CRFS

RFeye SenS Portable

High-fidelity, long-duration
wideband recording and playback

RFeye SenS

Portable 16-bit I/Q recorder for aerospace,
defense, manufacturing & telecommunications
Includes: DeepView surgical extraction software

RFeye SenS Portable

HIGH RESOLUTION

1 Hz resolution provides the highest signal quality for analysis and post-processing

FULL-RATE I/Q

4-lane Thunderbolt 3 port allows gapless, 16-bit streaming at up to 100 MHz IBW

LOW SWAP

Low size, weight and power provides portability to carry the lab outdoors

25.6 TB STORAGE

Built-in, high-speed, enterprise-class SSDs deliver up to 12 hours recording at 100 MHz IBW

SIGNAL CLARITY

Low noise figure, low phase noise and high SFDR let you capture and differentiate weaker signals

WHISPER QUIET

Low-noise fans avoid drawing unwanted attention to signals collection efforts

VERSATILITY

Broad detection range of 9 kHz to 8 GHz, 18 GHz or 40GHz allows you to capture diverse signals

DISK CAPACITY	IBW	TIME H:M:S	IBW	TIME H:M:S	IBW	TIME H:M:S
6.4 TB	100 MHz	03:02:30	50 MHz	06:05:00	25 MHz	12:10:00
12.8 TB	100 MHz	06:05:00	50 MHz	12:10:00	25 MHz	24:20:00
19.2 TB	100 MHz	09:07:30	50 MHz	18:15:00	25 MHz	36:30:00
25.6 TB	100 MHz	12:10:00	50 MHz	24:20:00	25 MHz	48:40:00

What is RFeye SenS Portable?

The RFeye® SenS Portable is a lightweight, high-fidelity RF recorder. With its small size and built-in storage of up to 25.6 TB, it records up to 12+ hours of RF signals, allowing you to capture hours of lab-quality signal data without the bulky lab equipment.

If you need to record RF signals in their native environment, that environment probably isn't an anechoic chamber. Desktop systems are useless here—they're too heavy to carry into the field or lug around a building. Most portable recorders are of limited use, too, providing either limited recording time or minimal signal fidelity. However, the RFeye SenS Portable removes these restrictions. It delivers high-value, long-duration RF recording in a quiet, lightweight, easily portable form factor. Using the RFeye DeepView software, it allows you to rapidly find, analyze and export your most valuable signals.

What is RFeye DeepView?

The RFeye® DeepView software is a RF signal analysis tool that controls the SenS Portable hardware module. It lets you rapidly identify key signals across terabytes of data, extracting your most important signals from the background noise with surgical precision, keeping I/Q samples as small as possible.

Applications

Interference hunting & recording

Many CRFS customers use the RFeye SenS Portable for interference hunting in support of spectrum management and infrastructure. For those experiencing sporadic, unpredictable interference—for example, on test ranges, satellite communications platforms, airports or sensitive equipment such as automotive or medical electronics—the long recording duration and high sensitivity of the SenS Portable make it a trusted resource for signal capture.

Capturing native signals for T&M

Life-or-death technologies (e.g., autonomous vehicles, insulin pumps, military communications networks or pacemakers) cannot afford service failures. The range of the SenS Portable, from 9 kHz up to 18 GHz, lets operators to record diverse signals from HF to SHF, indoors or outdoors, for test and measurement (T&M). RFeye DeepView then allows analysts to quickly extract small file snippets for further manipulation or layering via third-party software such as MATLAB.

TSCM planning & support

Before a full technical surveillance countermeasures (TSCM) system is installed, it's often a good idea to gather a baseline survey of the RF environment in a secure compartmentalized intelligence facility (SCIF) or other high-security facility. By recording and analyzing the signals present in any area of the building, countersurveillance teams can whitelist friendly/allowed signals such as medical devices or wireless printers. They can also optimize the placement of fixed sensors for the most efficient and effective RF coverage possible. Even after a TSCM system is in place, the SenS Portable can be used to gather evidence of criminal misconduct.

Applications

Recording COMINT

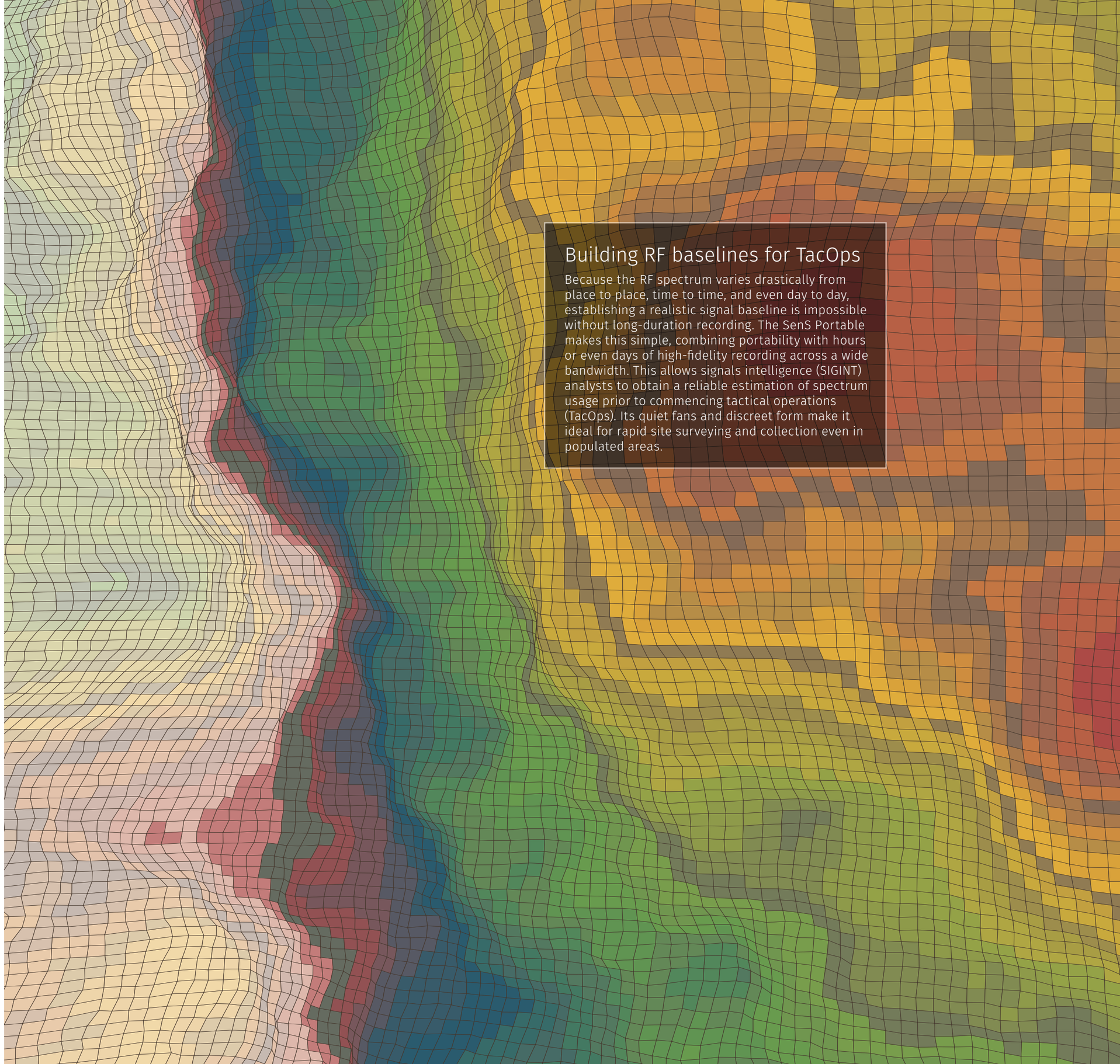
The SenS Portable operates on the physical RF layer but allows users to extract communications intelligence (COMINT). Although CRFS does not itself provide signal decryption or Wi-Fi protocol analysis, its 16-bit I/Q files are often used in conjunction with various 3rd-party SIGINT software. By recording even faint signals and those hiding next to larger, “louder” signals, the SenS Portable captures signals clearly, maximizing COMINT collection and providing improved audio quality.

Building signal libraries

The SenS Portable captures high-resolution RF signals via 16-bit, continuous I/Q data. Because of this, it’s a customer favorite for building and developing RF signal libraries for signal classification and exploitation. Whether capturing sensitive signals from drones, adversary command and control or communications platforms, or IED detonation attempts, the SenS Portable captures signals in their native environments, across various conditions and times of day.

Training machine learning & AI

CRFS and several of its customers use the SenS Portable to capture native signals in various signal environments to train and test machine learning and artificial intelligence platforms. The light weight and small size of the SenS Portable allow operators to quickly deploy and redeploy the system to collect multiple signal types in one day, from garage door openers to automotive key fobs to drones, etc. Its high resolution and high SFDR help distinguish between neighboring signals to avoid adding unintentional signal distortion for “clean-capture” recordings for machine learning algorithms.



Building RF baselines for TacOps

Because the RF spectrum varies drastically from place to place, time to time, and even day to day, establishing a realistic signal baseline is impossible without long-duration recording. The SenS Portable makes this simple, combining portability with hours or even days of high-fidelity recording across a wide bandwidth. This allows signals intelligence (SIGINT) analysts to obtain a reliable estimation of spectrum usage prior to commencing tactical operations (TacOps). Its quiet fans and discreet form make it ideal for rapid site surveying and collection even in populated areas.

Record. Analyze. Extract. Manipulate.

RFeye® DeepView lets you capture hours or days of high-fidelity RF signals. Its intuitive user display and multiple analysis windows let you quickly find and analyze the data you want, without having to wade through hours of recording. With DeepView's open file formats of 16-bit I/Q, you can easily export the signals you need to your external software.

Key features

The key features of DeepView include:

- Live file indexing across terabytes of I/Q data
- On-the-fly signal analysis
- Live recording adjustments
- Interactive zooming down to single sample level
- Efficient file extraction via digital tuning & filtering
- Correlated multi-factor analysis on signals of interest
- Playback of full dataset or user selection
- Parallel loading and display of multiple files
- Marker and delta markers for signal measurement
- Unlimited file duration

PC requirements

DeepView is a Windows desktop application. It requires the following at a minimum:

- Intel core i9 processor
- 16 GB for analysis; 32 GB RAM for streaming
- Thunderbolt 3 port with 4 lanes*

*For further details, contact support@crfs.com

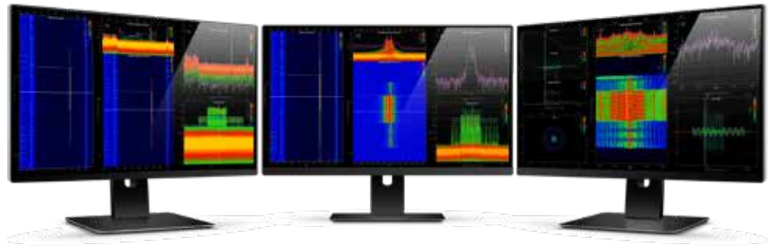
Ultimate forensic tool for mining & export of RF big data

RFeye DeepView is a state-of-the-art software package designed for interactive visualization and easy-to-interpret analysis of recorded RF data. It is designed for use with the RFeye SenS Portable hardware module and allows users to control and record up to 100 MHz bandwidth of 16-bit I/Q data as a continuous, real-time stream. DeepView indexes and stores vast amounts of measured data, ready for fast, in-depth post-analysis to find and export ultra-short pulses and other signals of interest (SOIs), drastically reducing post-processing time and effort.

The software provides comprehensive views for the signal analysis across the time, frequency, amplitude and phase domains and color-coded statistical displays based on the number of hits. DeepView lets users pinpoint and analyze SOIS more easily and efficiently, offering fine resolution and smooth, rapid navigation, with streamlined display updates and fine resolution. Dynamic index markers facilitate playback of the whole dataset or just selected sections.

DeepView is designed to make life easier for RF analysts and electronic intelligence (ELINT) teams. It automatically indexes and stores full-rate I&Q data in real time so users don't have to miss vital signals or spend hours waiting for files to load. Because many CRFS customers use hybrid systems, DeepView exports files using open data formats compatible with many 3rd-party software platforms. CRFS understands that interoperability is key.

SenS Portable *Specifications*



DeepView forensic analysis software: Dataset overview provides an overall index for rapid navigation of files larger than 2 GB, and rapid FFT calculations facilitate quick zooming and reduced lag. Includes statistically weighted displays for frequency, time, power and I/Q along with many other powerful real-time and historical data analysis options.

System components

Hardware module

Receiver	R-8 (8 GHz)	or
	R-18 (18 GHz)	
	R-40 (40 GHz)	
Built-in, enterprise-class SSD	6.4 TB	or
	12.8 TB	or
	19.2 TB	or
	25.6 TB (R-8 & R-18 only)	

Signal analysis software

RFeye DeepView (included)	Windows 10 based; 4-lane Thunderbolt 3 port required for hardware*

Internal receiver: R-18 example

Frequency

Range	9 kHz to 18 GHz

Noise figures at maximum sensitivity (typical)

9 kHz to 83 MHz	11 dB
83 MHz to 1 GHz	9 dB
1 GHz to 2.9 GHz	8 dB
2.9 GHz to 5.9 GHz	7 dB
5.9 GHz to 10 GHz	9.5 dB
10 GHz to 15 GHz	12 dB
15 GHz to 16 GHz	13 dB
16 GHz to 17 GHz	18 dB
17 GHz to 18 GHz	21 dB

Sweep speed

Sweep speed at 2 MHz RBW	390 GHz/s typical

Phase noise at 20kHz offset (typical)

Receiver input at 1 GHz	-126 dBc/Hz.
Receiver input at 5 GHz	-121 dBc/Hz.
Receiver input at 18 GHz	-110 dBc/Hz.

Signal analysis

Instantaneous bandwidth	100 MHz
Tuning resolution	1 Hz

Signal analysis software

RFeye DeepView (included)	Windows 10 based; 4-lane Thunderbolt 3 port required for hardware

Overall system

Signal analysis

Switchable full-bandwidth RF inputs	3 x SMA connectors (rear) (R-40 - 2 x SMA, 1 x K2.92)
Instantaneous bandwidth	100 MHz
Tuning resolution	1 Hz

Sampling

Resolution	16 bits I&Q
Rate	125 MS/s I&Q

Internal frequency reference

Initial accuracy @ 20°C	±0.1ppm typical
Stability over temperature	±0.3 ppm typical
Ageing over 1 day	±0.04 ppm per year

Connectivity USB-C (Thunderbolt 3)

Equivalent lanes	4 x Gen 2.0 PCIe
Total throughput	Up to 20 Gbps

Size, Weight and Power

Dimensions (w, h, d)	10.9 x 5.0 x 6.5 in 277 x 126 x 165 mm
Weight (w/ dual SSDs)	7 lbs 6 oz/ 3.4 kg
Power consumption	60 W typical

Environmental

Operating temperature range	0 to +50°C (32 to 122°F)
Storrage temperature range	-40 to +70°C (-40 to 158°F)

The CRFS difference

CRFS sits at the forefront of new technology for distributed monitoring and geolocation, featuring wideband receivers with lightning-fast sweep speeds and best-in-class noise figures and phase noise. These high-sensitivity receivers are known as RFeye Nodes.

For our military customers, fast sweep speeds and instantaneous bandwidth mean higher probability of intercept (POI). This translates to confidence that potential threats can be detected for real-time tracking, recording and further analysis.

Low noise means that operators can detect and locate lower-power, more distant signals that might otherwise have been missed entirely, providing earlier threat warning indicators (TWIs) and better situational awareness of an area of operations (AO).

Rfeye's high-performance hardware and state-of-the-art software enable extremely fast processing to give much faster geolocation updates than other systems. Our TDOA geolocation algorithms typically update 10 times per second compared to similar systems that may only update once every 30 seconds. Fast geolocation updates are crucial in situations where hostile targets may be moving at speeds of over 1,000 mph.

How we work with military customers

CRFS is recognized as a best-in-class COTS supplier by defense forces and system integrators, and our systems have been widely deployed with outstanding results over many years.

CRFS is known not just for the hardware and software we provide, but for our support. We have long-term partnerships with many of our military customers, working closely with them not just to ensure the successful deployment of equipment, but also to develop new features to meet their specific mission requirements.

Military & government contract vehicles

Many of our Mil/Gov customers prefer to purchase CRFS products using an existing approved contract vehicle. Our products are available through a range of different contract vehicles, and the list is always growing. If you have a specific request, please do not hesitate to get in contact with us directly via **enquiries@crfs.com**.

1: RFeye Array 100/150
2: RFeye Array 50
3: RFeye Array 300
4: RFeye Node + ODK
5: RFeye Node 100-18
6: RFeye SenS Portable Recorder

RFeye Mission

MN

Automated RF situational awareness

RFeye Mission is CRFS's flagship solution for automated spectrum operations. It enables spectrum stakeholders to derive useful and actionable intelligence from their deployed RFeye receivers without the need for teams of RF experts. It has been designed for use with RFeye assets deployed over wide areas such as ranges, test sites, borders and cities, as well as small networks such as indoor technical surveillance countermeasures (TSCM).

RFeye Mission is controlled via a web browser interface. It allows even novice operators to automate spectrum monitoring task schedules without junior analysts having to view a "wall of spectrum data." Sweeps, scans and surveys can be set up quickly, and operating zones, geolocations and authorized transmitters are clearly displayed alongside immediate alarms as incident logs as violations happen.

Software Solutions

ST

Site

RFeye Site is our state-of-the-art desktop application for real-time monitoring and geolocation requirements.

Monitoring, Geolocation, Indoor Geolocation, 3DTDOA MLAT, Signal Classification, Propagation, Map, Signal Verification

DV

DeepView

RFeye DeepView software is the ultimate forensic tool for searching through multi-terabyte datasets for signals of interest.

Big data view: time/spectrogram & heatmap, Live mode: Real-time Spectrum Analyzer, Fast zoom/scroll through IQ data, Select export: filtered IQ data, Full dataset or selection playback, Marker: Delta function with live recording, Unlimited file duration, Screens: Dataset, Analysis region overview, Analysis region Spectrum, Time cursor Spectrum, Power/Time

ST

3D TDOA

3D TDOA (or MLAT) is a recent advance in our geolocation software enabling passive tracking of targets in three dimensions even with a ground-based network of Nodes.

This is used to track objects such as military/civilian aircraft, commercial drones and more advanced military UAVs. As the method is entirely passive it allows targets to be tracked without any emissions which may alert those targets.

About CRFS

CRFS creates deployable systems to detect, identify and geolocate signals in complex RF environments.

We provide end-to-end automated solutions for spectrum management and deconfliction, interference hunting and threat detection, using our intelligent receiver technology, software and advanced analytics.

Our RFeye systems are widely deployed by military, intelligence, law enforcement and regulatory agencies around the world.

For further information or to schedule a demonstration visit:

crfs.com

CRFS

See through the noise

CRFS Inc
Chantilly, VA, USA
+1 571 321 5470
enquiries@crfs.com

CRFS Ltd
Cambridge, UK
+44 1223 859 500
enquiries@crfs.com

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