

ADVANCED SIGNAL MONITORING, DETECTION & INTELLIGENCE



Introducing Signal Discovery™ for RFeye DeepView

 **CRFS**

**EXTRAORDINARY
RF TECHNOLOGY**

INCREASING PROBABILITY OF INTERCEPT FOR HARD-TO-DETECT SIGNALS



Today’s electromagnetic spectrum is congested, contested, and constrained. Monitoring wide frequency ranges and identifying signals of interest, including unknown, low-signal-to-noise-ratio (SNR), or non-standard signals, is increasingly complex. Traditional detection methods struggle to scale across wide bandwidths or adapt to hard-to-detect signals without intensive operator input.

CRFS’ RFeye technology is designed to help operators face this challenge. RFeye Nodes enable long-duration, wideband signal monitoring and real-time processing at the edge. Advanced signal intercept helps distinguish between close-in signals and noise. CRFS software allows operators to monitor, detect, capture, geolocate, and record signals for analysis in real-time and post-processing.

Smart workflows and filtering support signal interception, surveillance and analysis without reliance on predefined signal libraries. Out-of-the-box detectors and custom detector builder tools help operators monitor thousands of signals, focus on target characteristics, and detect unknowns.

Signal surveillance: monitor wideband frequency bands, build patterns of life, detect and filter out known signals to reveal hidden or unexpected signals and extract intelligence in real-time.

Signal detection: search for, detect, and report signals of interest including pulse characteristics and geolocation intelligence.

Signal analysis: record, detect, analyze, and share RF data for post-processing.

Signal Discovery™ for RFeye DeepView: enables operators to detect what others miss.



KEY CAPABILITIES

SIGNAL MONITORING, DETECTION & ANALYSIS: MAKING YOUR LIFE EASIER



The RFeye ecosystem combines advanced hardware and software to deliver all-in-one wideband RF signal monitoring, detection and analysis capability.

The foundation of the ecosystem is CRFS' RFeye Node: a high-performance, intelligent RF sensor with in-built edge processing, reducing backhaul data bandwidth. The RFeye Node Plus 100-18 can capture, process, record, and stream real-time full 100MHz I/Q data for enhanced SIGINT.

CRFS' advanced spectrum monitoring and geolocation software empowers users:



RFeye Site software for real time spectrum monitoring, geolocation and analysis.



RFeye DeepView software for post-processing detection and forensic analysis of signals.



RFeye Mission Manager software for automated mission management, tasking and reporting (multiple users)

Search for signals of interest rapidly

Monitor signals from 9kHz to 40GHz with automated workflows to accelerate the reliable and comprehensive identification of signal types.

Identify signals of interest

Efficiently identify transmission systems and modulation types, with easy measurement and processing of technical signal parameters.

Access custom-built detectors

Reliably detect, capture, and geolocate signals of interest using pre-built detectors for common emitters such as ADS-B, TACAN, IFF, and AIS.

Automate signal monitoring and geolocation

Advanced scan, detect, identify and geolocate can be configured and executed in real-time.

Analyze the content of a signal

Record and capture I/Q data for analysis in postprocessing using RFeye DeepView software.

Record and replay multiple signals

Record and capture in high fidelity. Stream wideband signals in high-definition for SIGINT. Replay in RFeye DeepView for forensic signals analysis and export for decoding.

Open Interfaces and I/Q Streaming

Open APIs for 3rd party integrations, as well as I/Q data streaming and export in multiple formats, including VITA-49.

Detect what others miss

CRFS' Signal Discovery™ for RFeye DeepView* detects and characterizes signals without knowing precise parameters.

* Signal Discovery is available as a perpetually licensed feature within RFeye Site (late 2025) and RFeye DeepView (August 2025) It requires the Signal Discovery Detector configuration on RFeye Nodes.

INTRODUCING SIGNAL DISCOVERY™ FOR RFEYE DEEPCVIEW



CRFS' high performance search and discovery detector is specifically designed to significantly accelerate the signal recognition process.

This unique algorithm effectively monitors spectrum of interest and automatically extracts target signals hidden within huge data sets without prior knowledge of the signal.



Filter out unwanted signals, pulse characteristics or noise



Focus only on the target signals left



Quickly identify, isolate and analyse the result

You no longer need to know a lot about the signal or pulse characteristics (frequency, bandwidth, power, duration, timing).

CRFS' Signal Discovery™ for RFeye DeepView allows EW and SIGINT operators to find unknown, hidden, or low-SNR RF signals—without relying on predefined signal libraries. It combines automated signal detection, statistical analysis, visual filtering, and automated workflows to accelerate detection and reduce operator burden in complex spectrum environments.

Benefits

- Detects what others miss - finds low-SNR, transient, or deeply buried transmissions—ideal for identifying covert comms or drone telemetry.
- Reveals unknown signals - detects unknown or non-standard waveforms using pattern recognition instead of static libraries.
- Reduces the operator's workload - visual filtering and pulse clustering reduce operator fatigue and accelerate time-to-decision.
- Enhances situational awareness - highlights anomalies in spectrum behaviour, helping operators identify potential threats faster.
- Supports near real-time action - enables signal detection and geolocation in near-real-time, not just post-mission analysis
- Improves SIGINT effectiveness - turns 'unknown unknowns' into actionable intelligence through dynamic, library-free detection

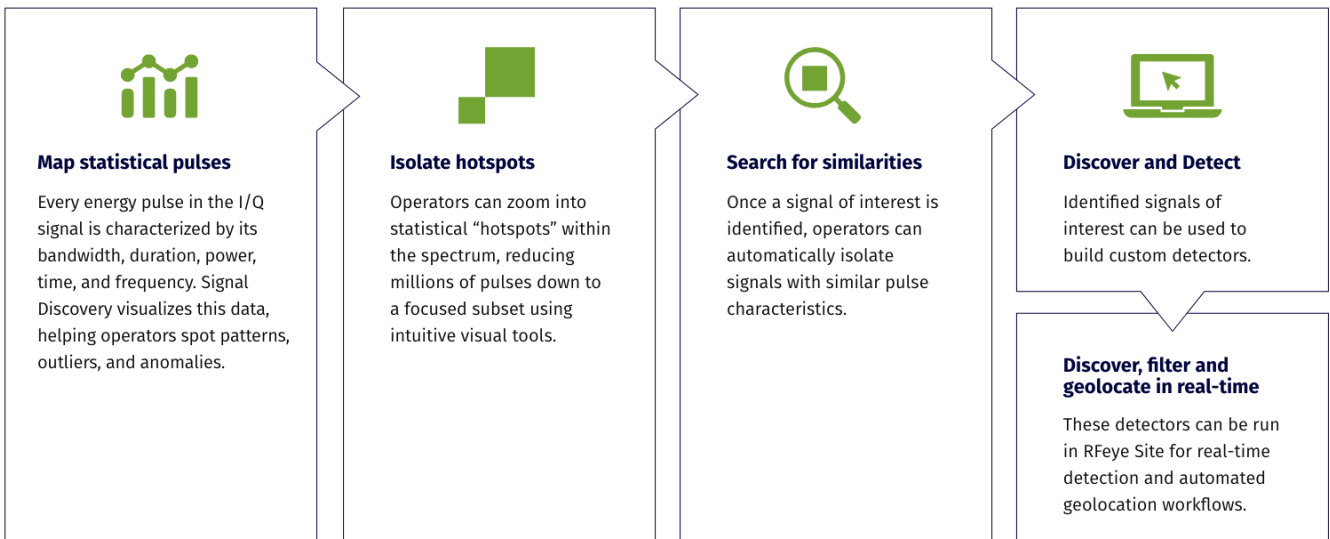
Detection challenge	Signal Discovery response
Very low power emissions	Detects low-power signals that are often missed by traditional tools
Short-duration/burst transmissions	Identifies pulsed signals regardless of their duration or transmission time
Spread spectrum/frequency agility	Detects signals across wide and shifting frequency ranges
Non-repeating or unknown emissions	Finds signals without relying on prior knowledge, templates, or repetition
Noise-like emissions	Identifies pulsed emissions even when they resemble background noise

POST-MISSION ANALYSIS WITH SIGNAL DISCOVERY



RFeye DeepView supports long-duration I/Q recording for post-mission signal analysis. Signal Discovery in RFeye DeepView enhances this capability by automatically parameterizing detections and enabling operators to statistically analyze large datasets to isolate signals of interest, especially LPI or disguised emissions, without prior knowledge of signal characteristics. This process allows operators to quickly focus into patterns of signals and reduce the number from millions to a few — impossible when searching manually.

Mission workflow: using Signal Discovery™ in RFeye DeepView



EXAMPLE USE CASE

DETECTING AN LPI SIGNAL IN A CROWDED BAND

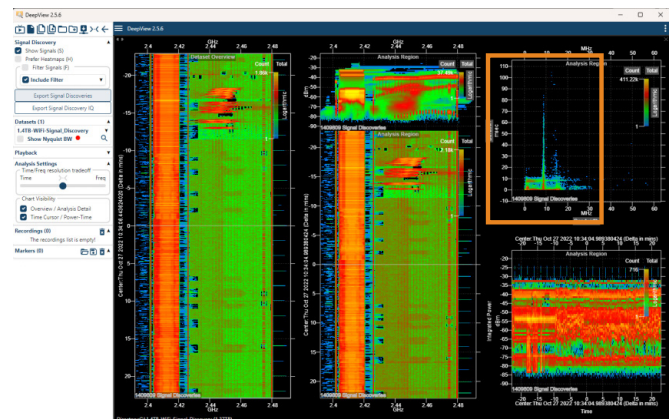
In a post-mission analysis of a 2.4 GHz Wi-Fi band, Signal Discovery reduced 1.4 million pulses to just 16.

Problem

Detecting a hard-to-detect signal—particularly in crowded bands like 2.4 GHz—is a significant challenge. Manual review of the spectrum is impractical due to the sheer volume of data. Unknown or non-standard signals are increasingly common, and many emissions are low-SNR, short in duration, or frequency-agile, making them difficult to distinguish from background noise. Traditional detection tools, which rely on signal libraries, cannot identify these kinds of unknown transmissions.

Desired result

Accelerate the identification of signals of interest in extremely large, complex RF datasets, reducing the operator burden.

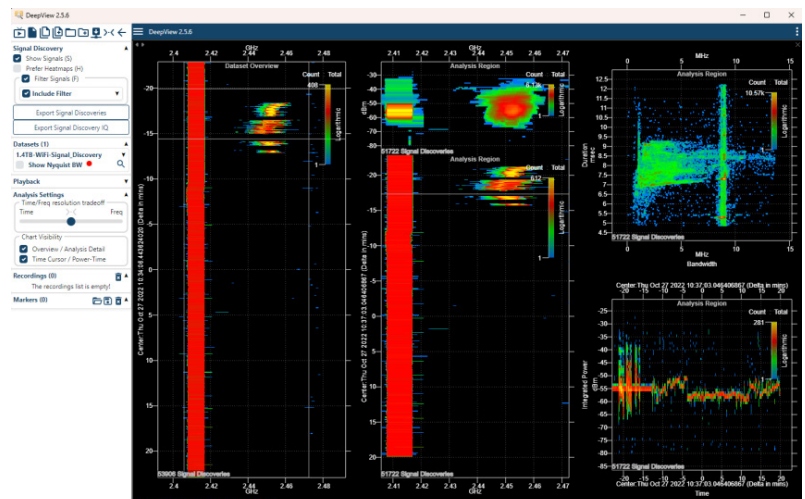


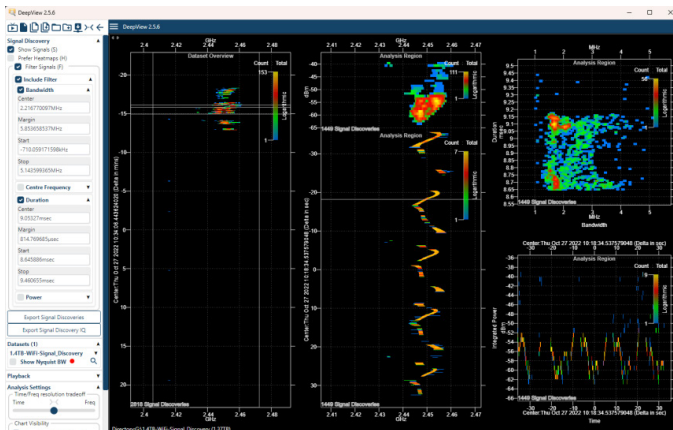
View the statistical overview

Signal Discovery presents a statistical view of the entire pulse dataset, mapping each pulse by bandwidth, frequency, power and duration, with density shown as heat intensity. In this case, more than 1.4 million pulses are visible.

Zoom into a hotspot

The operator identifies an area of interest (a “hotspot”) using bandwidth (x-axis) and duration (y-axis) where an unusual pulse density appears. The selection tool allows them to isolate this region for further inspection, and by the user selecting what they care about, they can reduce the dataset from 1.4 million to ~51,000 pulses (that match what the user is looking for, based on their selection).



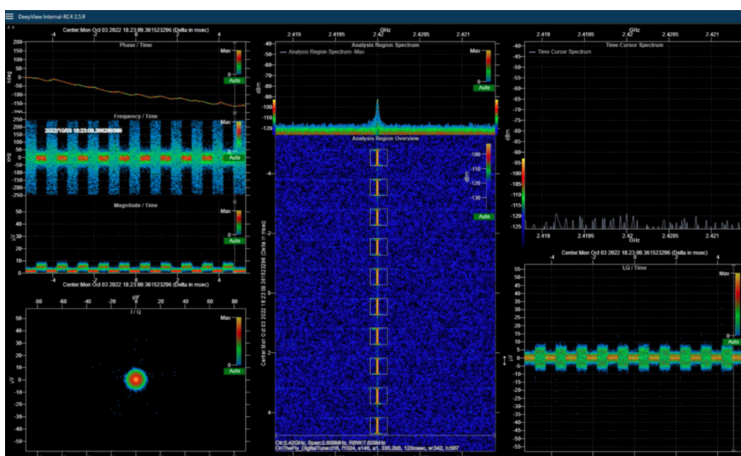
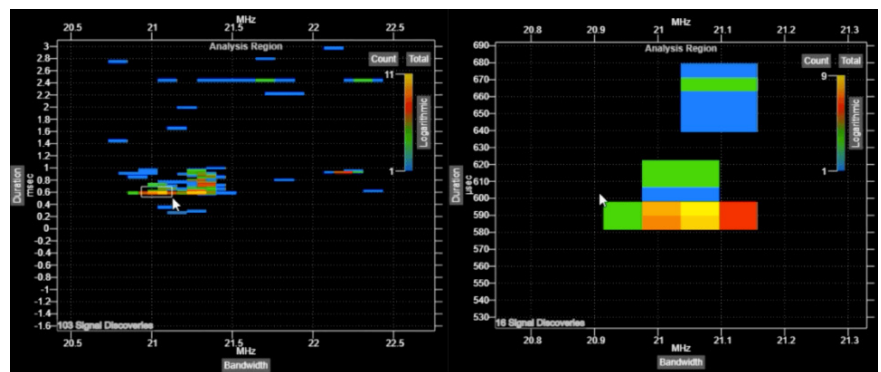


>>> Identify patterns

Operators might see statistical patterns that are unlikely to have been noticed without the ability to zoom into areas of interest. By continuously zooming into hotspots of interest (which isolates signals of interest), users can reduce the number of signals and see statistically similar signals. This reduces the number to 1449 signals (based on their selection).

>>> Choose statistical parameters

Confining the view to specific statistical parameters further reduces the number of signals from 103 to 16. Once the user has a manageable number of signals, further analysis can be carried out of these signals to identify a particular transmitter.



<<< Find similar signals

Operators can search for similar signals, automatically finding signals with matching characteristics.

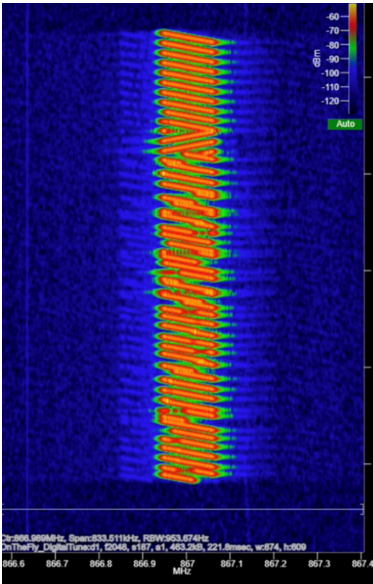
Use the intelligence

Operators can carry out further analysis of signals, including:

- Exporting an I/Q segment for deep waveform analysis
- Creating a custom Detector based on a specific signal's characteristics (e.g., pulse timing, frequency, power)
- Running the Detector in RFeye Site to run a real-time detection and geolocation workflow

FINDING LoRa SIGNALS

In CRFS field trials, Signal Discovery for DeepView was used to detect and geolocate LoRa signals: lowpower, low bandwidth, short-pulse transmissions that use Chirp Spread Spectrum (CSS) modulation. Given their non-standard operating frequencies and powers, these signals are typically challenging to intercept and geolocate. However, a LoRa detector-based TDoA solution successfully detected and geolocated them with an accuracy of within 15 meters, at a range of 25 km.



SUMMARY

Modern signal environments contain unpredictable, short-duration, and low-SNR transmissions, many of which fall outside the scope of traditional detection tools. CRFS' Signal Discovery addresses this challenge by enabling real-time and post-mission workflows that automate detecting, characterizing, filtering, and geolocating unknown or hard-to-detect signals.

Integrated into the RFeye ecosystem, Signal Discovery reduces operator burden, accelerates time-to-decision, and supports missions in a contested, congested, and constrained electromagnetic spectrum.

By shifting away from library-dependent detection and towards an automated statistical analysis of large datasets, operators can discover emissions that would otherwise remain undetected. Signal Discovery allows operators to detect what others miss.



RFEYE® DEEPVIEW

Forensic signal analysis with 100% probability of intercept (POI)



RFEYE® RECEIVER (NODE)

High-performance spectrum sensor (receive / record) to 40GHz



EXTRAORDINARY
RF TECHNOLOGY

CRFS is an RF technology specialist for the defense industry, national security agencies, and systems integration partners. We provide advanced capabilities for real-time spectrum monitoring, situational awareness, and electronic warfare support to help our customers understand and exploit the electromagnetic environment.



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