

W-BV (BitView Tool)

Data import from W51PC, W61LAN and W-CODE
 Analysis, display and manipulation of bit stream data

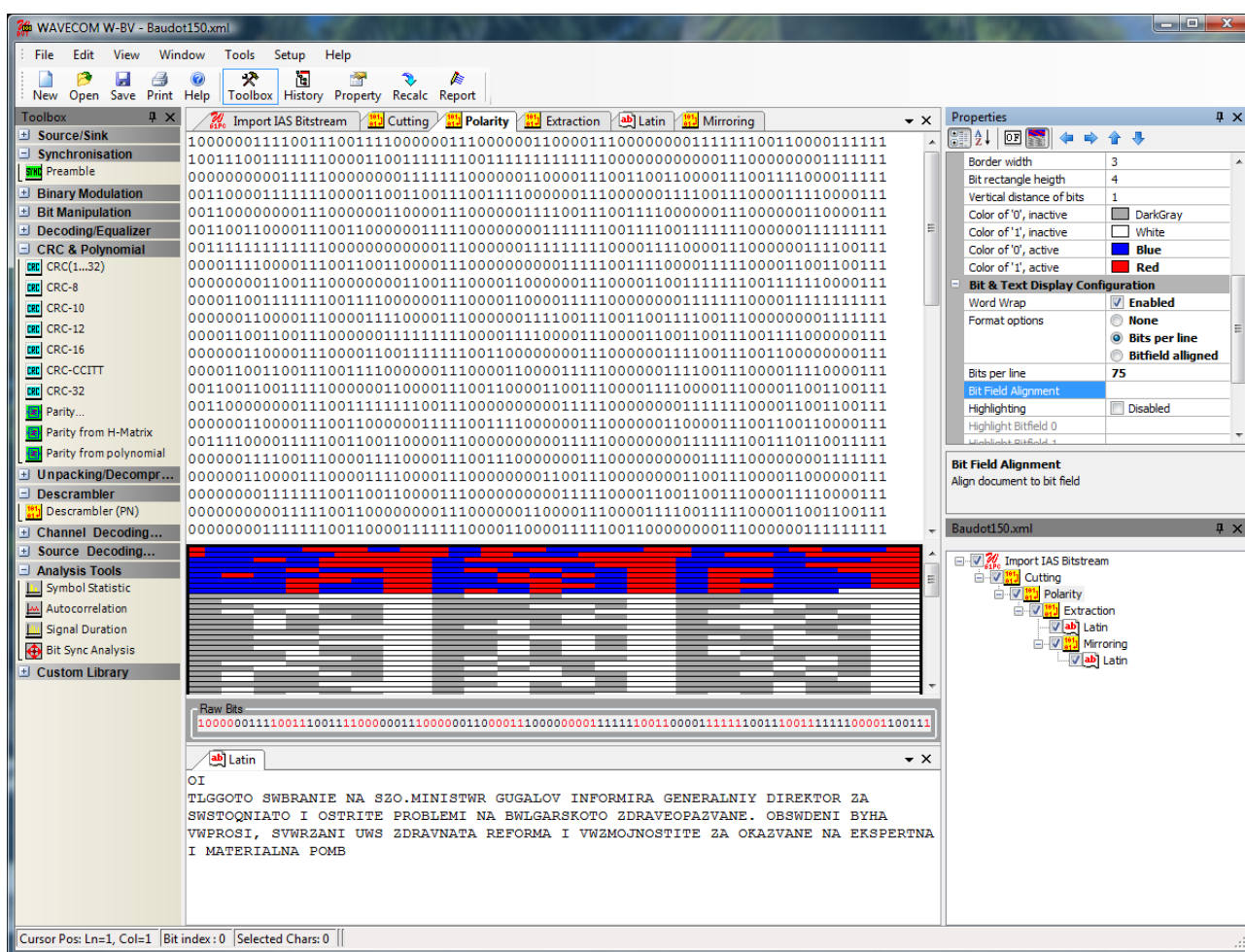
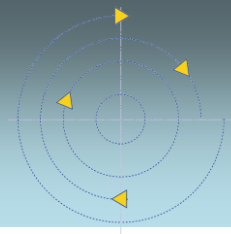


Figure 1 Baudot Signal Analysis



WAVECOM Offline Analysis Tool

The splendid BitView Tool (W-BV) is an external .NET application to analyze unknown signals. It is possible to import the data stream directly from the W-CODE, W61 or W51 decoder or to import data files.

- Offline tool, stand alone application
- Bit Manipulation Tool
- Bit display tools (text, graphics)
- Multiple analyses may be processed at the same time
- Auto-update functionality

- Nested docking
- Auto hide
- Free drag and drop of windows
- Apply and modify alphabets
- Persistent to XML file. The application can restore its screen layout every time it starts up
- .NET technology
- Data import from W61PC/LAN and new WAVECOM® products
- Custom defined functions
- Reports in text or XML format

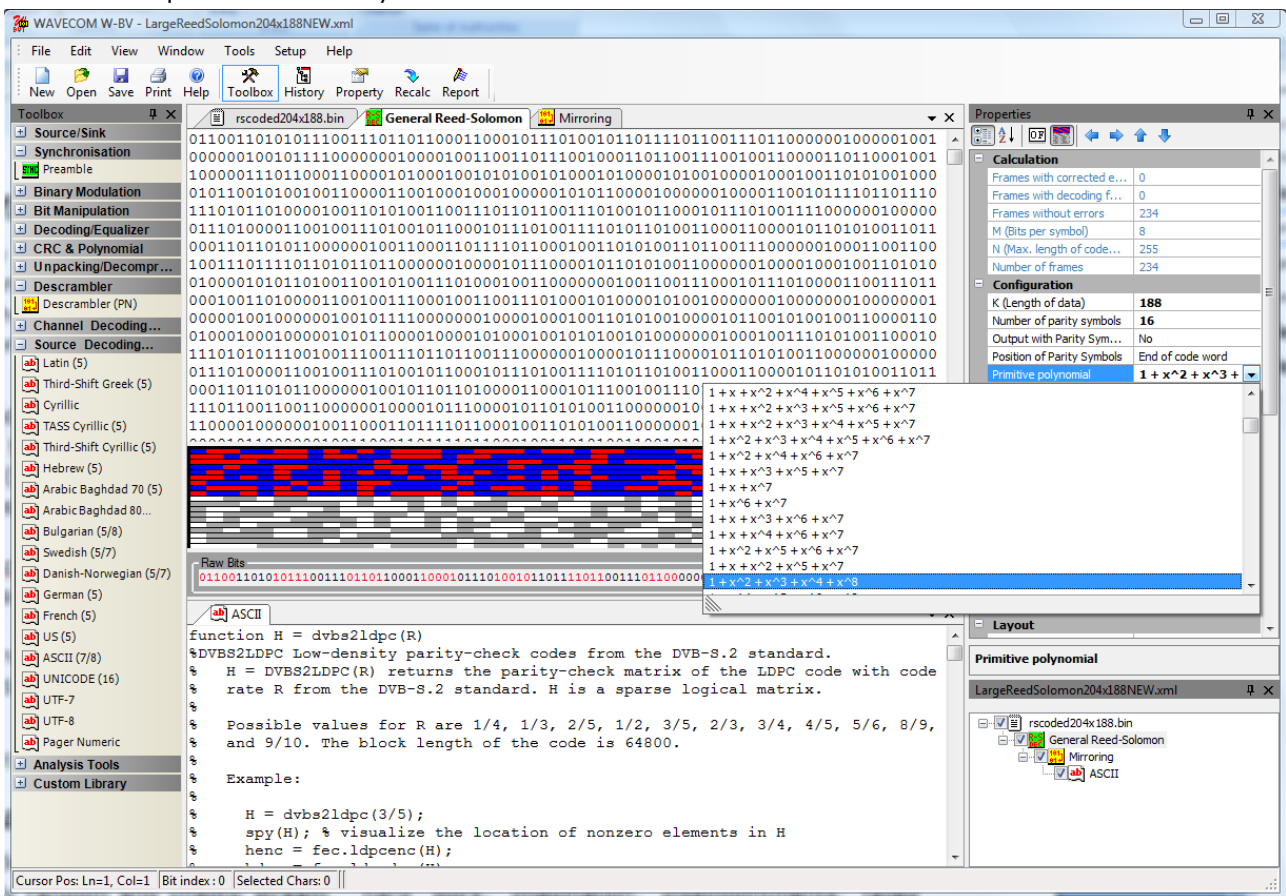
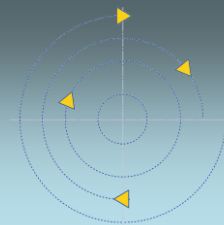


Figure 2 Reed-Solomon Decoding

- Report generator (parameter, data; ASCII, XML)
- Free drag and drop of functions
- Re-arrange functions in tree view
- Auto Calculation
- HEX/Graphic View
- Bit Sync Analysis Tool



What is Bit Analysis?

Bit analysis may be described as the art of finding pattern in a seemingly random and chaotic stream of bits. The final objective of this endeavor is to transform the bit stream into clear text or into cleaned-up crypto text for further processing. The objective is not cryptanalysis of the message, but the message should be ready for this, i.e. all framing, protocol overhead and checksums removed

about the message, i.e. what is or could be the source, language, how was it captured and similar environmental and circumstantial information. For messages captured by radio monitoring the knowledge of frequency, modulation mode, time of capture, the nature of the network, etc. are important pieces of information which may facilitate the analysis of the bit stream. So knowledge or qualified

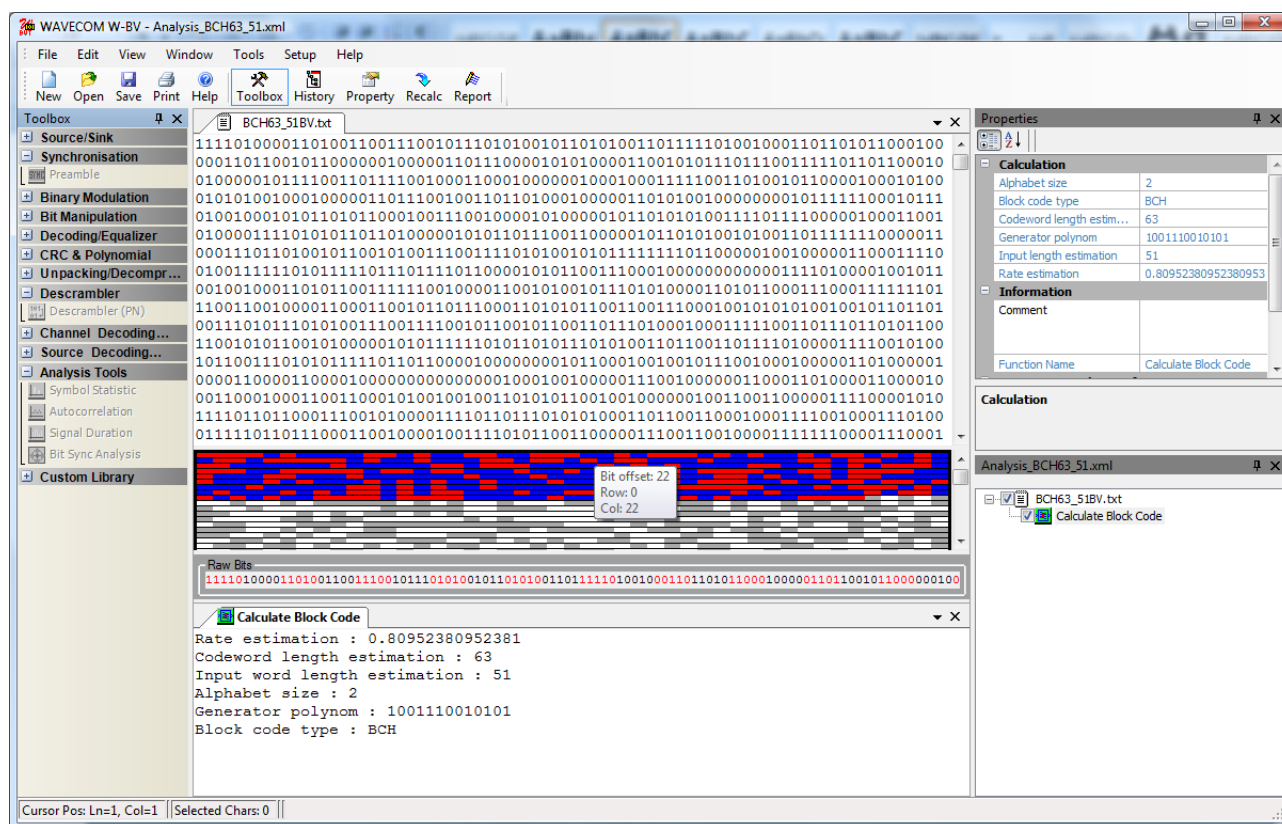
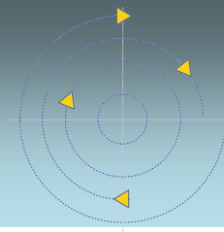


Figure 3 Block Cod Analysis for BCH63

until the message is “clean”. And it is all about hard work, imagination, disappointments, failed hypotheses, and then if skill, experience and luck all come together you are rewarded. Be aware “code” and “coding” should not be understood as the concealment of information content, but as the tools used to preserve the integrity of transmitted information protecting it from errors and disturbances introduced by the transmission channel.

How then does one go about analyzing a bit stream? First one has to consider what is known

guesses about the environmental information about a message may be very helpful. Then of course a good knowledge of coding theory is most helpful because this will give the user hints to how to approach the task. Let us assume that you are listening to the radio and using a WAVECOM decoder and want to find out what this strange signal is. First thing is to listen carefully – the experienced monitor can distinguish by ear the various modulation formats and sometime also the less complex encoding formats just by listening. Based



on his listening and previous experience the user may decide to switch in the mode he thinks is the right one. And sometimes he will be right and sometimes wrong. Then the user should use the various classifier tools available from the decoder. These tools allow either a fully automatic determination of modulation type and coding format or at

The WAVECOM decoders contain a wealth of tools and modes, but as an on-line application it is focused on real-time analysis. This is where BitView kicks in. Because it is a specialized application is has a very rich feature set with highly sophisticated and specialized tools for the user, but do not forget that optimum use of this application re-

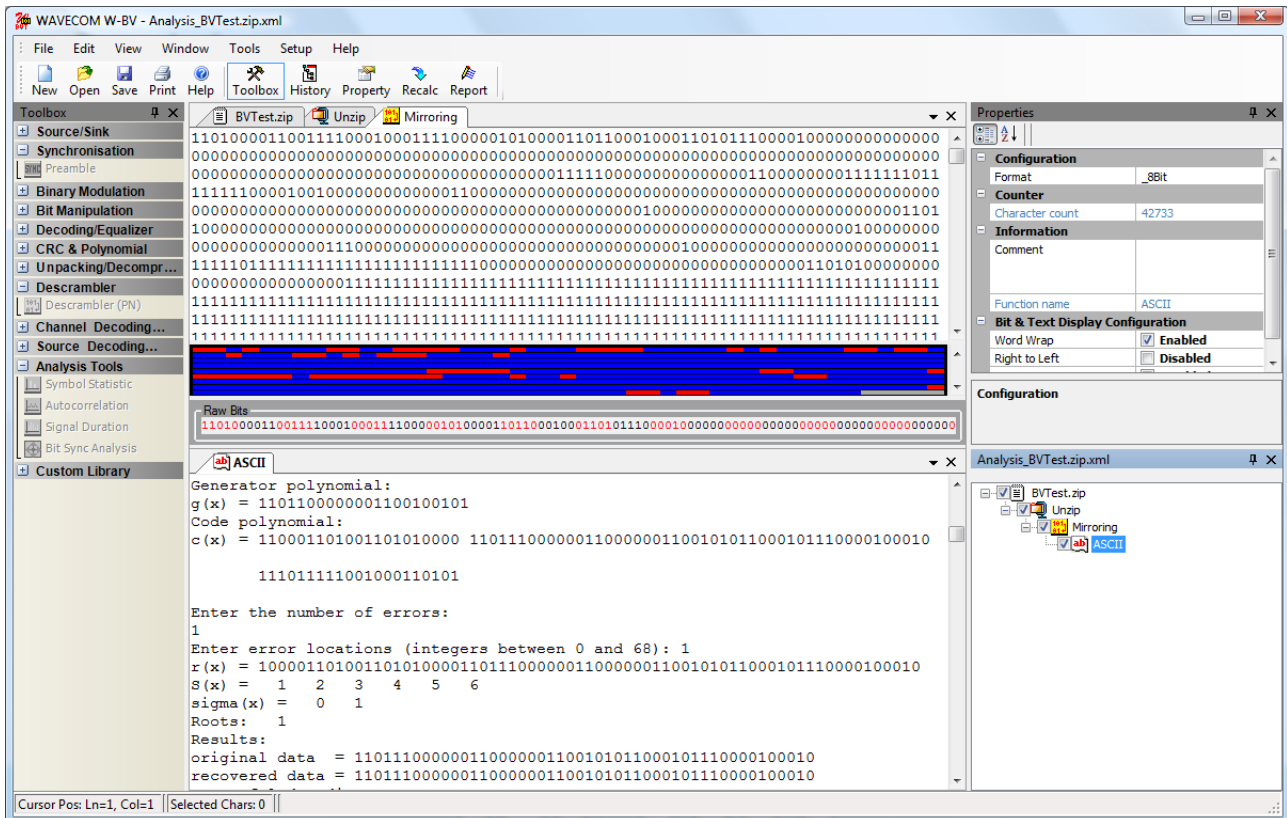
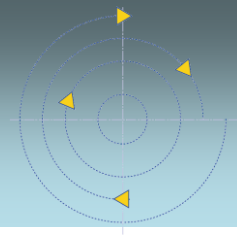


Figure 4 UNZIP Function

least the determination of certain essential parameters of the signal, e.g. baud rate, frequency shift, modulation type or number of phases. Using the auto correlation function will tell the monitor whether the bit stream contains repeating patterns, e.g. synchronization words, HDLC flags or start-stop bits. Again the experienced monitor is able to deduct information from these parameters and by comparing them to his knowledge of the frequency bands he may be able to narrow down the number of possibilities. In between he will test his assumptions by switching in various modes and see if something intelligible appears.

quires a good knowledge of mathematics and coding theory in addition to the knowledge mentioned in the preceding paragraphs.

As mentioned in the beginning, pattern recognition is the name of the game. If captured material is available in a format which can be read by a simple text editor a quick glance will often reveal repeating structures. Taking this approach a step further, a hex editor is also a useful tool for the monitor. Most hex editors will display two panes, one with the file in hexadecimal representation and the other one displaying the information as printable ASCII characters. Fortunately BitView has a built-in hex viewer.



Description

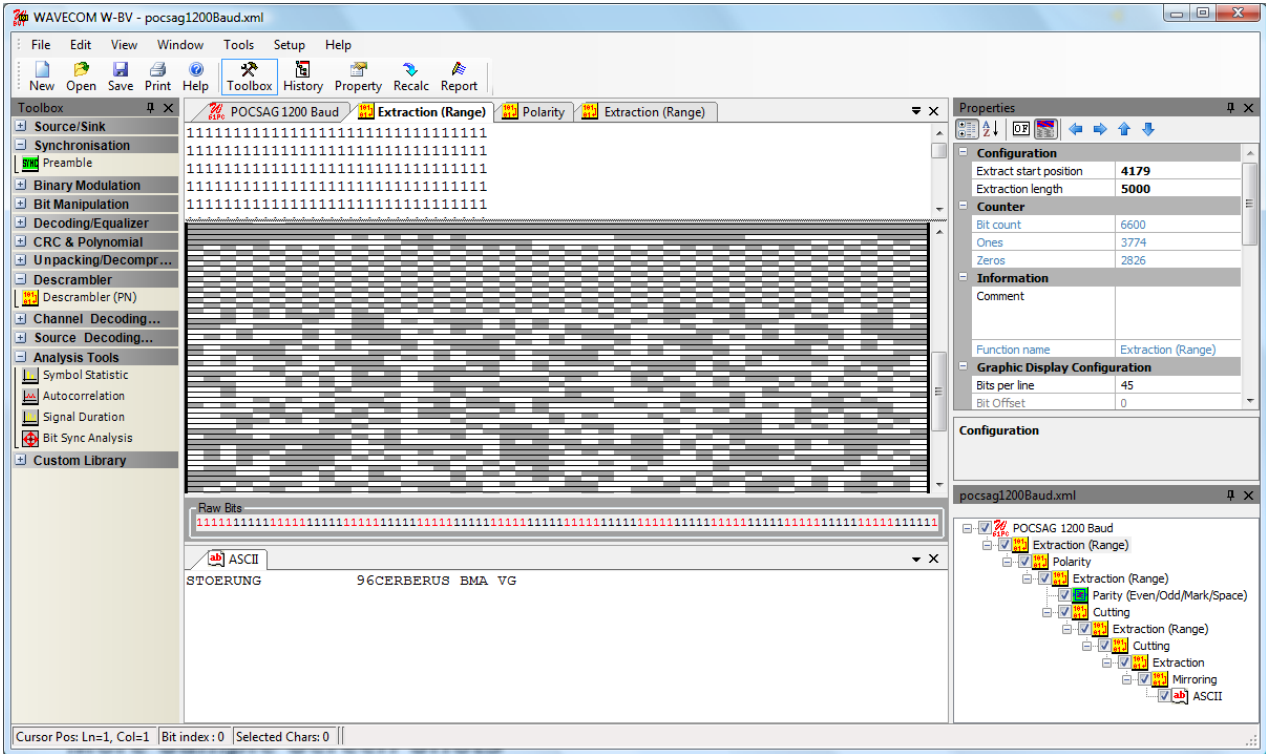


Figure 5 POCSAG Decoding

WAVECOM W-BV, the powerful BitView Tool enables the user to analyze bit stream. The range of functions extends from the display of a bit stream in various formats, simple bit stream manipulations, over statistical and mathematical functions to complex mathematical functions and functions based on coding theory. The tools are directed at users with experience in this area. To understand some of the functions a comprehensive, mathematical knowledge is a prerequisite.

All steps of the analysis are logged and saved in a log file in ASCII (XML) format. The file may be edited with any editor. Each processing step including the necessary parameters is logged as is each function and its parameters. The log file may be loaded and used by the software to repeat the saved analysis steps. This enables analysis sessions to be documented and stored for later automatic rerun without user intervention.

To a certain degree this feature enables the user to implement a pre-production decoding, when a

proper decoder is not available. The amount of data to be processed and the processing speed does however limit this use.

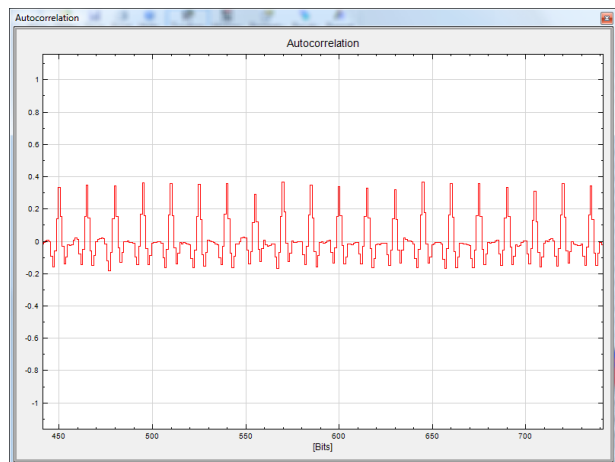
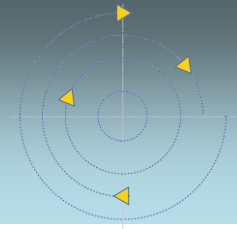


Figure 6 Autocorrelation Analysis Tool



As such a tool is never complete, user defined code templates are part of the delivery. functions are supported (*.NET or MatLab). Source

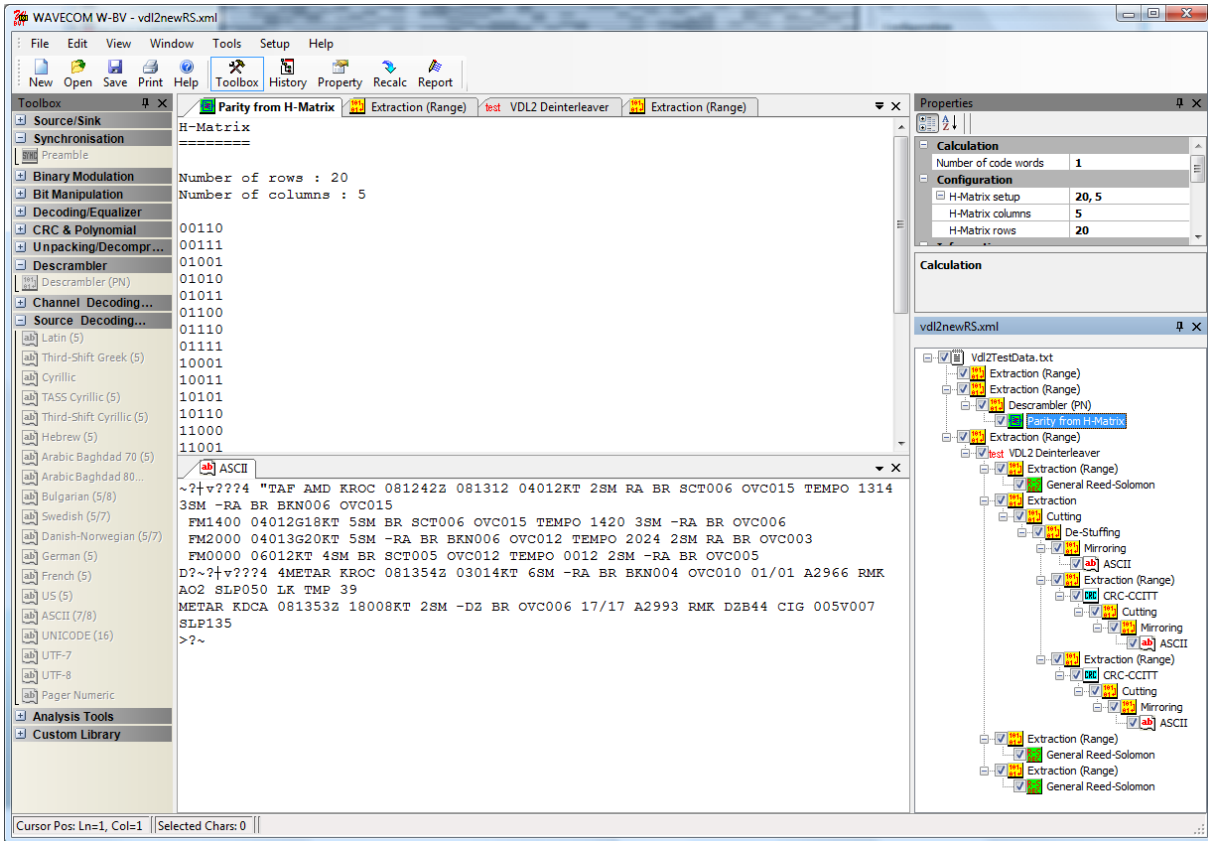


Figure 7 VDL2 with Text and H-Matrix Analysis

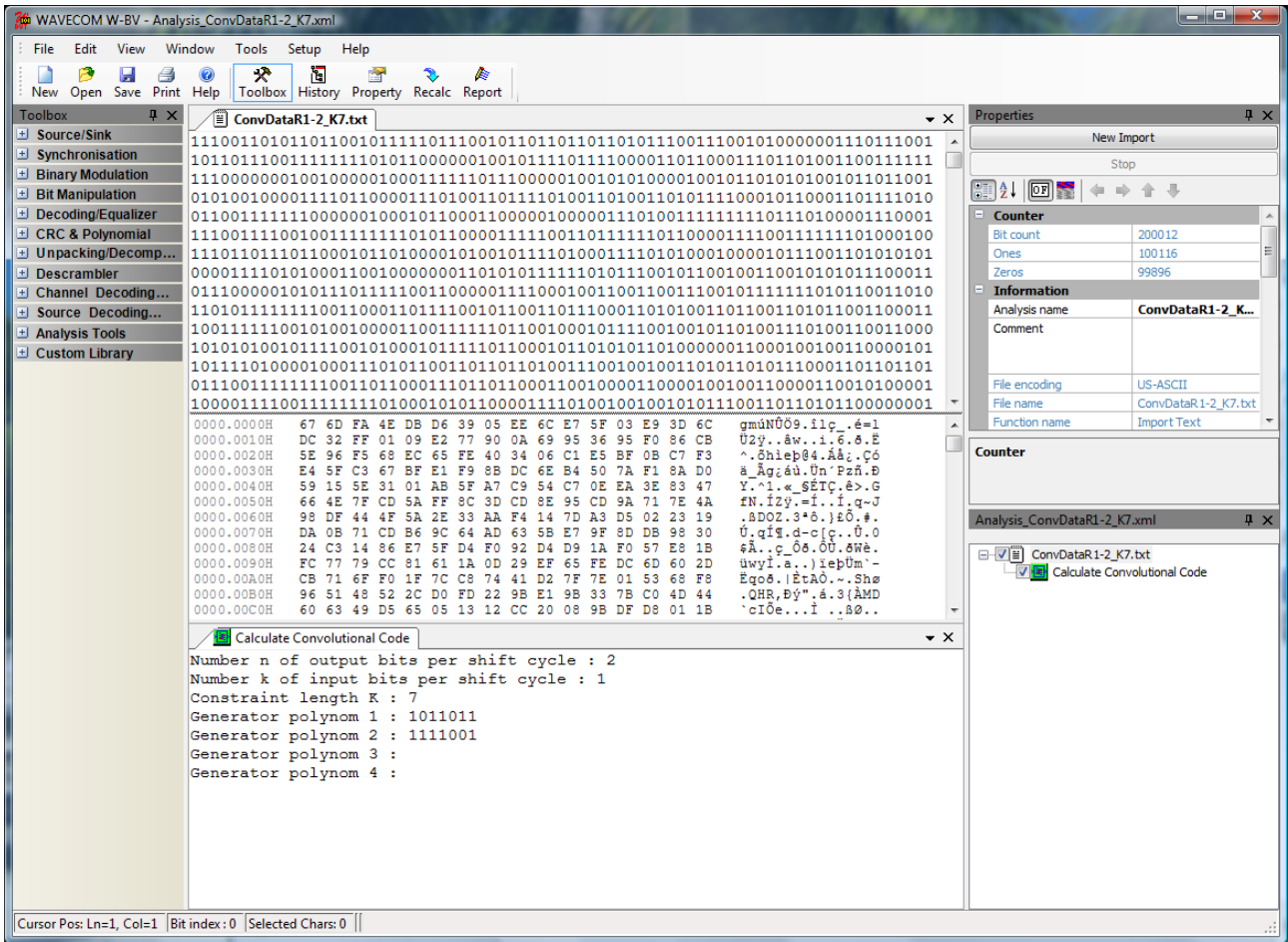
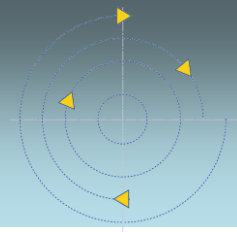
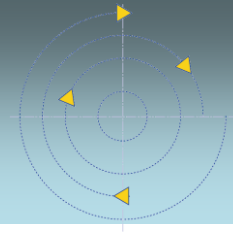


Figure 8 Convolutional code analysis with hex output

Specifications

BitView Functions		
Signal Source	File Bit stream, Text, Unicode, HEX File Bit stream Binary Data	W51PC, W61PC, W-CODE IAS bit stream
Synchronization	Preamble	
Binary Modulation	NRZ-I NRZ-M NRS-S Bi-phase L (Manchester)	Bi-phase-M Bi-phase-S DBi-phase-M DBi-phase-S
Bit Manipulation	De-Interleaving Block De-Interleaving Stream Extraction (Mask) Extraction (Range) AND/OR/XOR/NOT Bit Rotation	Bit Shift Bit Inversion DE-Stuffing (HDLC) Mirroring Cutting
Decoding/Equalizer	Viterbi-Decoding 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-32 CRC (CCITT) Parity (Even/Odd/Mark/Space)



BitView Functions		
	CRC-12 CRC-16	Parity from H-Matrix Parity from Polynomial
Channel Decoding	ARQ-E3 SITOR FEC-A Bauer	HNG-FEC RUM-FEC ITA-3 (M.342) ITA-5
Unpacking / Decompression	UNZIP	
Descrambler	Descrambler (Pseudo Noise)	
Source Decoding (Alphabets)	Latin Third-Shift Greek Cyrillic Third-shift Cyrillic Hebrew Arabic Bagdad-70 Arabic Bagdad-80 (ATU-80) Bulgarian Swedish	Danish-Norwegian German French US ASCII Unicode UTF-7 UTF-8
Display Tools	Background Color Font Right-to-left Word Wrap Bits per line Highlighting	Alignment Transparent Cut/Copy/Paste Undo/Redo x/- instead of 1/0 Graphic Bit display
Analysis Tools	Bit Statistic Autocorrelation	Signal Duration Bit Sync Analysis
User defined functions	C# and MatLab sample template	

Computer Requirements	
Hardware	Core2Duo 2 GHz 2 GB RAM
Software	Windows Vista or XP .NET Framework 2

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