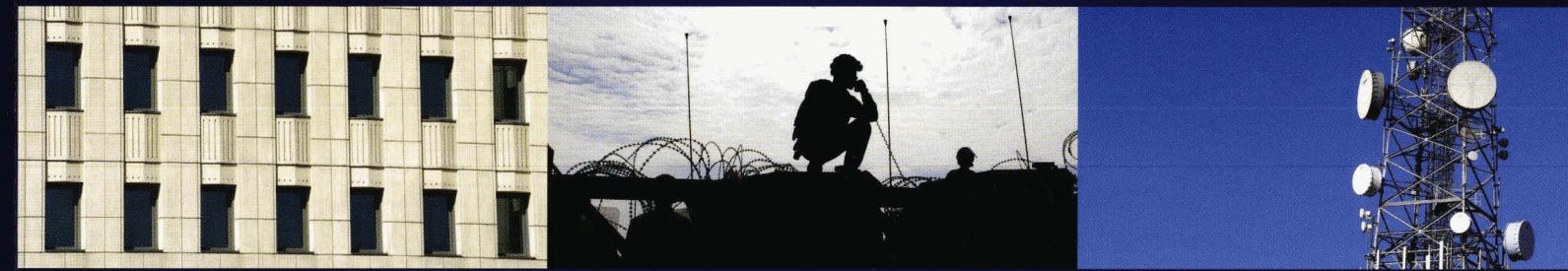




WWW.CRFS.COM



SPECTRUM INTELLIGENCE SYSTEMS

CRFS Limited

Building 7200, Cambridge Research Park
Beach Drive, Cambridge, CB25 9TL, UK

Tel: +44 (0)1223 815 615 Fax: +44 (0)1223 280 351
Email: enquiries@crfs.com

CRFS Inc.

34428 Yucaipa Boulevard, Suite E346
Yucaipa, CA 92399, USA

Tel: +1 949 413 1024
Email: enquiries@crfs.com

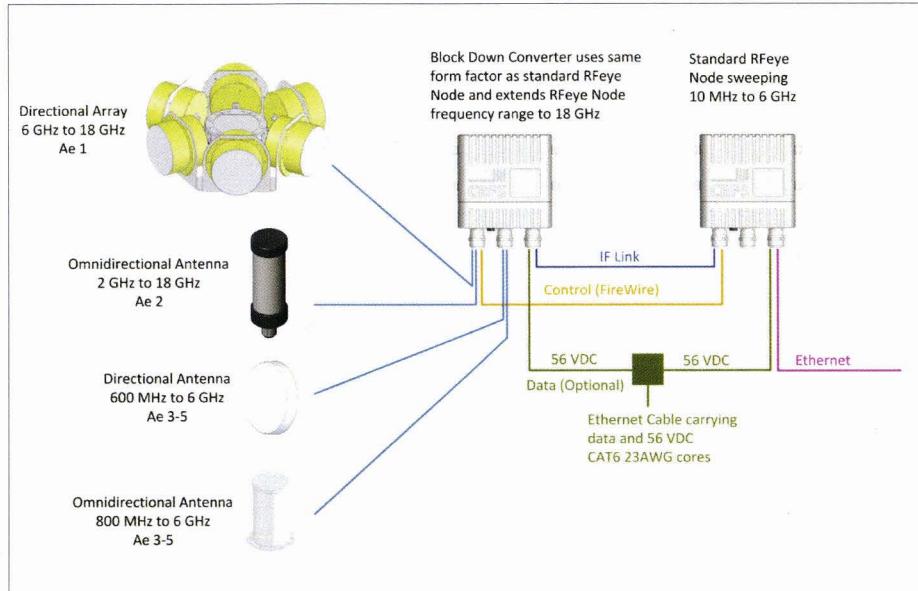


CRFS pioneered the concept of remote real-time software-defined networks of intelligent spectrum sensors to provide continuous 24/7 monitoring of the RF environment. We developed the RFeye® to help improve the efficiency of modern-day spectrum usage, resolve complex interference issues and provide cyber security for critical buildings and installations.

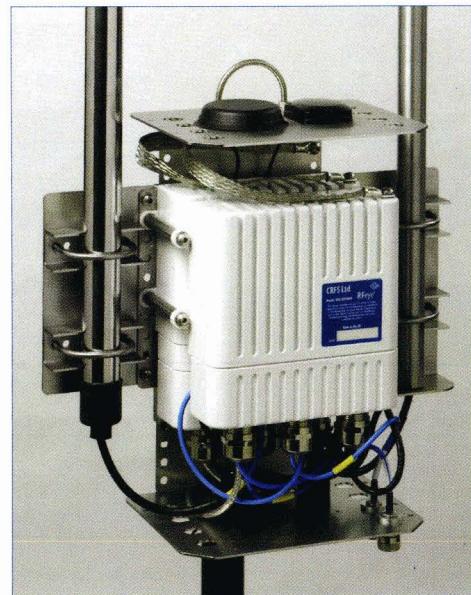
Key features

- Remote distributed networks of intelligent and cooperative sensors
- On-node data processing and analysis for fast, dynamic and backhaul-efficient system
- Multi-user access, multi-mission configuration
- Large bandwidth signals capture and analysis, real-time alarms and transmitter geolocation
- Excellent RF specification with very high probability of signal intercept
- Direct interaction with nodes from anywhere in the world over TCP/IP
- Dynamic local license checking and push/pull to central databases
- Simple plug and play installation, autonomous and self-maintaining
- Open API for custom applications
- Robust, cost effective, high performance

System Architecture



Antennas for full 10 MHz - 18 GHz frequency range are input via RFeye Block Down Converter, combined installation shares single cable for POnE power and data



RFeye Node and RFeye BDC co-located within an Outdoor Mounting Kit (sunshield cover removed)

Technical specifications

Frequency	
Range	6 GHz to 18 GHz
IF Bandwidth	3 GHz
IF Centre Frequency	2.5 GHz and 3.5 GHz band dependent
Gain	15 dB
Phase Noise	-110 dBc/Hz @100kHz typical
Preselection bands (standard)	6 - 9 GHz 9 - 12 GHz 12 - 15 GHz 15 - 18 GHz

Interfaces	
RF input	5 switchable inputs (SMA)
DC power from external source	10 - 56 VDC
Power consumption	10 W typical
Reference clock input	10 MHz from RFeye Node

Sensitivity (equivalent noise figures at maximum sensitivity)	
6 GHz - 15 GHz	9 dB typical
15 GHz - 18 GHz	10 dB typical

Signal input	
Input connector	Five switchable SMA inputs 1 x 6 GHz - 18 GHz 1 x 10 MHz - 18 GHz 3 x 10 MHz - 6 GHz
Maximum input level	+15 dBm; 15 VDC
Signal output	
Output connector	Single SMA output, IF to Node
Maximum output level	-20 dBm
Mechanical	
Dimensions (w h d)	170 mm x 60 mm x 125 mm (6.7 in x 2.4 in x 4.9 in)
Weight	2.0 kg (4.4 lb) with environmental protection cover
Environmental	
Operating temperature	30 to +55°C (-22 to 131°F)
Storage temperature	-40 to +70°C (-40 to 158°F)
Environmental protection	IP67 with optional environmental cover

For more information

To find out more or discuss your specific application, please e-mail us at enquiries@crfs.com or call +44 (0) 1223 815 615. You can also find useful resources on our website at www.crfs.com





Block Down Converter

Seamless 6 GHz to 18 GHz frequency extender for the RFeye Node

Product code: NOD-BDC0001

Key features

- Seamless extension of the RFeye Node to 18 GHz
- Plug and play installation and operation
- Multi-user, multi-mission compatible
- Rugged and compact
- IP67 rated with optional environmental cover
- Fast synthesiser tuning and preselection filtering
- Multiple RF ports for multi-antenna operation
- Mounting kits available for easy deployment



High performance RFeye monitoring of microwave transmissions up to 18 GHz

The RFeye Block Down Converter (BDC) seamlessly extends the frequency range of the RFeye Node from 6 GHz up to 18 GHz. Frequencies above 6 GHz are down-converted to allow analysis using the Node. It enables all of the extensive real-time analysis capability of the RFeye Node to be accessed at these higher frequencies with minimal impact on overall system speed and RF performance.

Plug and play operation

The BDC is connected to the RFeye Node via a calibrated IF link and is fully controlled by the RFeye Node allowing for simple plug and play operation. It can be run from the same power supply, simplifying installation and reducing additional cable run requirements. The BDC accepts RF inputs for the full extended RFeye frequency range from 10 MHz to 18 GHz.

All the power of the RFeye up to 18 GHz

The BDC extends all of the multi-user, multi-mission functionality of the RFeye Node to microwave frequencies allowing monitoring of bands such as radar transmitters, satellite communications, radio relay links, short range terrestrial data links and high frequency bugging devices.

Designed for hostile environments

The BDC uses the same form factor and mounting options as the RFeye Node, permitting standardization of mounting options. It is also built to the same strict environmental specifications and is designed for use in outdoor or indoor, fixed or mobile operation, including in hostile environments.

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IP67 Environmental protection cover

The environmental protection cover fully isolates the front panel of the Node and BDC providing outstanding IP67 rated environmental protection. The operating temperature range of the unit is from -30°C to +55°C (-22°F to +131°F), making it suitable for most environments.



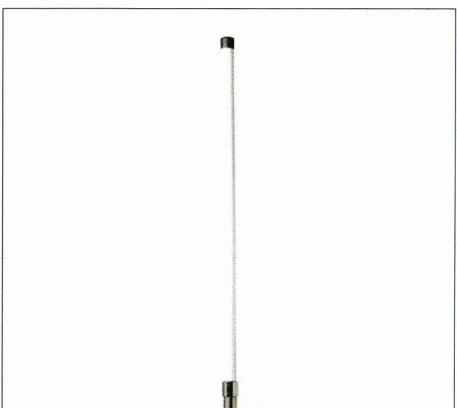
External interface panel for Ethernet* with POnE, 2 x N-type RF, and USB



Top mounted GPS and cellular antennas with hoist ring



Environmental protection cover for Node & BDC



Omnidirectional antenna
10 MHz - 1 GHz



Omnidirectional antenna
0.8 GHz – 6 GHz



Omnidirectional antenna
0.8 GHz – 18 GHz

Mechanical specifications

Outdoor mounting kit	Dimensions	Weight	Part number
	320 mm (w) x 360 mm (h) x 170 mm (d) 12.6" (w) x 14.2" (h) x 6.7" (d) (excluding antenna poles)	7.7 kg (17 lbs) excluding Node / BDC	Node only: KIT-OUT0006 Node + BDC: KIT-OUT0010
Antennas**	Dimensions	Weight	Part number
10 MHz - 1 GHz	40 mm (1.6") diameter x 938 mm (37") height	790 g (1.7 lbs)	ACC-ANT0040
0.8 GHz – 6 GHz	79 mm (3.1") diameter x 143 mm (5.6") height	325 g (0.7 lbs)	ACC-ANT0015
0.8 GHz – 18 GHz	100 mm (3.9") diameter x 108 mm (4.3") height	720 g (1.5 lbs)	ACC-ANT0025

* Ethernet surge protection available on request

** Detailed specifications available on request, antenna cables supplied separately

For more information

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RFeye®

Outdoor Mounting Kit & Antennas

Outdoor Mounting Kit with optional
antennas from 10 MHz to 18 GHz



Key features

- Robust pre-assembled IP67-rated system
- Ruggedized for "fit and forget" deployment
- Node-only and combined Node+BDC kits
- Single cable installation via Power on Ethernet
- Pole, wall or mast mount
- Multiple RF ports for multi-antenna operation
- Range of high performance antenna options

Pre-assembled rugged outdoor kit with antennas for fast and simple RFeye network installation

The RFeye Node has been designed for quick and easy deployment with maintenance-free use. In keeping with this approach, CRFS supply a complete pre-assembled Outdoor Mounting Kit for easy attachment to wall, pole or mast, as well as a range of high performance omnidirectional antennas. Both a Node-only option up to 6 GHz and a Node + Block Down Converter option up to 18 GHz are available.

Complete hardware setup ready for use

The Node-only kit includes a stainless steel outdoor mounting system with brackets and fittings, 2 x antenna pole mounts, hoist ring and sunshield, an environmental protection cover for the Node, GPS and cellular antennas, Power on Ethernet injector with mains cable (56 VDC), all required cabling and an external interface panel with outdoor rated connectors.

Combined Node and BDC within standardized kit

The Node + BDC kit includes an additional environmental protection cover for the BDC, an uprated POnE injector to split POnE feed between the Node and BDC, plus additional required cabling.

Pre-fitted antennas and additional auxiliary antenna connectors

The Outdoor Mounting Kit is designed to accommodate a range of IP67 rated omnidirectional antennas to cover the frequency range from 10 MHz up to 18 GHz. Antennas can be supplied as an option pre-mounted with integrated RF cable assemblies for ease of installation.

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Easy to deploy as fixed or portable/mobile units

The Node is housed in a rugged, compact lightweight enclosure and has an environmental cover that provides IP67 protection for hostile environments. It is low power and can be powered from multiple sources. It can be discreetly deployed in-building, easily mast mounted outdoors or deployed in various man-portable or mobile configurations. Data can be accessed securely in real time via IP, stored locally to USB drive or optional internal SSD, transmitted via the built-in modem or via Ethernet to a centralized database.



Technical specifications

Receiver performance		Signal analysis		Frequency reference	
Frequency range	10 MHz to 6 GHz	Real-time analysis bandwidth	20 MHz maximum	Selection	Internal, GPS or External
Receiver noise figure	8 dB typical (10 MHz – 4 GHz) 11 dB typical (4 GHz – 6 GHz)	Equivalent resolution bandwidth	20 kHz min. (max. analysis b/w) 18 Hz min. (reduced analysis b/w)	External ref. input	Via expansion port, 10 MHz ± 1 kHz
Input connector	Four switchable signal inputs			Reference output	Via expansion port, 10 MHz
Maximum input level	+15 dBm; 15 VDC				
3rd order intercept point (IP3)	+20 dBm typical (AGC active)	Interfaces		Internal frequency reference	
1 dB input compression	+10 dBm typical (AGC active)	RF input	SMA (X 4)	Initial accuracy	better than ±2 ppm at 20°C
Level accuracy	± 2.5 dB typical	DC power	10 - 56 VDC	Stability	better than ±1 ppm (10°C to 30°C)
Antenna LO re-radiation	-90 dBm typical	DC power input	Direct to node or via Ethernet (POe)	Ageing	better than ±2 ppm per year
Antenna port isolation	30 dB min. at 2 GHz	Power consumption	15 - 25 W, radio operational 6 W typical, radio idle	Operating system and software development options	
SSB phase noise	-90 dBc/Hz at 10 kHz oset -110 dBc/Hz at 200 kHz oset typical, at 2 GHz* (*low noise synthesiser)	GPS antenna	SMA, passive and active (3.3 VDC nominal) antennas supported	Linux version	2.6
Synthesiser switching time	50 µs typical (fast sweep mode)	Cellular modem antenna	SMA	Development environments	Full SDK C and Python development environment available
Spurious free dynamic range	60 dB min.	Ethernet	1 x 1 GigE	Data storage	
AGC range	60 dB	USB	2 x USB A (2.0)	USB	USB flash drive via 2 x USB ports
Sweep and triggering		Expansion ports	2, configurable to provide: (a) trigger input (b) frequency reference input (c) external (peripheral) control (d) frequency reference output	SSD	Optional internal integrated SSD, up to 1 TB
Sweep speed	40 GHz/s (fast synthesizer) 10 GHz/s (high quality synthesizer)	Timing reference		Mechanical	
Sweep mode	Fully programmable: Free run continuous, single, timed, delay timed user trigger, adaptive (if-then-else)	GPS	30 ns RMS accuracy typical	Dimensions (w x h x d)	170 mm x 60 mm x 125 mm (6.7 in x 2.4 in x 4.9 in) (h = 70mm / 2.8 in with internal SSD)
Trigger on event	Fully programmable: userdefinable masks, user-definable action when mask exceeded	RFeye SyncLinc	< 10 ns RMS accuracy typical	Weight	1.4 kg (3.1 lb) [Node only] 2.0 kg (4.4 lb) [with environmental protection cover]
Environmental					
Operating temp.	-30 to +55°C (-22 to 131 °F)				
Storage temp.	-40 to +70°C (-40 to 158 °F)				
Envrn. protection	IP67 (with environmental cover fitted)				

For more information

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Node

Distributed spectrum monitoring and surveillance for indoor/outdoor use

Product code: NOD-EYE0001



Key features

- 10 MHz to 6 GHz, optionally to 18 GHz
- Fully scalable for small to very large networks
- Fast, sensitive, excellent noise figure
- TDOA, POA and AOA capable
- Embedded Linux system, local bulk data storage, integrated SSD option
- Rugged and compact, IP67 with optional environmental cover
- On-board GPS for accurate positional and time stamping
- Multiple RF ports for multi-antenna operation
- Range of powerful RFeye software available
- Open API, fully programmable with supplied SDK

Intelligent networkable node for spectrum monitoring of sensitive buildings, critical sites, borders, or any area of interest

The RFeye Node sets the new standard for high performance, cost-effective, real time 24/7 monitoring of the radio spectrum. It has been designed and packaged to enable flexible and scalable deployments in remote distributed networks. With built-in intelligence, the Node can operate both autonomously and in cooperation with other Nodes in the network.

Very high probability of signal intercept

Capable of sweeping from 10 MHz to 6 GHz (or optionally to 18 GHz) at 40 GHz/s, the RFeye Node captures signals of all types, including transient transmissions such as pulsing or short-burst signals. High sensitivity and exceptionally low spurious components mean that it is able reliably to distinguish even very low power signals from the noise floor.

Flexible multi-user multi-mission capability

The RFeye's unique architecture is capable of supporting multiple concurrent tasks and missions, as well as multiple queries from simultaneous users. Remote programming allows tasks to be assigned relative priorities and the Node is able seamlessly to execute the required tasks in the most efficient manner. In this way, the Node is able concurrently to perform sweeps and IQ captures, make spectrum occupancy measurements, monitor mask breakages and trigger alarms, log data to memory, record sequences for playback, measure an AOA bearing or coordinate with nearby Nodes to carry out geolocation measurements using TDOA or POA techniques. In addition, there is no limit to the number of users who can simultaneously query the Node via IP and make varying requests to display information of interest.

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