800 bps
MIL-188-141A (ALE)
MIL-188-141B (BW0, BW1, BW4 data)
MIL-188-141B (BW2, BW3 ID)
MIL-M-55529 NB/WB
OLIVIA
PACKET-300/600
PACTOR (all CRCs)
PACTOR-FEC (all CRCs)
PACTOR-II (all CRCs)
PACTOR-II-AUTO (all CRCs)
PACTOR-II-FEC (all CRCs)
PACTOR-III (all CRCs)
PICCOLO-MK12
PICCOLO-MK6
POL-ARQ

PRESS-FAX
PSK-10
PSK-125 (BPSK, QPSK) with FLARC
PSK-125F
PSK-220F
PSK-250 (BPSK, QPSK) with FLARC
PSK-31 (BPSK, QPSK)
PSK-31-FEC
PSK-63 (BPSK, QPSK) with FLARC
PSK-63F
PSK-AM
ROBUST-PACKET
RUM-FEC
SI-ARQ
SI-AUTO
SI-FEC
SITOR-ARQ
SITOR-AUTO
SITOR-FEC
SP-14
SPREAD-11, 21, 51
SSTV Automatic
SSTV Martin 1, 2, 3, 4
SSTV Robot 8s, 12s, 24s, 36s
SSTV SC-1 16, 32s
SSTV SC-1 8s, 16s, 32s
SSTV Scottie 1, 2, 3, 4
SSTV Wraase SC-1 24s - 96s
SSTV Wraase SC-2 20s - 180s
STANAG 4285 75-3600 bps
STANAG 4415 75 bps (NATO ROBUST)
STANAG 4481-FSK (KG-84)
STANAG 4481-PSK
STANAG 4529 75-1800 bps
STANAG 4539 3200-12800 bps
STANAG 5065-FSK
SWED-ARQ
TWINPLEX
VISEL
WEATHER-FAX

**Advanced HF - Protocols**

**GW-OFDM** is used by GlobeWireless® which owns and operates coastal stations world-wide connected by leased lines to two, redundant network operation centers in Liverpool, UK and San Francisco, USA. The company offers fully automatic HF and satellite systems to more than 4,000 vessels worldwide.

GW-OFDM (Orthogonal Frequency Division Multiplex) uses long packets for payload data and short packets for control or request information for the ARQ process. The Information Sending Station (ISS) exchanges information with an Information Receiving Station (IRS) in half-duplex on a pair of frequencies. A data scrambler is used to reduce the high peak-to-average-power ratio which is a characteristic of OFDM systems.

The main parameters of GW's adaptation of OFDM are:

- 12 to 32 subcarriers dynamically assigned
- DQPSK modulation
- 62.5 Hz subcarrier spacing
- Symbol rate 62.5, duration 16 ms
- Guard interval duration 2 ms
- 700-2700 Hz occupied bandwidth
- Pilot tone for synchronization and frequency tracking

**LINK-11**, also known in the USA as TDL A and previously as TADIL A, is a NATO standard for transmission of tactical data over radio. Data is exchanged using the Conventional Link Eleven Waveform (CLEW) - a differential quadrature phase-shift modulated data link operating at a rate of 1364 bps (HF, UHF) or 2250 bps (UHF). Since SLEW is susceptible to ECM, a recent addition to the standard has been the Single Tone Link Eleven Waveform (SLEW), which using single tone M-ary PSK disperses data bit errors uniformly utilizing data interleaving and Full Tail Biting Convolutional Block (FTBCB) encoding. The better ECM resistance allows a data rate of 1800 bps.

**ROBUST-PACKET (RPR)** is optimized for deployment in the short wave band. To accommodate the characteristics of this frequency range, e.g.

fading and multipath propagation resulting in intersymbol interference, eight-carrier, pulse-shaped OFDM is used. The AF center frequency is 1500 Hz and the carrier center spacing is 60 Hz. Dependent on the user data rate (200 or 600 bps excluding AX.25 protocol overhead) each carrier is DBPSK or DQPSK modulated at a constant rate of 50 Baud. The WAVECOM decoder automatically detects the user data rate and the size of the transmitted packets.

**FACTOR-III** is an adaptive transmission mode that provides higher throughput and improved robustness compared to FACTOR-I and FACTOR-II.

**CLOVER-2** is an adaptive modulation system with ARQ and FEC (broadcast) modes. It uses Reed-Solomon (RS) coding to achieve a remarkable performance even under poor HF propagation conditions.

**CLOVER-2000** is another adaptive modulation system of the CLOVER family and offers ARQ with Reed-Solomon (RS) coding to achieve a remarkable performance even under the worst HF propagation conditions.

**CODAN-9001** is an asynchronous adaptive ARQ system. The Wavecom decoder supports these functions:

- Automatic recognition of secure and unsecure modes
- De-randomization of secure and unsecure mode
- Arbitrary start values for de-randomization
- Output of recognized start value in secure mode
- Output of status information
- Output of recognized frame type
- Decoding of chat messages into text
- Decoding of text file transmissions into readable output
- Decoding of data transmissions into hexadecimal output
- Decompression of data
- Storage of channel data for analysis purposes
- 7-bit ASCII alphabet used by CODAN-9102 software

**VHF/UHF - Protocols**

ACARS
AIS
APCO-25 (P25)
ASCII
ATIS (Selcal digital)
BIIS
CCIR-1 (Selcal analog)
CCIR-2 (Selcal analog)
CCIR-7 (Selcal analog)
CCITT (Selcal analog)
CTCSS
DCS-SELCAL
DGPS
DMR (with live voice)
dPMR (with live voice)
DTMF (Selcal analog)

DZVEI (Selcal analog)
EEA (Selcal analog)
EIA (Selcal analog)
ERMES
EURO (Selcal analog)
FLEX
FMS-BOS (Selcal digital)
GMDSS/DSC-VHF
GOLAY/GSC
MOBITEX-1200 (with OVLS)
MOBITEX-8000
MODAT (Selcal analog)
MPT-1327 (with ITA-5)
NATEL (Selcal analog)
NMT-450
NWR-SAME

NXDN
PACKET-1200
PACKET-9600
PCCIR (Selcal analog)
PDZVEI (Selcal analog)
POCSAG
PZVEI (Selcal analog)
SKYPER (POCSAG)
TETRA (with live voice)
VDEW (Selcal analog)
VDL-M2
X.25
ZVEI-1 (Selcal analog)
ZVEI-2 (Selcal analog)
ZVEI-3 (Selcal analog)
ZVEI-VDEW (Selcal digital)

**SATELLITE - Protocols**

AMSAT-P3-D
INMARSAT-AERO-P (beta)
INMARSAT-B-C-TFC (return)
INMARSAT-B-Data (forward)
INMARSAT-B-FAX (forward)
INMARSAT-B-HSD (forward, high speed data)
INMARSAT-B-TEL (forward, with live voice)

INMARSAT-B-TELEX-MM (forward)
INMARSAT-B-TELEX-SM (forward)
INMARSAT-C-EGC (Enhanced Group Call)
INMARSAT-C-TDM
INMARSAT-C-TDM-EGC
INMARSAT-C-TDMA
INMARSAT-M-DATA (forward)

INMARSAT-M-FAX (forward)
INMARSAT-M-TEL (forward, with live voice)
INMARSAT-mM-DATA (forward)
INMARSAT-mM-FAX (forward)
INMARSAT-mM-TEL (forward)
NOAA-GEO SAT
ORBCOMM

**FAX-G3 and MODEM - Protocols**

FAX-G3 T4 / T6 / JPEG / JBIG T.30 protocol with ECMM
FAX-G3-V.17
FAX-G3-V.27ter
FAX-G3-V.29
FAX-G3-V.34hdx

BELL103
BELL212A
V.21
V.22 / V.22bis
V.23

V.26 / V.26bis
V.32 / V.32bis
V.34 / V.34bis
V.90
V.92



#### Advanced VHF and UHF Protocols

**TETRA** (Terrestrial Trunked Radio, ETSI EN 300 392-2) is a digital, trunked mobile radio standard for voice and data developed by ETSI. TETRA was designed using the experience gained from GSM and from several trunked radio systems. It provides various security measures including authentication mechanisms, air interface encryption and end-to-end encryption. TETRA has found widespread use all over Europe and also outside the EU in public safety, transportation, military and general land mobile applications.

**APCO-25**, P25 or Project 25 is a set of standards for radio communications for public safety, security, public service and commercial applications developed among others by the Association of Public Safety Communications Officials International (APCO). It is standardized by the US Telecommunications Industry Association (TIA) and supports both voice and data transmissions. P25 compliant radios can communicate in analog mode with non-P25 radios and in analog and digital mode with P25 radios.

**DMR** - In the ever ongoing effort to squeeze more capacity out of a finite resource, the electromagnetic spectrum, a new digital standard, Digital Mobile Radio (DMR, ETSI TS 102-361) is emerging. Whereas the older analogue PMR (Private Mobile Radio) systems require 25 kHz channels or for newer systems 12.5 kHz, DMR offers two channels within 12.5 kHz. DMR offers both voice and data communications and interfacing to external networks. Voice communications offer features as call alert, emergency call, remote monitoring, silent worker, Push-to-Talk ID, radio check, all call, stunning etc.

**dPMR** is an open ETSI standard published in TS 102 490 (license-free) and TS 102 658 (licensed). TS 102 490 covers license-free hand portable equipment operating in peer-to-peer mode. The radios have an integral antenna and limited output power. The standard is also known as dPMR446. dPMR offers two discrete frequency channels with

thin 12.5 kHz FDMA (Frequency Division Multiple Access) and voice as well as data communications.

**VDL-M2** - For many years, ACARS has been the only mode for air-ground/ground-air VHF data communications. However, global increase in air travel as well as the demand for bandwidth hungry data applications has also led to an increase in the demand for aeronautical VHF communication channels. ACARS is also constrained to 7-bit character oriented data, whereas VDL-M2 natively is bit oriented. To comply with this demand, aeronautical voice channel bandwidth has been decreased to 8.33 kHz. One result of these considerations has been the introduction of VHF Data Link Mode 2 (VDL Mode 2) which is planned to eventually replace ACARS.

**MOBITEX-8000** utilizes a hierarchical switching architecture with a top level main exchange through which all national traffic is switched. Regional exchanges connect to the main exchange and are in turn connected to area exchanges. Fixed terminals and external gateways for exchange of traffic with the Internet, PSTN, GSM-SMS etc. are connected to the area exchanges as are the base stations. At the lowest level of the switching hierarchy mobile terminals connect to the base stations. Traffic between mobiles connected to the same base station will be switched there, the principle being to switch at the lowest possible level. By using this architecture, unnecessary traffic load is removed from the trunks, and a high degree of autonomy and resilience is ensured even if the higher level links are not operational. Mobitex 8000 is only enabled for data and uses 8000 bps GMSK modulation.

**BIIS** (Binary Interchange of Information and Signaling) is a data mode standardized by ETSI TS 300-230. The standard only describes the air interface, i.e. the physical layer, the data link layer and a call control layer. BIIS functionality includes selective calling, various other call features, short text messaging, predefined status messages and data transmission.

#### Computer Specifications and Technical Data

Dimensions (LxWxH)	268 x 195 x 100 mm
Weight	5.0 kg
DC power requirement (typical values)	9-30 V (max. 120 W)
AC power requirement (typical values)	100-240 , 50-60 Hz, 2 Amp.
Operating temperature	- 5 °C to 55 °C (According to IEC60068-2-1, IEC60068-2-2, IEC60068-2-14)
Case temperature range	-5 °C to 55 °C
Storage temperature range	-20 °C to 80 °C
Relative humidity	10 to 93 % (non-condensing)
Operating system (OS)	Windows 7 Professional, 32-bit, English Windows 7 Professional, 64-bit, Englisch (optional)
CPU	Intel® Core™ i5-520M PGA Processor (3MB Cache)
CPU Clock	2.4 GHz
Controller	Mobile Intel® QM57 Platform Controller Hub
Memory	4 GB DDR3-RAM, PC1333 CL9 240-pin memory DIMM
Hard disk	160 GB, 5400, 8MB cache, 24h/7d
W-PCI-LAN	1 slot for W-PCI 1 slot free
Ethernet / LAN	2 x 10MB/100MB/1GB
USB	2 x USB 2.0 (front) 4 x USB 2.0 (rear)
Serial ports	3 x RS232 1 x RS232/422/485
Audio	1 x Mic-In 1 x Speaker-Out
eSATA	2 ports
Video	1 x DB-15 VGA port, 1 x DVI-I port (1280 x 1024)
Keyboard/Mouse	2 x PS/2 or USB
Conformity	CE approval, FCC Class B

#### W-PCI Specifications and Technical Data

Inputs	AFIF#1 and AFIF#2	IF70#1a, IF70#1b and IF70#2
Connector	SMA female	SMA female
Frequency range	50 Hz to 25 MHz	52.5 MHz to 87.5 MHz (SAW filter)
Bandwidth	5 kHz to 500 kHz	5 kHz to 500 kHz
Frequency raster DDC	1.0 Hz	1.0 Hz
Signal level	2 mVrms to 0.5 Vrms 20 mVrms to 2.5 Vrms with 20 dB at- tenuator (jumped)	20 mVrms to 2.5 Vrms
Input impedance	> 1 kOhm	50 Ohm
Input max sampling rate	92.16 MHz	92.16 MHz
Input sampling rate jitter	1 ps (RMS 12 kHz to 20 MHz)	1 ps (RMS 12 kHz to 20 MHz)

Card type	Half-size PCI card
Number of concurrent, independent inputs	2 AFIF#1 or IF70#1a or IF70#1b -with- AFIF#2 or IF70#2
Dimensions (L x W x H)	168 x 106 x 22 mm
Weight	0.15 kg
Power requirement (typical values)	+3.3V @ 1.0 A +12V @ 0.4 A
Bus interface	32-bit 3.3V PCI slot 100 Mbytes/s
Operating temperature range	0 °C to 50 °C
Case temperature range	0 °C to 55 °C
Storage temperature range	0 °C to 70 °C
Relative humidity	10 to 90 % (non-condensing)
A/D converter	AD9268 dual 16 bit ADC
Dynamic range	> 60 dB
Digital down converter DDC	FPGA Cyclone II 50K
DSP	TI DSP320C6454
Watchdog for on-board generated voltages	Yes
Conformity	CE

## Software Release V 8.1.00

- New mode: NXDN with demodulated bitstream (symbol) output
- All VHF/UHF DIR (directly modulated) and VHF/UHF SUB (indirectly modulated) modes are identically handled by Classifier and Classifier Code Check (CCC) and voice classification in VHF/UHF modes is fully supported
- STANAG-4285 decoder now offers a demodulated symbol output for further analysis with Wavecom's W-BitView Tool
- STANAG 4285 center frequency search extended to +/-160 Hz and various significant improvements
- „IAS Bitstream Output“ renamed to „Demodulated Bitstream Output“
- General improvements and bug-fixes

## Ordering Information

Product designation	WLANP
Documentation and online help	English user manual
Software and signal samples	Installation DVD with the latest software version
Updates	Software update by DVD
Warranty	One year on hardware
Prices	<a href="http://www.wavecom.ch/quotes.htm">http://www.wavecom.ch/quotes.htm</a>

## WAVECOM Products

• <b>W-CODE</b>	• <b>W-PCI-LAN</b>	• <b>W-BitView</b>
• <b>W-PCle</b>	• <b>W-Classifier-NB</b>	• <b>W-SAT-email-Decoder</b>
• <b>W-PCle-LAN</b>	• <b>W61PC Classifier-NB</b>	• <b>W-Signal-Library</b>
• <b>W-PCI</b>	• <b>W-Classifier-WB</b>	• <b>Operator Training</b>