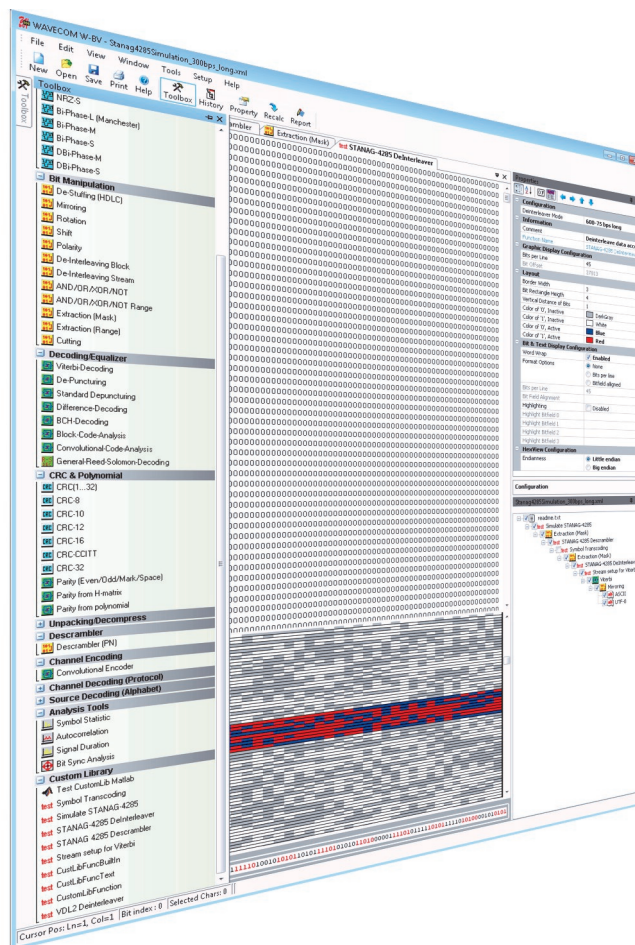


# WAVECOM® W-BitView



Today, the possibility to analyze and process demodulated signals with unknown protocols is important. W-BitView is a stand alone application for analyzing unknown signal. Signals with unknown protocols can be further analyzed and processed to retrieve the transmitted data. The software can also be used as a postprocessor for decoded data.

## W-BitView Overview

- ◆ Direct data import from the W-PCI, W-PCle, W-CODE, W61PC or W51PC decoder
- ◆ .NET application
- ◆ User can add own functions (MatLab or C#)
- ◆ Offline, stand-alone application
- ◆ Bit manipulation tool
- ◆ Bit display tools (text, graphics)
- ◆ Multiple analyses may be processed simultaneously
- ◆ Auto-update functionality
- ◆ Report generator for parameter and data (ASCII or XML)
- ◆ Drag and drop of functions
- ◆ Re-arrange functions in tree view
- ◆ Nested docking
- ◆ Auto hide
- ◆ Toolboxes for all functions

## What is Bit Analysis?

Bit analysis is the process of finding patterns in a seemingly random and incoherent stream of bits. The goal is to transform the bit stream into clear text, or into reliable, cryptographic text, for further processing – these objectives require that all

framing, protocol overhead, checksums, and other extraneous data should be removed. The BitView provides the user with a set of sophisticated and highly specialized tools to ease and accelerate this process, and facilitate the recovery of useful data.

## What W-BitView Offers

BitView enables the user to analyze bit streams. The range of available functions includes the display of a bit stream in various formats, simple bit stream manipulations, as well as statistical and mathematical functions, and functions based on coding theory. The tools are directed at users with experience in both coding theory and mathematics; in particular, to fully exploit some of the more complex functions a comprehensive mathematical knowledge is a requirement.

All analysis and processing steps, including the necessary parameters involved, are logged as is

each function used and its parameters. The log file is saved in ASCII (XML) format as may be edited with most text editors. It may be loaded to repeat the saved analysis steps, which enables analysis sessions to be documented and stored for later automatic rerunning, without user intervention.

The W-BitView Tool is an excellent companion to other Wavecom decoder products. W-BitView is a native .NET C# Winforms application. W-BitView offers the important feature of using custom project templates and all MATLAB Toolboxes.

## Using W-BitView

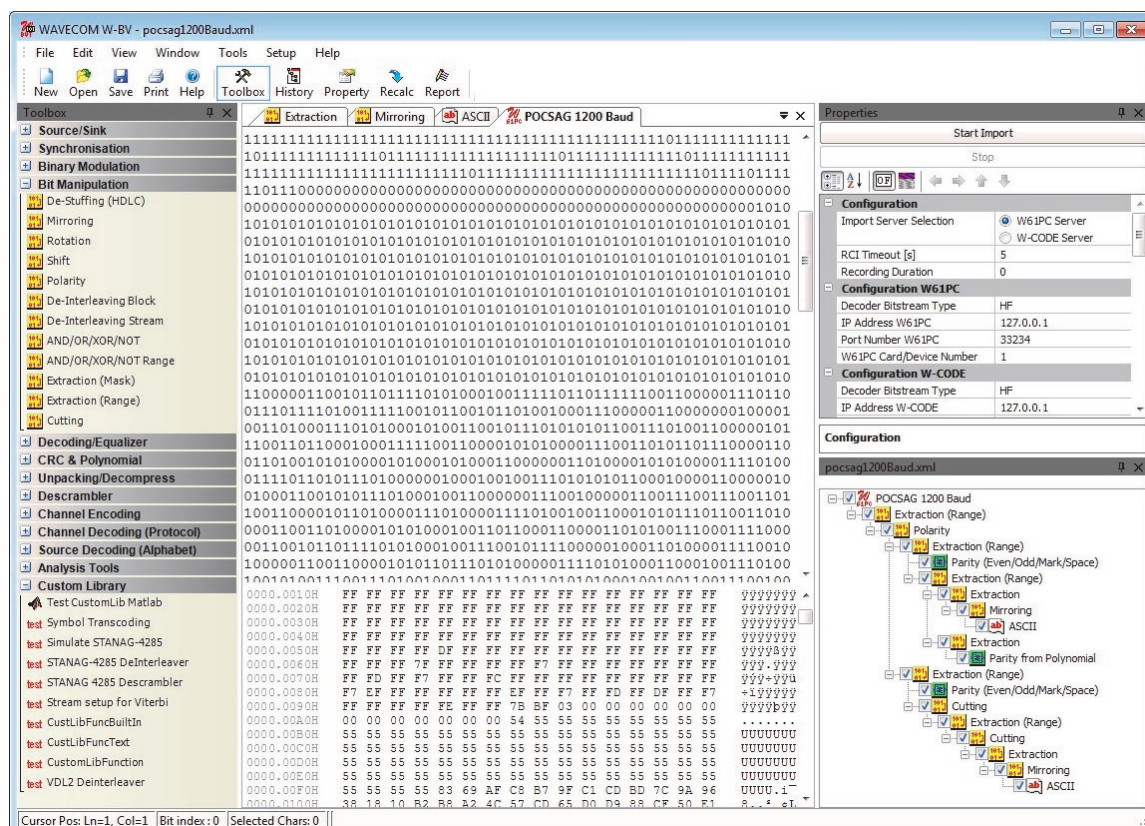
The initial steps in the bit analysis process depend on what is known about the signal, and on the skill and experience level of the user. Prior knowledge of the source, language, frequency, modulation mode, time of capture, etc. are useful pieces of information which may facilitate the analysis of the bit stream.

The various classification tools available from the Wavecom decoders should then be used. These allow a fully automatic determination of modulation type and coding format, or at least the determination of certain essential parameters of

the signal, e.g. baud rate and frequency shift.

Using the autocorrelation function will tell the operator whether the bit stream contains repeating patterns, e.g. synchronization words, HDLC flags or start-stop bits.

While the Wavecom decoders contain a wealth of tools and modes, their focus is on real-time analysis; BitView gives the user the opportunity to analyze and experiment repeatedly offline with captured data in order to recover the signal content.



POCSAG Decoding Example

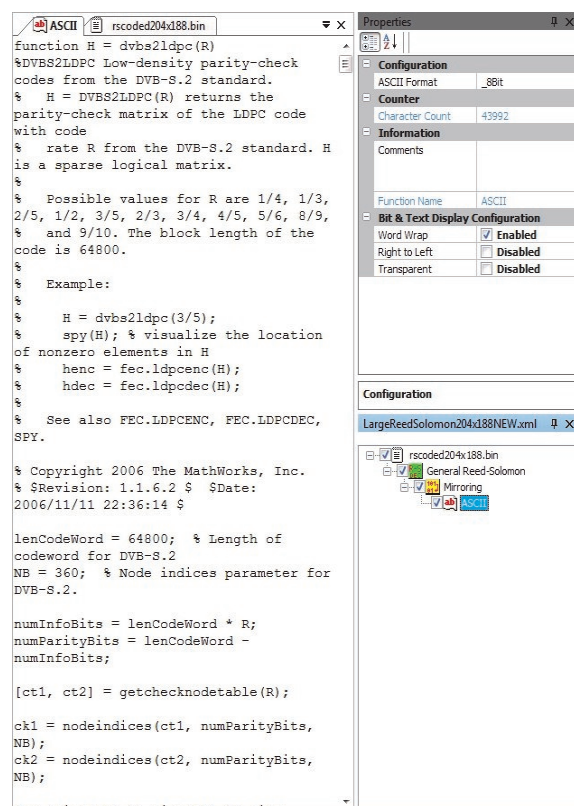
## Custom Functions

The user may expand the functionality of BitView by adding custom functions developed in Visual Studio C# .NET. Project templates are included with the BitView package. The user may use these templates as a starting point for his development work. The .NET DLL templates come in two flavors, with and without MATLAB linking. This feature allows

bit stream manipulation in MATLAB to be included in a custom function. The procedure is described in detail in the BitView manual. A MATLAB Runtime is installed together with BitView and is required in order to allow a MATLAB function to work in a .NET environment without the user acquiring a complete MATLAB system.

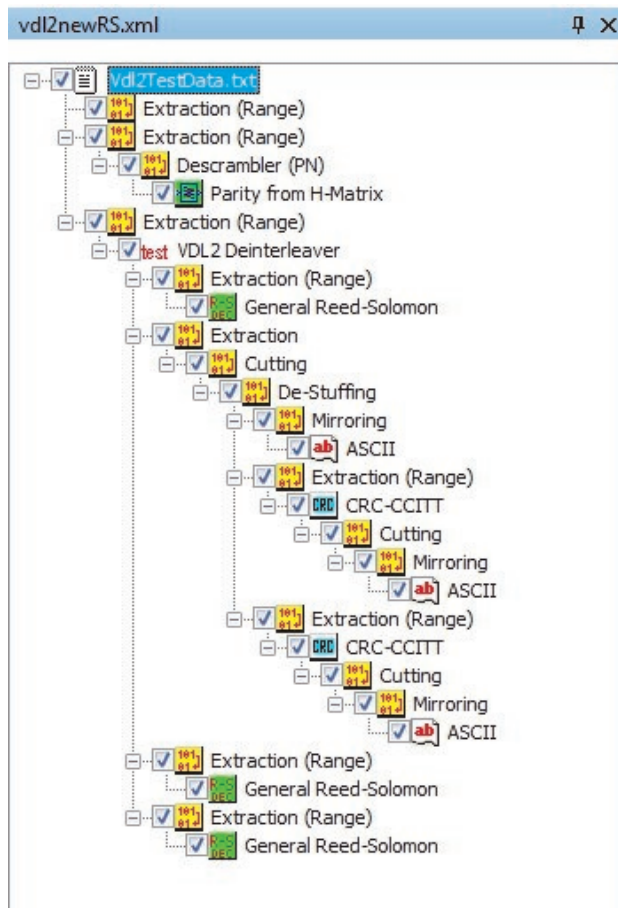
## MATLAB™ Runtime Library

MATLAB includes numerous toolboxes with several thousand functions for a multitude of applications. One such toolbox is called the Communications Toolbox including error detection and correction, interleaving, modulation and demodulation, equalizing and many other functions. Similar functions developed in C# are also found in BitView, e.g. a Reed-Solomon Decoder. Although complex features like block code analysis are found in MATLAB, they must be developed by the user in the proprietary programming language of MATLAB. To do so the built-in functions are used. For instance way a clever student has in this way developed a MATLAB program for the analysis of block codes and convolutional codes, which was published with his master thesis. This feature would have been very difficult to realize in .NET C# and was the reason for the integration of MATLAB in W-BitView. For the experienced MATLAB user this combination is very useful.



*Reed-Solomon Example*





Flow chart with VDL-M2

## W-BitView Analysis Set Examples

Example	<p>Analysis_BCH63_51</p> <p>Analysis_ConvDataR1-2-K7</p> <p>Analysis_RUM-FEC_164_Scrambled</p> <p>Baudot150</p> <p>GenPseudo</p> <p>NewDepuncturingTest</p> <p>psk-31</p> <p>rumfec-164</p> <p>Stanag Scrambling sequence</p> <p>Stanag4285Simulation_300bps_long</p> <p>Stanag4285Simulation_2400bps_long</p> <p>Stanag4285Simulation_2400bps_short</p> <p>vdl2newRS</p>	<p>Analysis_BVTest.zip</p> <p>Analysis_Packet-300_2-V11</p> <p>Analysis_s4285_5N1_V11</p> <p>Fec-a-96-sreg72</p> <p>LargeReedSolomon204-188NEW</p> <p>pocsag1200Baud</p> <p>reed-solomon-testNEW</p> <p>sitor-A</p> <p>Stanag4285-600-long-new</p> <p>Stanag4285Simulation_1200bps_long</p> <p>Stanag4285Simulation_2400bps_long_Noise</p> <p>unzip</p>
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**W-BitView Toolbox Functions**

Signal Source/Sink	Import Text Data Import Hex Data Import Binary Data Import "Demodulated Bitstream" from W-CODE, W-PCle, W-PCI, W74PC or W61PC Export Text Data Generate Pseudo-Noise
Synchronization	Preamble
Binary Modulation	NRZ-I NRZ-M NRZ-S Bi-Phase-L (Manchester) Bi-Phase-M Bi-Phase-S DBi-Phase-M DBi-Phase-S
Bit Manipulation	De-Stuffing (HDLC) Mirroring Rotation Shift Polarity De-Interleaving Block De-Interleaving Stream AND/OR/XOR/NOT AND/OR/XOR/NOT Range Extraction (Mask) Extraction (Range) Cutting
Decoding/Equalizer	Viterbi-Decoding De-Puncturing Standard De-puncturing Difference-Decoding BCH-Decoding Block-Code-Analysis Convolutional-Code-Analysis General-Reed-Solomon-Decoding
CRC & Polynomial	CRC (1...32) CRC-8 CRC-10 CRC-12 CRC-16 CRC-CCITT CRC-32 Parity (Even/Odd/Mark/Space) Parity from H-matrix Parity from polynomial
Unpacking/Decompress	Unzip
Descrambler	Descrambler (PN)

### W-BitView Toolbox Functions

Channel Encoding	Convolutional Encoding	
Channel Decoding (Protocol)	ARQ-E FEC-A HNG-FEC ITA-3 (M.342) PSK-31 (Varicode)	SITOR BAUER RUM-FEC ITA-5
Source-Decoding (Alphabet)	Latin (5 bit) Third-Shift-Cyrillic (5 bit) Arabic-Baghdad-70 (5 bit) Bulgarian (5 bit) Swedish (5 bit) Danish-Norwegian (5 bit) German ITA-2 US ITA-2 UNICODE (16 bit) UTF-8 Pager-Numeric	Tass-Cyrillic (5 bit) Hebrew (5 bit) Arabic-Baghdad-80 (ATU-80) (5 bit) Bulgarian (8 bit) Swedish (7 bit) Danish-Norwegian (7 bit) French ITA2 ASCII ITA-5 UTF-7 Code Page Decoding
Analysis Tools	Symbol Statistics Signal Duration	Autocorrelation Bit Sync Analysis
Custom Library	Test CustomLib Matlab Simulate STANAG-4285 Stream setup for Viterbi Test CustLibFuncText Test VDL2 Deinterleaver	Symbol Transcoding STANAG-4285 Descrambler Test CustLibFuncBuildIn Test CustLibFunction

### W-BitView Properties and Configuration

Function	Configuration Input Server Bit Counter Graphic Display Configuration Bit & Text Display Configuration File Information Graphic Layout Configuration HexView Configuration Input Device Configuration for W-CODE, W-PCI, W-PCle, W74PC or W61PC
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Since more than thirty years Wavecom Elektronik AG has developed, manufactured and distributed high quality devices and software for the decoding and retrieval of information from wireless data communication in all frequency bands. The nature

of the data communication may be arbitrary, but commonly contains text, images and voice. The company is internationally established within this industry and maintains a longstanding, world-wide network of distributors and business partners.

## Product Information

Products	<a href="http://www.wavecom.ch/product-summary.php">http://www.wavecom.ch/product-summary.php</a>
Datasheets	<a href="http://www.wavecom.ch/brochures.php">http://www.wavecom.ch/brochures.php</a>
Specifications	<a href="http://www.wavecom.ch/product-specifications.php">http://www.wavecom.ch/product-specifications.php</a>
Documentation	<a href="http://www.wavecom.ch/manuals.php">http://www.wavecom.ch/manuals.php</a>
Online help	<a href="http://www.wavecom.ch/content/ext/DecoderOnlineHelp/default.htm">http://www.wavecom.ch/content/ext/DecoderOnlineHelp/default.htm</a>
Software warranty	One year free releases and bug fixes, update by DVD
Hardware warranty	Two years hardware warranty
Prices	<a href="http://www.wavecom.ch/contact-us.php">http://www.wavecom.ch/contact-us.php</a>

## System Requirements and Ordering Information

	<i>Minimum</i>	<i>Recommended</i>
CPU	P4 Dual-Core 2.4 GHz	Core i5 or Core i7 2.8 GHz
Memory	2 GB RAM	4 - 8 GB RAM
OS	Windows XP	Windows 7 32-bit or Windows 7 64-bit

Product Code	Description
WBV	Stand alone bit-level analysis tool

## Distributors and Regional Contacts

You will find a list of distributors and regional contacts at <http://www.wavecom.ch/distributors.php>