

BlueBottle™ by Solinnov

RF superiority in a dynamic
and hostile environment



solinnov

When every nanosecond counts

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Introducing BlueBottle

BlueBottle is a multi-mission software-defined radio system for electromagnetic operations developed by Solinnov to demonstrate the true power of radio technology. It provides a wide range of specialist applications in communications, electronic surveillance, electronic countermeasures and radar.

The BlueBottle units have the ability to switch applications at any time during operations; combined with its small size, weight and power profile, it provides a versatile and cost-effective solution for defence and intelligence operations. BlueBottle's software allows units to be used individually or as networked sensors for distributed operations.

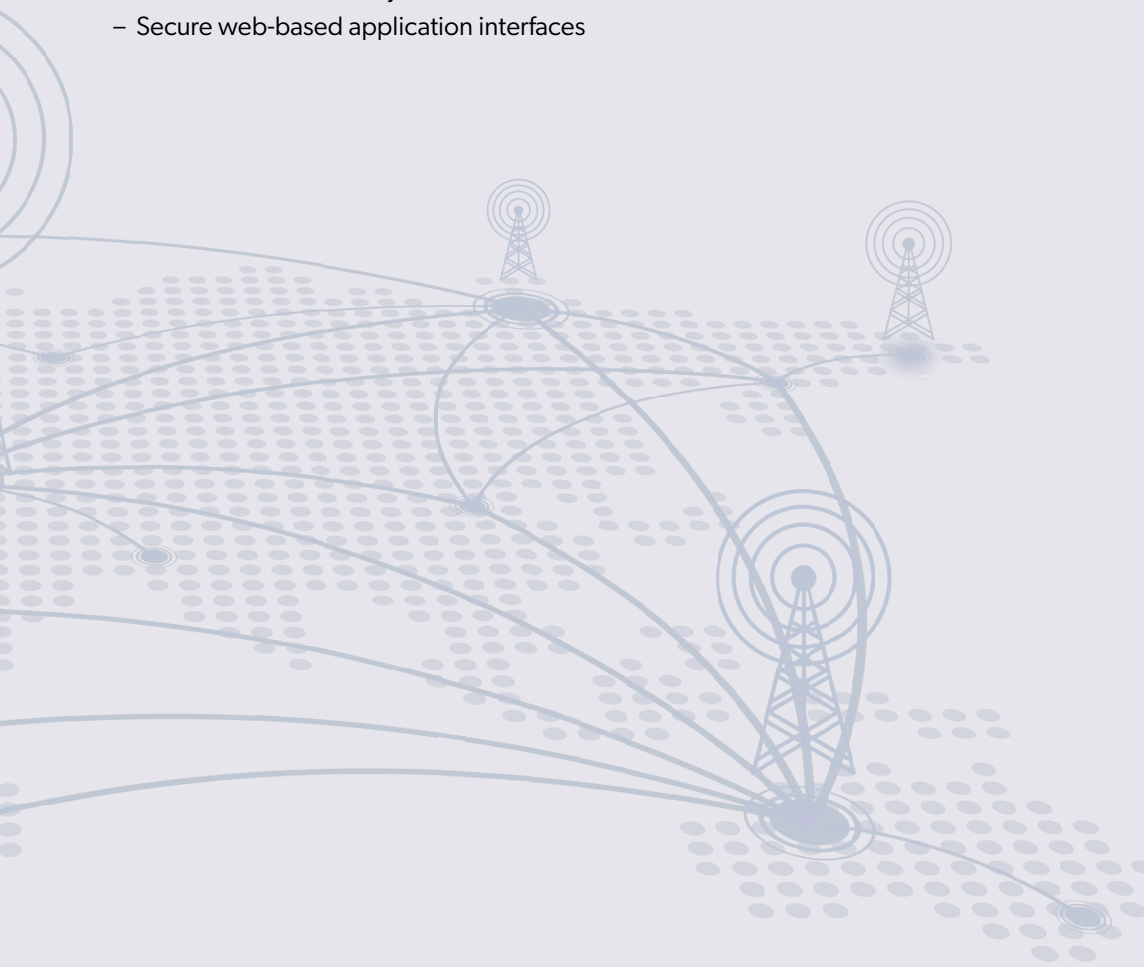


Product Specifications

Operating bandwidth	5MHz to 6GHz
Instantaneous bandwidth	54MHz
Size	145mm × 87 mm × 30 mm (378.5 cm ³)
Weight	455g
Power consumption	Max 12W (0.8A @ 12VDC)
GPS	u-blox M8-T
Multiple unit timing accuracy	±30ns (for stationary setup)
Operating temperature	0°C to 70°C -40°C to 85°C (industrial variant)
RX power input	Max 6dBm, min less than -100dBm
TX power output	Max 0dBm
Impedance TX/RX	50Ω
Data capture and playback buffers	Fast 128MB DDR4 buffer (bandwidth ≤ 60MHz) Slow 512GB SD card buffer (bandwidth ≤ 2MHz)

Product Features

- Built-in encryption and anti-tamper technology
- External 10MHz reference and PPS signals
- 1Gb Ethernet and OTG USB 2.0 interfaces
- 3G and 4G connectivity
- Secure web-based application interfaces



Applications

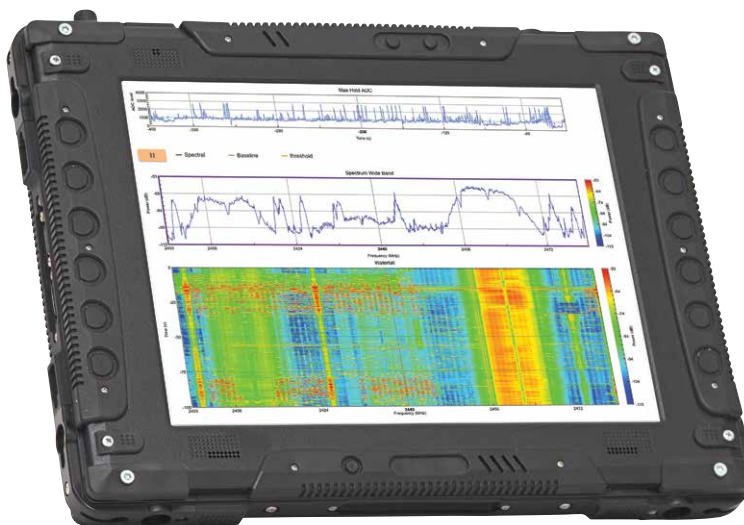


Wideband Scanner

The Wideband Scanner application allows an operator to monitor the spectrum to capture and analyse signals of interest in real-time. This application scans over the spectrum and alerts the operator when non-typical signals are detected in the environment to enhance situational awareness across critical areas of concern. The application can scan across user-defined frequency ranges that span the entire operating bandwidth of the BlueBottle hardware.

Application features:

- Provides wideband monitoring from 5MHz to 6GHz
- Captures GPS time-tagged data for analysis
- Generates real-time reporting and waterfall displays
- Can perform emitter geolocation using a distributed set of BlueBottle units
- Generates a baseline assessment of an electromagnetic environment
- Allows user-configurable threshold triggers to detect and identify non-typical signals





Cellular Surveillance

The Cellular Surveillance application allows the operator to monitor the spectrum for cellular signals emitted from 4G base stations and devices. The application demodulates and analyses the cellular signals in real-time to identify emitters and track their activities. The application targets individual emitters and tracks relationships between neighbouring cells providing situational awareness and surveillance within the environment.

Application features:

- Monitors cellular communication in standard and non-standard frequencies
- Targets individual emitters and captures cellular attributes
- Measures cellular signal strength
- Detects emitter geolocation using a distributed set of BlueBottle units





Wi-Fi Surveillance

The Wi-Fi Surveillance application monitors the spectrum for communications between Wi-Fi access points and stations. These signals are demodulated and analysed in real-time to identify Wi-Fi emitters and allows the operator to track their activities. The application targets individual emitters and tracks relationships between access points and stations, providing situational awareness and surveillance within the environment.

Application features:

- Monitors Wi-Fi communication in standard and non-standard frequencies
- Targets individual Wi-Fi emitters to capture raw packet data
- Performs emitter geolocation using a distributed set of BlueBottle units





Wireless Network

The Wireless Network application allows two or more BlueBottle units to form a standalone dynamic mobile network using a custom waveform. The application uses a mesh routing algorithm to establish self-healing connections between multiple BlueBottle devices. This provides the operator with a versatile communications channel over a decentralised and infrastructure-less network that operates across a configurable frequency and bandwidth.

Application features:

- Supports communication via standard network protocols.
- Can operate as a transparent bridge or as a gateway between networks
- Supports multiple modulation schemes; BPSK, QPSK and QAM



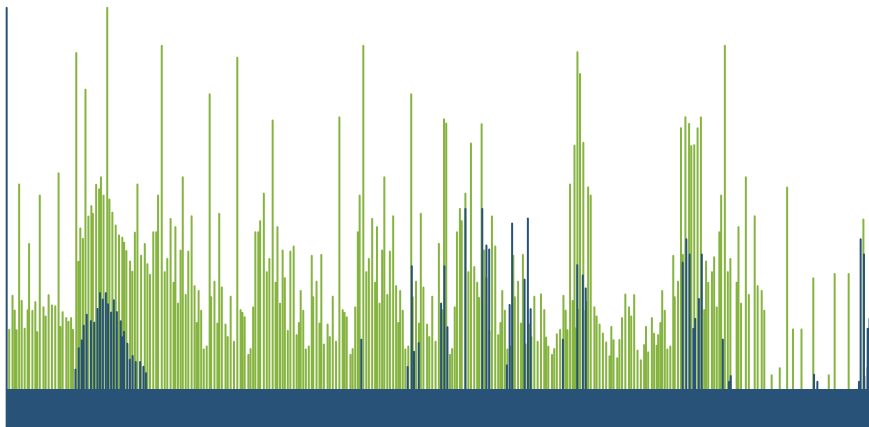


EM Environment Simulator

The EM (electromagnetic) Environment Simulator application allows an operator to use the BlueBottle as a generic transmission device. The operator can design or capture waveforms (offline) and create a playlist that will transmit these waveforms across one or more synchronised BlueBottle units to emulate RF activity. This can be used to influence the EM environment to create confusion/distracted, mask covert activity, transmit scheduled messages or test receiver equipment.

Application features:

- Supports covert operations by disguising communications
- Allows mimicking of frequency-agile communications and radars
- Transmits up to four independent waveforms concurrently



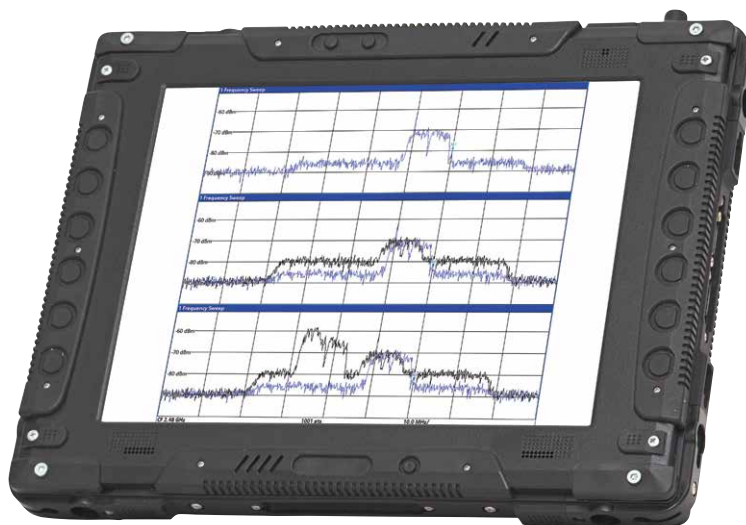


Digital Channel Emulation

The Digital Channel Emulation application is designed to evaluate and test radio equipment in the presence of realistic channel effects. The application allows the operator to emulate an environment based on location, topography, background electromagnetic activity and channel effects. By emulating the environment, the device enables the operator to enhance the realism of laboratory testing and evaluate equipment in realistic scenarios.

Application features:

- Emulates co-channel and adjacent channel interference
- Emulates propagation, multipath fading and noise effects
- Replays channel characteristics recorded in the field



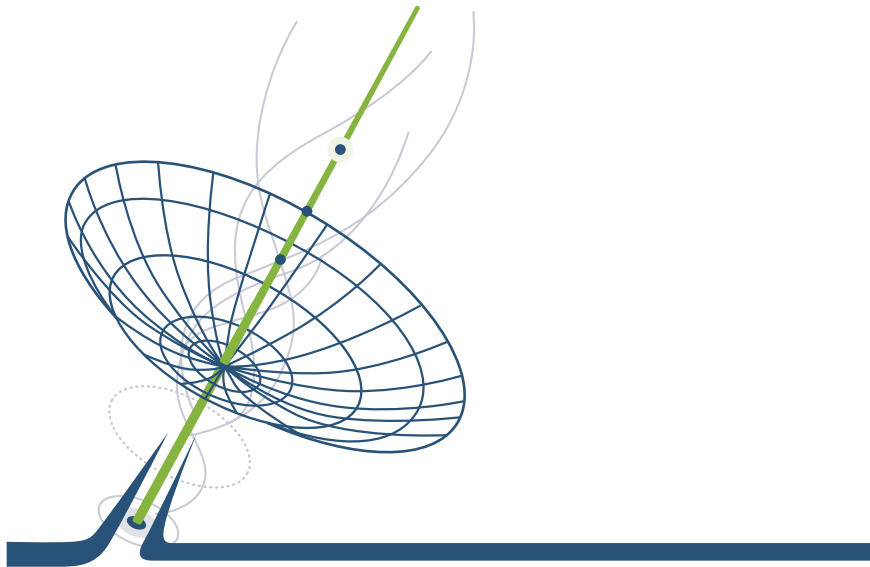


LPI SATCOM Link

The LPI (low probability of intercept) SATCOM Link application provides the operator with a modem that enables clandestine communication using BlueBottle units. This application allows a base station to communicate with multiple terminals using a hard to detect satellite signal. The application enables users to send covert communication via an LPI waveform that can operate well below the noise floor.

Application features:

- TDMA (time-division multiple access) channel access allows users to use the same frequency at different time slots
- Allows simultaneous transmission from multiple units within the same bandwidth
- Operates with ultra-low signal to noise ratios
- Enables widespread global covert communications





Surrogate Seeker

The Surrogate Seeker application allows the operator to emulate an active radar to assist in developing radar countermeasures. This application enables the BlueBottle unit to appear as a threat radar by transmitting a configurable sequence of pulses. This can be used to stimulate and test Electronic Warfare systems, including RWR (radar warning receivers), ES (electronic surveillance) systems and ECM (electronic countermeasure) techniques.

Application features:

- Allows multiple configurable radar parameters; waveform, operating frequency, instantaneous bandwidth and pulse repetition interval.
- Provides General Purpose Input/Output to allow control via external frequency controllers
- Ability to work with external RF up/down converters to operate beyond 6GHz



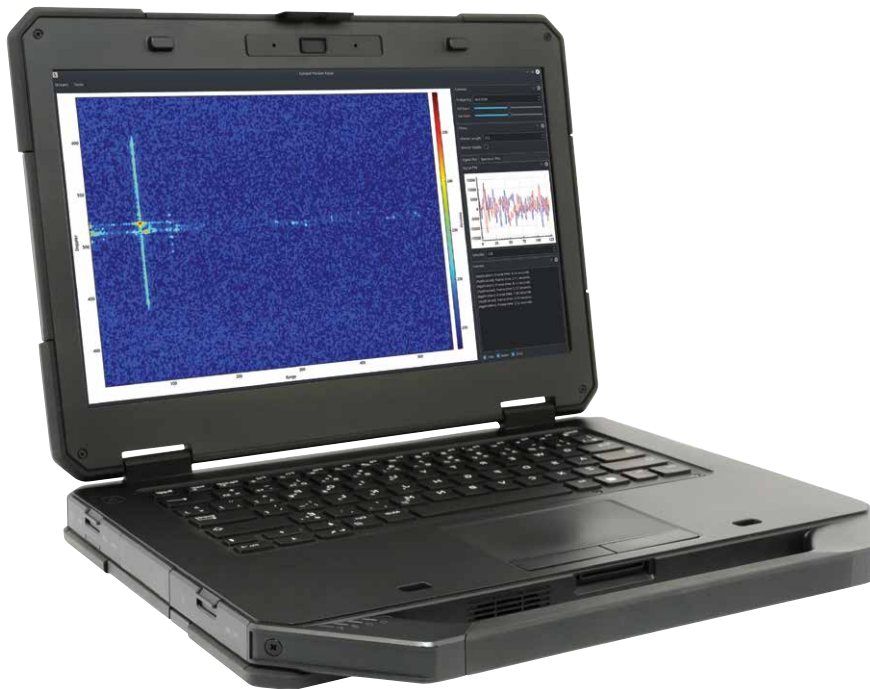


Distributed Passive Radar

The Distributed Passive Radar application allows the operator to detect and track moving targets using a distributed set of BlueBottle units. This application exploits existing radio signals to illuminate targets, allowing the BlueBottle unit to generate measurement data without fear of detection. The measurement data from each unit is processed at a central site to provide precise target position, velocity and trajectory estimates.

Application features:

- Provides covert surveillance of airborne targets
- Integrates with external or additional sensors for greater location and tracking accuracy
- Functions in GPS denied locations and environments



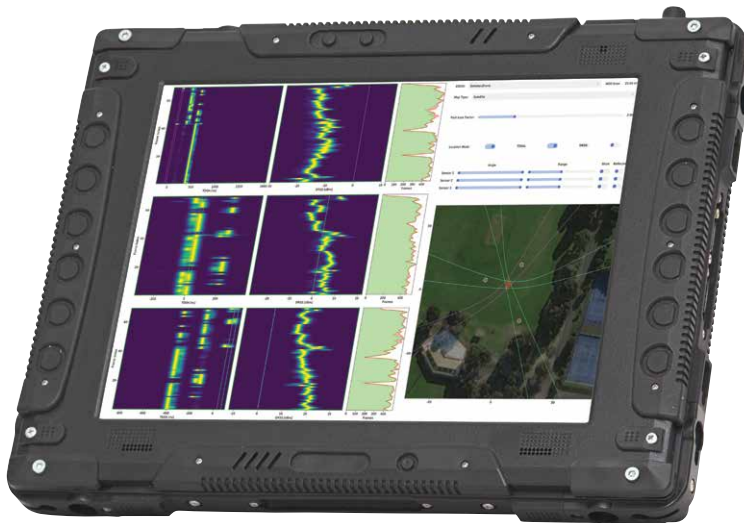


RF Detection and Geolocation

The RF (radio frequency) Detection and Geolocation application allows the user to detect and geolocate radio signal emitters using a distributed set of BlueBottle units. The application enables the operator to search for emitter types of interest and then request a geolocation estimate. The detection data from each unit is processed at a central site to provide precise emitter geolocation estimates to provide situational awareness.

Application features:

- Tracks both stationary and dynamic emitters
- Allows multiple capture modes to monitor different signal types; persistent and intermittent
- Online mode for real-time operation monitoring
- Offline mode for post-processing and analysis of recorded data



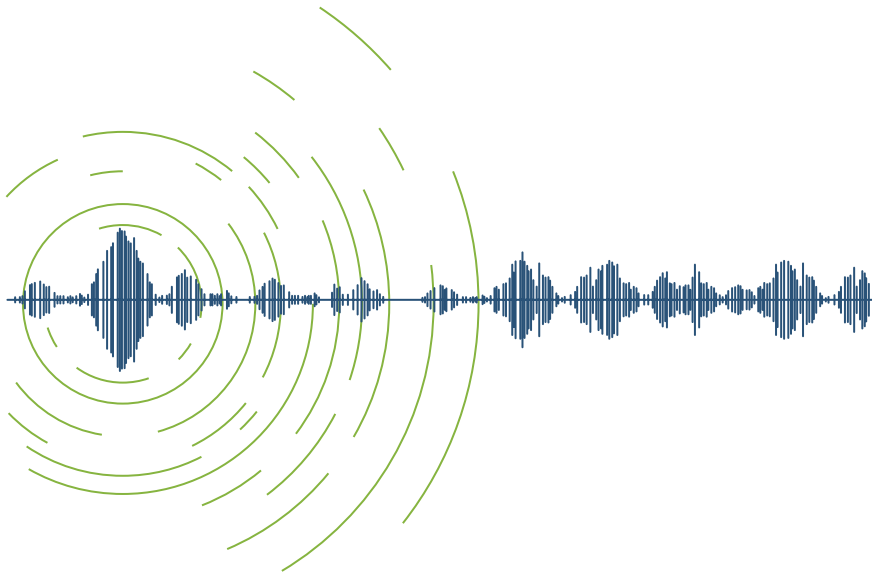


DRFM

The DRFM (digital radio frequency memory) application captures incoming signals in real-time and plays them back with user-selectable effects such as frequency modulation, phase modulation and noise. The application can create multiple radar test targets with realistic range and doppler characteristics to support radar development and testing. The application allows users to perform conventional jamming techniques and provides electronic countermeasure capabilities.

Application features:

- Effective against communication protocols as well as radars
- Pipeline mode operation does not require pulse prediction
- Allows up to 32 user-defined targets
- Can be mounted on an unmanned aerial vehicle tool kit
- Has an instantaneous bandwidth of 54MHz



About Us

At Solinnov, we believe that there is greater potential in multi-mission radio systems for electromagnetic operations than what is currently being harnessed. This is fundamental to reducing the cost of ownership of RF operational equipment for defence and intelligence organisations.

Solinnov's primary mission is to optimise customer value in multi-mission software-defined radios.

Solinnov attracts workforce talent in hardware and software design, communication engineering and digital signal processing to design novel software-defined radio architectures and radiofrequency operations applications, such as communications systems (modems), electronic surveillance systems, electronic countermeasure systems and radars. We deliver these applications to a broad range of defence and non-defence customers implemented in an open architecture SDR to create a critical mass of mission applications that demonstrate the true power of multi-mission radio technology.





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