

SENTINELnano Gen 3 Sensor

**Low-SWaP SIGINT Bringing Intelligence –
Based Decision Making to the Edge**



The SENTINELnano is a low-SWaP, laptop-based RF sensor with embedded receiver and digital signal processing – bringing SIGINT to the edge.

Key Capabilities

- ▶ Man portable / transportable V/UHF sensor with an integrated 30 MHz to 6 GHz Software Defined Radio (SDR)
- ▶ External connectors enable integration with antennas, GPS timing sources, external tuners and other SDRs
- ▶ Digitize, record, and process up to 112 MHz of Instantaneous Bandwidth (IBW)
- ▶ Complete client-server SENTINEL software suite including AI/RFML signal classification in a low-SWaP configuration
- ▶ JICD4.2 compliance ensures interoperability across local and wide area networks

Key Advantages

- ▶ Low-SWaP maximizes CONOPS flexibility to support a wide range of mission objectives
- ▶ “Bring your own radio” – capability enables detection, ingest & processing of signals in other frequency ranges – increasing SIGINT & EMSO capabilities and CONOPS
- ▶ Theater Net-Centric Geolocation (TNG) enables local and wide area signal geolocation and the ability to operate as a TNG and Time Difference of Arrival (TDOA) node
- ▶ AI/RFML signal classification reduces operator burden and training requirements and moves data to intelligence conversion to the edge

Espy teamSENTINELnano Gen 3

Overview

The teamSENTINELnano Gen 3 incorporates a Theater Net-Centric Geolocation (TNG) compliant integrated RF Software Defined Radio (SDR) module inside a laptop. Espy's teamSENTINEL server and client software functions turn the teamSENTINELnano Gen 3 into a transportable V/UHF sensor and signal visualization and identification system. Espy's QuickAssist RF Machine Learning (AI/RFML) capability provides automated energy detection, classification, and processing of PTT, DMR, FM Voice and other common signal types. Including a fully featured toolset for the operator to collect and train the RFML algorithm on new signals of interest.

Digitize, record, and process up to 112 MHz of Instantaneous Bandwidth (IBW), tunable from 30 to 6000 MHz with the integrated SDR module. Connection to an external SDR, via the included Thunderbolt to 10GbE SFP+ adapter, enables increased frequency range, dynamic range, and IBW. teamSENTINEL software supports full command and control of SDRs from multiple manufacturers including: CyberRadio, DRT, HTL, MMS, Mastodon and Signal Hound.

To complete the package, Espy's planar wideband omni-directional antenna is integrated into the transit case lid for instant setup and RF monitoring. The antenna may be detached from the case and deployed on a tripod.

Four-sensor teamView

The teamSENTINELnano Gen 3 is both a client and sensor. A four-sensor teamView is depicted below. Each sensor is viewing the same emitter. Despite differing power levels, Geolocation of the emitter is achieved via TDOA alone or by combining TDOA with DF.

Diverse sensor teams can be networked together using the entire teamSENTINEL product line:
teamSENTINEL, teamSENTINELmini, teamSENTINELmicro and teamSENTINELnano



Enabling Mission Success

A Dell Pro Max 18 Plus laptop is combined with a M.2 SDR and custom RF connector card to make a compact, easy to setup, and mobile design. Both sensor and operator software applications run unified on a single hardware platform. Supporting accessories aid in interfacing with use of third party antennas, tuners or other equipment.

Specifications and Accessories

Specifications	
Case Dimensions	20.2 X 16 X 8.30 in (53.8 x 40.6 x 21.22 cm)
Case Specs	Pelican im2600 Watertight, Padlock Hasps
Weight, including case	~40 lbs (18 kg)
Max Power Draw	280 Watts
Power supply	90/264 VAC 50/60Hz

Included Accessories	
Espy Wideband Planar Antenna	RF Adapters
USB Mouse	Headphones
RF Cables	Insulating Mast Adapter
Laptop cooler for use in non-air conditioned environment	GPSAntenna
Thunderbolt SPF+ Adapter	USB DVD Reader



The laptop, antenna and all accessories fit into one compact hand carried case for easy transport and storage



Included GPS antenna with mount

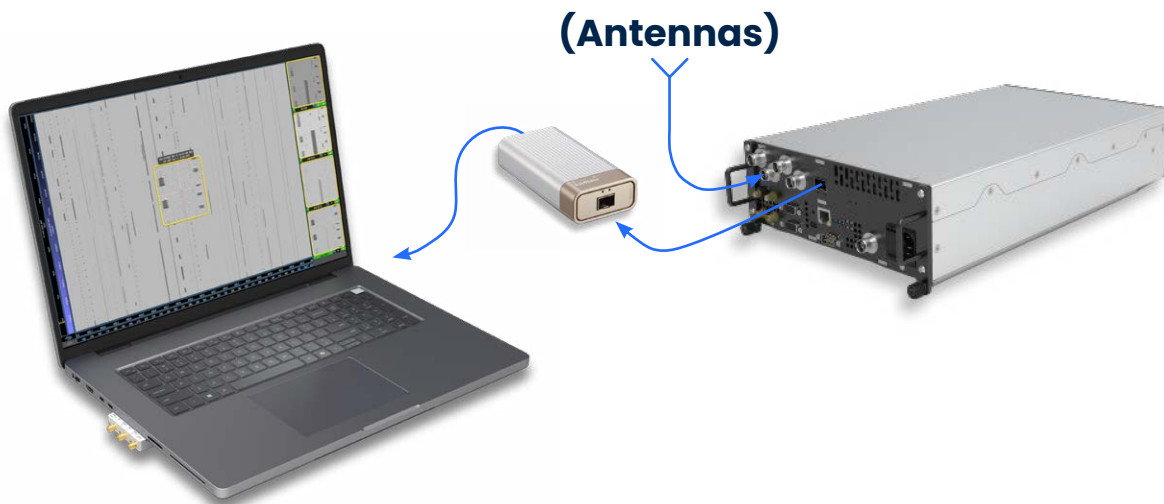
The insulating mast extension enables the planer antenna to mount to common tripods



+

(Your Own SDR)

The included Thunderbolt 3 SFP+ module enables interfacing with other SDRs from several manufacturers



HF Nano

- ▶ Transportable D1 H4 HF RFC combined with tsNano
- ▶ SFP+ to Thunderbolt Adapter
- ▶ DF capable when connected to appropriate antennas

Mission			
HF Monitor	HFDF Sequenced	NChan = 3	NChan = 4
Delay time (Hours)			
12	6	4	3

Specifications

Capability	Specification	Comments
Internal Receiver Subsystem		
Tuner Frequency Range	30-6000 MHz	MHz
Analog Antenna Inputs	2 (SMA-f)	R1 ← Antenna A R2 ← Antenna B
Max RF Input w/o Damage	+20 dBm	Continuous
Noise Floor	-130 dBm typical	3 kHz bandwidth, max gain
Internal Spurious	< -100 dBm typical	Input equivalent power
SFDR	80 dB min	Includes ADC
Gain Range	-13 to +21dB	0.5 dB steps
Noise Figure	< 5 dB typical	Tuner Spec, Does not include cable loss
Input 1, 3rd Order Intercept Point	0 dBm typical	
Input 2, 3rd Order Intercept Point	+9 dBm typical	
Time & Frequency Subsystem		
GPS Antenna Input	1 (SMA-f)	+R3 ← GPS Antenna 3.3 VDC Out
Reference I/Os (Optional)	3 (MMCX-m)	J1 ← 1 PPS In (3.3 VDC max) J2 → 1PPS Out J3 ← 10 Mhz In (0.8 to 3.0 Vpp, +7 dB max)
NTP Services	Standard	Provides Stratum 1 NTP services when GPS lock has been achieved
Software Subsystem		
Operating System	Rocky Linux 9	CentOS 8 Optional
QuickAssist AI-enabled Automated Energy Detection	Standard	
Theater New-Centric Geolocation	Standard	When connected to the appropriate hub
TeamView Multi Sensor Access	Standard	When networked with any other teamSENTINEL sensor

Sample Rate (Maps)	61.44	40	30.72	20	15.36	10	7.68	4
Usable BW per Channel (MHz)	56 ²	36	28	18	14	9	7	3.6
1-Channel Delay (hrs) ¹	12	18	24	38	50	77	100	192
2-Channel Delay (hrs) ¹	6	9	12	19	25	38	50	96

¹ For a laptop with 3x4TB M.2 drives ² Analog filter rolloff between 50+56 MHz

Integration



Integration

- ▶ M.2 SDR integrated into the laptop
- ▶ Compact integrated RF connections
- ▶ SMA connectors for Antenna Inputs and GPS antenna
- ▶ MMCX connectors for 10MHz and 1PPS

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