RTMA

Radar Threat Monitoring and Analysis Software

RTMA is a GPU-accelerated ELINT software suite that turns the wideband output of digital receivers into a live picture of the radar emitters in the environment. It detects and measures up to one million pulses per second, separates them into emitters, analyzes the modulation inside each pulse, and identifies the emitters against a threat library. The same software serves live monitoring and post-mission analysis, from one or more networked operator workstations.

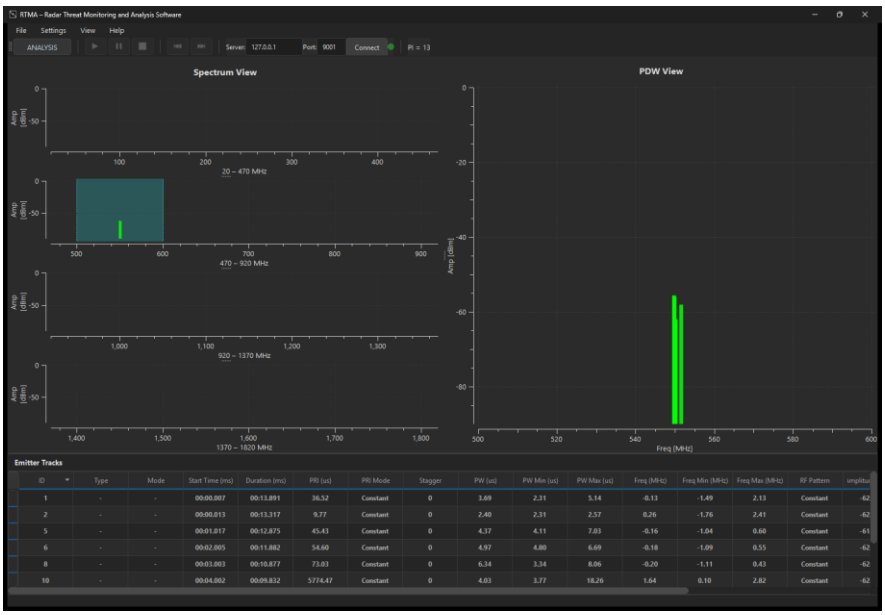


Figure 1. RTMA monitoring page: spectrum view, pulse view and emitter tracks

Key Features

- Real-time processing of up to 1,000,000 pulses per second
- GPU acceleration on commercial server hardware
- Automatic separation and tracking of simultaneously active emitters
- Intrapulse analysis with automatic recognition of modulation on pulse
- Identification against a user-defined emitter library, with alerts
- Live monitoring and post-mission analysis in one product
- Open, server-based architecture for several operators and external systems

AT A GLANCE

PULSE DENSITY
1,000,000 pulses per second

INSTANTANEOUS BANDWIDTH
Up to 1 GHz

PULSE WIDTH
50 ns to 1 ms

PRI
1 µs to 100 ms

PROCESSING
Real time, GPU accelerated

APPLICATIONS

- ELINT collection and analysis
- ESM and electronic support for EW systems
- Threat library generation and maintenance
- Test and verification of radar and EW equipment
- Operator and analyst training

Capabilities

Built for Dense Signal Environments

Modern radars and crowded spectra produce pulse densities that overwhelm conventional pulse analyzers. RTMA moves pulse detection and measurement onto graphics processors, and handles up to one million pulses per second

in real time across the full instantaneous bandwidth of the receiver. Capacity grows with the hardware: more GPUs or more servers give more bandwidth and more channels.

Automatic Emitter Tracking

RTMA sorts the pulse stream into emitters without operator intervention and keeps a track for every emitter, including radars that are seen only briefly in each antenna scan. Each track reports frequency, pulse width, PRI and amplitude with their ranges and agility types, the scan period, and the time the emitter was first and last seen.

Intrapulse Analysis

The I/Q samples of every pulse are kept, so that the signal inside the pulse is always available. RTMA displays amplitude, frequency and phase against time and the pulse spectrum, with markers for measurement and with overlay or averaging of many pulses. Modulation on pulse is recognized automatically, including linear and non-linear FM, phase codes and frequency codes, and becomes part of the emitter description.

Identification and Alerts

Measured emitters are compared with a user-defined emitter library and reported with emitter type, mode and a confidence value. Emitters of interest raise alerts; unknown emitters are flagged for the analyst and can be added to the library with the built-in editor.

Live Monitoring and Post-Mission Analysis

In live operation RTMA controls the receiver, runs search schedules over the bands of interest, and presents the environment on spectrum, pulse and emitter displays (Figure 1). Every mission is recorded. The same displays replay a recorded mission at any speed or step by step, and the analysis tools (pulse lists, histograms, inter-pulse and intrapulse plots, emitter reports) work identically on live and recorded data.

Open, Server-Based Architecture

RTMA Server runs on commercial off-the-shelf server hardware and serves several operator workstations over a standard network. An open interface delivers emitter reports and pulse data to command-and-control and EW systems, and unattended batch processing turns recordings into reports without an operator.

From Signal to Identified Emitter

RTMA carries out the complete chain from receiver samples to identified emitters in one product (Figure 2).

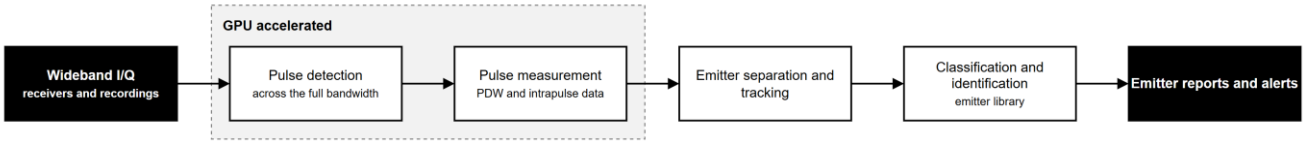


Figure 2. RTMA processing chain

System Architecture

Receivers and recordings feed RTMA Server, which performs all processing and recording. Operators work on RTMA Clients on the same machine or across the network, and external systems connect through the open interface (Figure 3).

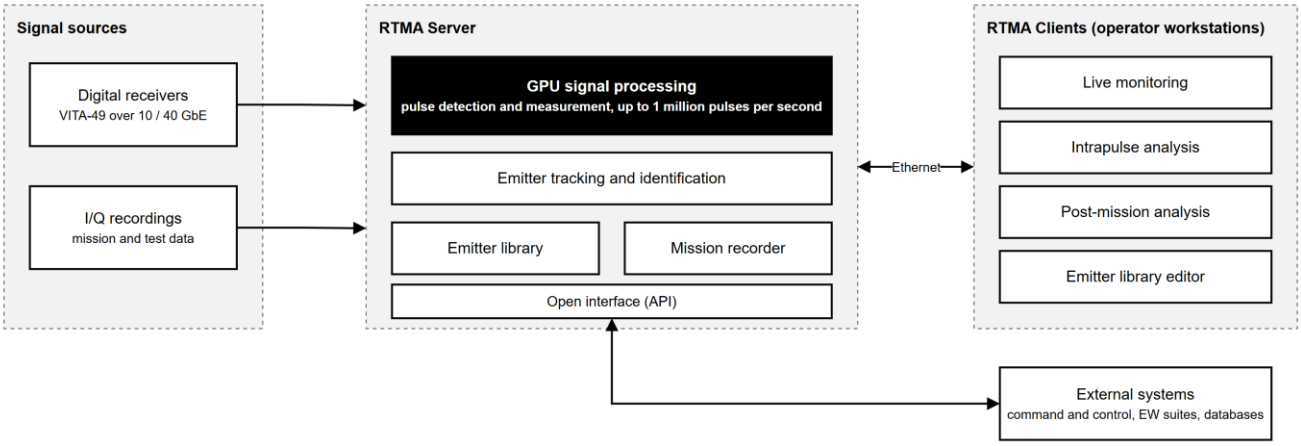


Figure 3. RTMA system architecture

Specifications

Signal Input	
Live input	Digital receivers, VITA-49 I/Q streams over 10 or 40 GbE
Recorded input	16-bit I/Q files (.16ic) and BLUE / Midas files (.mb, .blue)
Instantaneous bandwidth	Up to 1 GHz per receiver channel
Receiver channels	Scalable with the number of GPUs and servers

Pulse Processing	
Pulse density	Up to 1,000,000 pulses per second, real time
Pulse parameters	Time of arrival, pulse width, frequency, amplitude, modulation on pulse
Pulse width	50 ns to 1 ms
PRI	1 µs to 100 ms
Processing	GPU accelerated (NVIDIA CUDA)

Emitter Analysis	
Emitter tracks	Up to 100 simultaneously
PRI types	Constant, jittered, staggered, dwell-and-switch, sliding
Frequency types	Fixed, agile, hopping
Scan analysis	Scan period and scan type
Intrapulse analysis	Amplitude, frequency and phase against time; pulse spectrum; overlay and averaging
Modulation on pulse	Unmodulated, linear FM, non-linear FM, phase coded, frequency coded
Chip width	50 ns minimum, for phase-coded and frequency-coded pulses
Identification	User-defined emitter library with editor; match with confidence value; alerts

System	
Architecture	RTMA Server and RTMA Clients over Ethernet (TCP/IP)
Operators	Several clients per server
Operating modes	Live monitoring, mission playback, unattended batch processing
Recording	Complete mission sessions: pulses, intrapulse samples and emitter history
Interfaces	Open interface for emitter reports and pulse data; CSV and JSON export
Hardware	Commercial server with one or more NVIDIA GPUs
Operating system	Windows 10 and 11, 64-bit; Linux (server)

Ordering Information	
RTMA Server	Processing server software: pulse processing, emitter tracking, intrapulse analysis, mission recording
RTMA Client	Operator workstation software: live monitoring and post-mission analysis
Emitter Library	Option: emitter identification, alerts and library editor
Receiver Interface	Option: live input and control of digital receivers
Open Interface	Option: emitter reports and pulse data to external systems
Turnkey System	Option: server hardware with GPU and digital receiver, installed and configured

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.

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