# Bitstream Analyzer

Bit stream analysis software

Bitstream Analyzer starts where demodulation ends. It takes symbols or bits from files or a TCP stream, and the analyst assembles a pipeline from processing blocks: remap symbols, search for synchronisation and frame length, take and skip fields, demultiplex and destuff, de-interleave, descramble and decode error-correction codes. Every stage shows its bits, so each step is checked before the next one is added. Pipelines are saved and run again on new recordings or on a live stream, and the payload goes to files or over TCP and UDP to several destinations. Its features are specified and the product is in development.

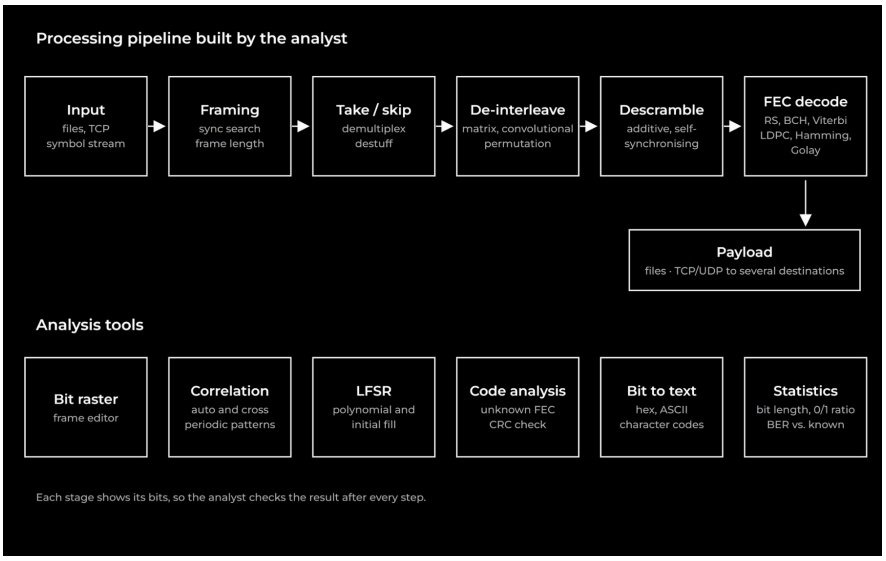



Figure 1. Diagram: the analyst's processing pipeline from input through framing, take/skip, de-interleaving, descrambling and error-correction decoding to the payload, with the analysis tools below

### Key Features

- Pipelines the analyst builds
- Frames and synchronisation
- Interleaving, scrambling and error correction
- Statistics and pattern search
- Payload as text, files and network streams

**AT A GLANCE**

PLATFORM
**Windows desktop application**

INPUTS
**Files of 16- or 32-bit integer or 32- or 64-bit floating-point values; symbol stream over TCP**

OUTPUTS
**Files; TCP and UDP to several destinations at once**

PIPELINES
**Built from processing blocks by the analyst; saved as files and run again on new data**

SYMBOLS
**Input and symbol remapping**

**APPLICATIONS**

- Analysis of unknown or proprietary data links found in monitoring
- Recovering the payload of recorded HF, VHF and UHF data transmissions
- Reusable decoders for newly identified formats
- Bit stream analysis exercises in EW operator training

## Capabilities

### Pipelines the analyst builds

Processing blocks are chained in the order the signal needs and can be rearranged at any point. Each block shows its output as a bit raster, so the analyst sees the effect of every step. A finished pipeline is saved as a file and runs again on new data, which turns one analysis into a reusable decoder.

### Frames and synchronisation

Searches for sync words and preambles, finds an unknown frame length or preamble period, and aligns the stream in a bit raster with a frame editor. Take/skip, demultiplexing and destuffing separate fields and channels; decimation, AND, OR, XOR, NOT and mirror operate on the bits directly.

### Interleaving, scrambling and error correction

Matrix, convolutional and permutation de-interleavers; additive and self-synchronising descramblers with detection of the LFSR polynomial and initial fill; Reed-Solomon, BCH, Viterbi, LDPC, Hamming and Golay decoding with CRC checks, and analysis of the parameters of an unknown code.

### Statistics and pattern search

Auto- and cross-correlation, periodic and non-periodic pattern search, bit length, 0/1 ratio and bit statistics show the structure of an unknown stream; bit error rate against a known sequence measures a link or a decoder.

### Payload as text, files and network streams

Recovered bits are shown as hex, ASCII or character codes such as Baudot/ITA2 and UTF-8, written to files or sent over TCP and UDP to several destinations at once. PCM demultiplexing, G.726, TDM over IP, SDR (ExtIO) and serial inputs extend the sources it reads.

## Specifications

| General | |
|---|---|
| **Platform** | Windows desktop application |
| **Inputs** | Files of 16- or 32-bit integer or 32- or 64-bit floating-point values; symbol stream over TCP |
| **Outputs** | Files; TCP and UDP to several destinations at once |
| **Pipelines** | Built from processing blocks by the analyst; saved as files and run again on new data |
| **Symbols** | Input and symbol remapping |
| **Framing** | Sync word and preamble search; unknown frame length and preamble period; take/skip; demultiplexing; destuffing |
| **Bit operations** | Decimation, AND, OR, XOR, NOT, mirror |
| **De-interleaving** | Matrix, convolutional, permutation |
| **Descrambling** | Additive and self-synchronising; LFSR polynomial and initial-fill detection |
| **Error-correction decoding** | Reed-Solomon, BCH, Viterbi, LDPC, Hamming, Golay; CRC check; analysis of unknown code parameters |
| **Analysis** | Auto- and cross-correlation, periodic and non-periodic pattern search, bit length, 0/1 ratio, bit statistics, bit error rate against a known sequence |
| **Display** | Bit raster and frame editor at every stage |
| **Bits to text** | Hex, ASCII, Baudot/ITA2, UTF-8 and other character codes |
| **Additional inputs** | PCM demultiplexing, G.726, TDM over IP, SDR (ExtIO), serial port |
| **Demodulation** | Upstream, for example SentinelIQ's blind demodulators |

## Warranty

All hardware and software procured from Zeta is under warranty against manufacturing or design failures for 2 years. Customer-specific warranty terms may be arranged.

## Disclaimer

Due to ongoing research and development, Zeta reserves the right to change product specifications without notice.

## About Zeta

Zeta Defence develops electronic intelligence (ELINT) and communication intelligence (COMINT) equipment and radar / electronic warfare simulators. Its capabilities include RF transceiver system design, digital design and large-scale software development.

## Contact

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