

Ranger and T/Rx

**Dominate Electromagnetic Spectrum Operations (EMSO)
in complex radio frequency environments.**

Deny • Manipulate • Disrupt • Dominate



VIAVI Solutions Ranger and T/Rx are complementary systems used to monitor, record, synthesize, and playback the Electromagnetic Spectrum (EMS).

Designed for ease of use and swift deployment in a variety of environments, including air, sea, and land vehicles, backpacks, and fixed installations. Used together, the Ranger and T/Rx systems allow users to adapt to or create complex and dynamic RF environments.



THE RANGER

The Ranger is full-featured solution, including detailed synthesis and analysis capabilities. The T/Rx is a small-form-factor, portable transceiver that augments the Ranger's transmit and receive capabilities to generate and receive signals at remote locations. Each component has different capabilities that support the overall objective of dominating the EMS.

The Ranger is typically operated at a Command Post (CP) or Tactical Operations Center (TOC) to monitor and record the EMS that the CP or TOC radiates. Additionally, Ranger can analyze the EMS to determine interference or possible conflicts in the environment. Recordings and synthetic waveforms made on a Ranger system can be modified or edited for playback into the EMS for obfuscation, training, or denial missions. The recordings and synthetic waveforms can also be transferred to a T/Rx system via network connections. T/Rx units can then replay the recordings or synthetic waveforms across various geospatial locations. The Ranger can also analyze recordings made from T/Rx systems that are scattered across the area of operation. Recordings from T/Rx units can be transported back to Ranger, via network connections, for analysis, processing and redistribution.



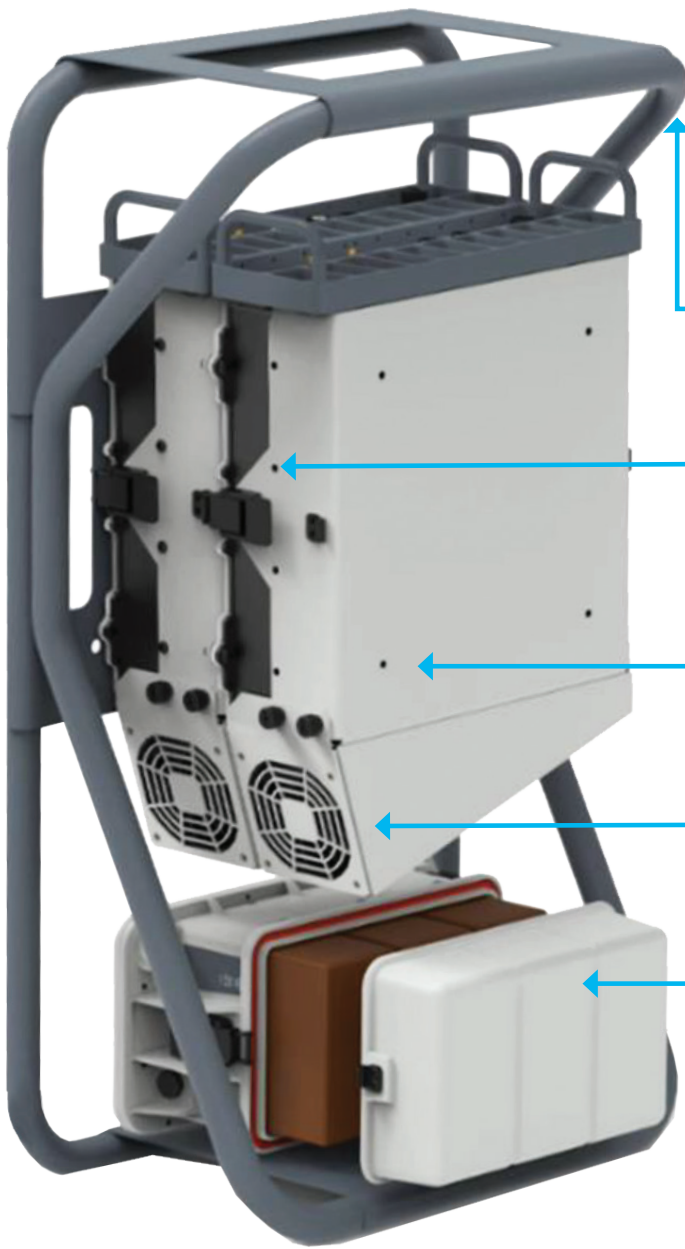
The VIAMI Ranger Benchtop systems with high-power processing for live analysis or offline processing to create and distribute mission sets for remote T/Rx systems.

Ranger Key Features

- Transmitter and receiver frequency coverage from 1 MHz to 6 GHz, with options up to 44 GHz
- Standard 200 MHz instantaneous signal bandwidth, with options up to 1 GHz
- Modular platform provides flexibility to create custom configurations
- Signal WorkShop™ software provides powerful tools for EMS analysis, synthesis, recording, and playback
- Intuitive User Interface simplifies complex EMS analysis, generation, and obfuscation tasks
- Mass waveform storage memory provides hours of recording and playback at full signal bandwidth
- Interfaces with Ranger Sequencer software to schedule transmissions and recordings on multiple Ranger and T/Rx units

T/RX SYSTEM (MANPACK CONFIGURATION)

Rugged, all-weather systems with modular amplifier, optional battery power, and network connectivity is suited for collaborative remote operations.



Manpack Frame – can be replaced for fixed installation, vehicle mount, and other configurations

Software Defined Transceiver – networked transceiver device including two receivers and two low-power transmitters

Power Amplifier – can be stacked and daisy chained to provide high-power configurations

Fan Assemblies – software controlled to reduce noise and field replaceable to reduce down time

Battery Case – encloses and protects one to three BB-2590 (or equivalent) batteries that can be hot swapped to reduce down time



THE T/RX

The T/Rx is a small form factor, portable transceiver that compliments the Ranger system with similar monitoring, recording, and transmit capabilities. With its small size, configurable power amplifier, and optional battery power, the T/Rx is suited for remote operation away from the main CP or TOC sites. Recordings and synthetic waveforms, created with Ranger, can be transmitted into the EMS, using T/Rx units, to increase signal density and clutter to confuse adversary receivers and operators. T/Rx's ability to receive and record the EMS at the tactical edge and transport it back to Ranger for detailed analysis and processing at the CP or TOC provides greater understanding of the operational EMS at all echelons.

T/Rx Key Features


- Transmitter and receiver frequency coverage from 1 MHz to 18 GHz
- Up to 400 MHz instantaneous signal bandwidth
- Intuitive mobile device User Interface
- Compatible with Signal WorkShop signal waveform files used on the Ranger
- Can be operated from a mobile phone or tablet device directly connected to the T/Rx unit or remotely from any mobile device or computer on the network
- Interfaces with Ranger Sequencer software to schedule transmissions and recordings on multiple T/Rx units
- Flexible software defined radio architecture can be used for many applications
- Software Communications Architecture (SCA) framework enables rapid deployment of new features and applications
- Modular hardware separates the SDR from the power amplifier unit, allowing for customizable configurations
- Flexible mounting solutions for fixed installation as well as vehicle and dismount configurations
- Operates using standard BB-2590 batteries

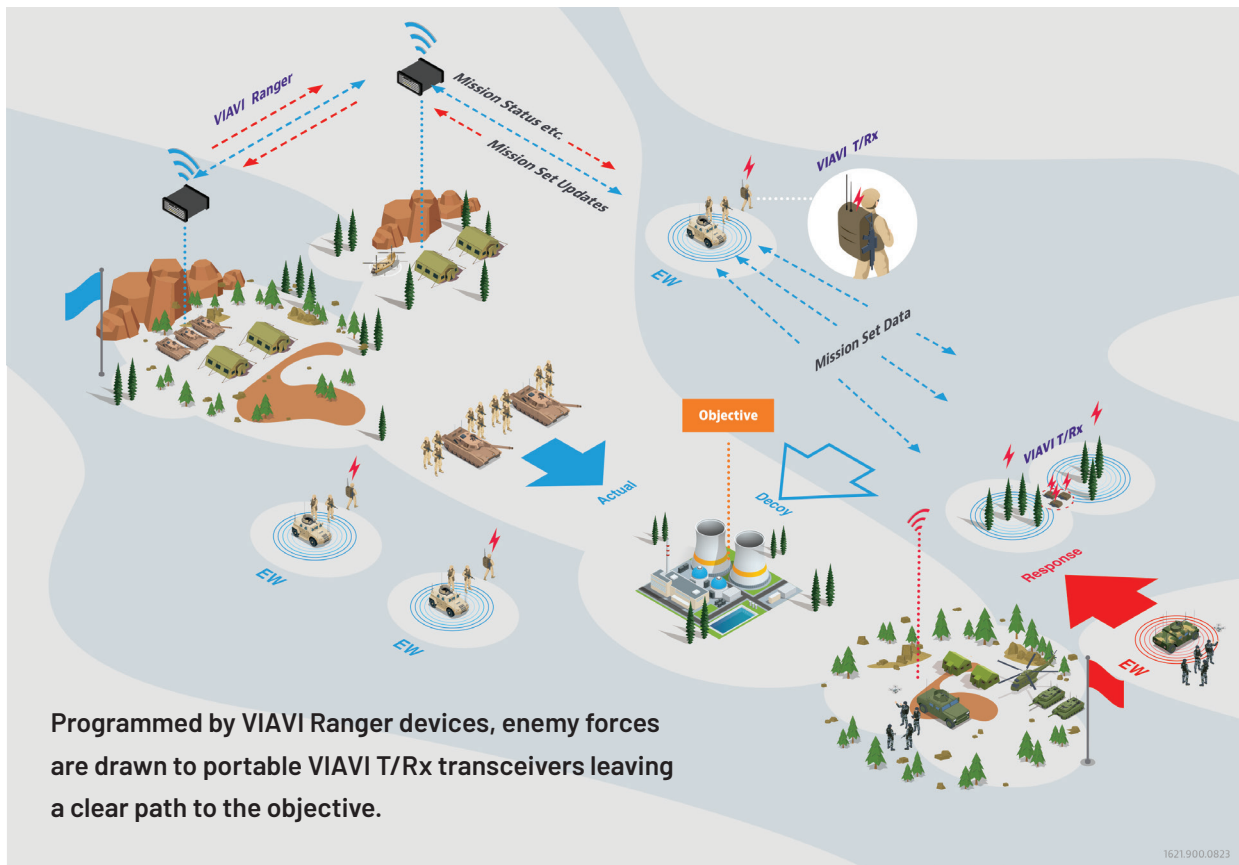
RANGER AND T/RX

Distributed EMS Monitor/Record/Transmit Platform working together to assist commanders in understanding, exploiting, and dominating the EMS as events change.

Passing recordings and synthetically generated waveforms from the Ranger to T/Rx units provides powerful capabilities to confuse adversary receivers by creating a false EMS at various geographical locations. Having networked reach-back capabilities to perform detailed analysis of remote T/Rx recordings on a Ranger is useful to multiple members of the command element at various echelons.

The combined capabilities to monitor, record, analyze, synthesize, and playback the Electromagnetic Spectrum, from the Command Post to the Tactical Edge, with one consolidated solution gives commanders control of the EMS to perform complex obfuscation missions. The combination of the Ranger and T/Rx Systems gives commanders an unparalleled ability to understand, control, exploit, and dominate the Electromagnetic Spectrum from anywhere in and around the Area of Operations.

 **The combined capabilities to monitor, record, analyze, synthesize, and playback the Electromagnetic Spectrum from one consolidated solution gives control of the EMS to the commanders to perform complex obfuscation missions.**



ECO SUITE

T/Rx software is based on the Software Communications Architecture (SCA) 4.1, the latest release of the SCA specifications from the Joint Tactical Networking Center (JTNC).

The SCA in conjunction with VIAVI eCoSuite Integrated Development Environment (IDE) provides capabilities to rapidly develop and deploy new features and complete applications to the T/Rx platform. The SCA is an open standard, developed by the international radio community to make the development of Software Defined Products more efficient, reducing development time and cost while also enabling more applications to be easily ported onto software defined platforms. This powerful capability gives the T/Rx platform the ability to rapidly grow and adapt to changing mission requirements.



eCoSuite software makes developing unique and complex applications for the T/Rx system easy, ensuring its flexibility in wireless communication domains such as electronic warfare (EW), signal intelligence (SIGINT), and Radar.



THE MULTI-MISSION ELECTRONIC WARFARE SUITE

EMS Sequencer software provides tools to schedule transmit and record operations on networked Ranger and T/Rx units. This software presents an intuitive user interface to schedule activities by placing tasks on a timeline associated with each Ranger or T/Rx unit.

Each task can be associated with a waveform file, gain/power level, frequency, number of iterations, and other parameters needed to create a complex vignette. When executed, EMS Sequencer coordinates the transfer of all required files and parameters while coordinating each task with precision timing.

When used with EMS Sequencer software, Ranger and T/Rx can be automated to create and monitor realistic and dynamic electromagnetic environments for obfuscation and training.

T/Rx and Mobile Application User Interface



Signal Workshop

Sequencer



Ranger





- 1 **Monitor** the EMS environment for unknown and friendly RF signatures, informing stakeholders/commanders of their effects on it over time.
- 2 **Record**, analyze and catalogue a library of RF signals of interest (SOIs) for use in other tests or exercises.
- 3 **Obfuscate** RF signatures to exercise equipment functions or confuse enemies by concealing the location and capability of maneuver elements.
- 4 **Interfere** with RF systems to test robustness of equipment or deny adversary use of communication systems.
- 5 **Train** commercial technicians and EW soldiers using real-world SOIs, exercising operator skills and equipment capabilities.

Ranger Specifications

6 GHz Vector Signal Generator	
Number of Channels	Configurable ¹
Frequency Range	100 kHz to 6 GHz
Instantaneous Bandwidth	200 MHz
Output Power	
RF Output Port	+10 dBm to -125 dBm
RF Duplex Port	-20 dBm to -150 dBm
Playback Time ^{2,3}	
Local Storage	2 seconds
9.6 TB Storage Module	2.6 hours
12.8 TB Storage Module	3.5 hours
6 GHz Vector Signal Analyzer	
Number of Channels	Configurable ¹
Frequency Range	100 kHz to 6 GHz
Instantaneous Bandwidth	200 MHz
Maximum Input Power	
RF Input Port	+10 dBm
RF Duplex Port	+40 dBm
Record Time ^{2,3}	
Local Storage	2 seconds
9.6 TB Storage Module	2.6 hours
12.8 TB Storage Module	3.5 hours
30 GHz Vector Signal Analyzer	
Number of Channels	Configurable ¹
Frequency Range	1 MHz to 30 GHz
Instantaneous Bandwidth	200 MHz
Maximum Input Power	
RF Input Port	+10 dBm
RF Duplex Port	+40 dBm
Record Time ²	
Local Storage	2 seconds
9.6 TB Storage Module	2.6 hours
12.8 TB Storage Module	3.5 hours
General	
Dimensions	432 mm (w), 177 mm (h), 435 mm (d) 17 in (w), 7 in (h), 17.1 in (d)
Weight	
6 GHz/6 GHz Single VST	18.5 kg (40.8 lb)
6 GHz/30 GHz Single VST	19.7 kg (43.4 lb)

Operating Temperature	0°C to 50°C
Storage Temperature	-40°C to 71°C
Humidity	50% at 40°C (MIL-PRF-28800F)
Altitude	3000 m
Functional Shock	30 G (MIL-PRF-28800F)
Random Vibration	5 Hz to 500 Hz (MIL-PRF-28800F)

¹ Multiple vector signal transceiver modules may be installed. The number of generators and analyzers must match.

² Stated at maximum bandwidth. Record time increases linearly with reduced bandwidth.

³ Playback and Record times are shared from a single data storage module.

T/Rx Specifications

Vector Signal Generator	
Number of Channels	2
Frequency Range	1 MHz to 18 GHz
Instantaneous Bandwidth	400 MHz
Output Power	+10 dBm to -57 dBm
Playback Time ^{1,2}	25 minutes
Vector Signal Analyzer	
Number of Channels	2
Frequency Range	1 MHz to 18 GHz
Instantaneous Bandwidth	400 MHz
Maximum Input Power	+20 dBm
Record Time ^{1,2}	25 minutes
Power Amplifier	
Frequency Ranger	
PA1	1 MHz to 30 MHz
PA2	20 MHz to 800 MHz
PA3	800 MHz to 6 GHz
PA4	6 GHz to 18 GHz
Output Power	
PA1	TBD
PA2	50 W
PA3	20 W
PA4	TBD

T/Rx Specifications (continued)

General	
Dimensions	See Drawings
Weight	See Table
Operational Temperature	MIL-STD-810H 502.7 Procedure II Operation -30°C to 60°C
Storage Temperature	MIL-STD-810H 502.7 Procedure I Storage -40°C to 70°C
Humidity	MIL-STD-810H paragraph 507.6: Hot-humid (Cycle B3) for non- hazardous items
Altitude	MIL-STD-810H paragraph 500.6: 4,600 m (15,000 ft) for operation/air carriage
Shock	MIL-STD-810H paragraph 516.8: 40 G/11 ms
Transit Drop	MIL-STD-810H paragraph 516.8: Procedure IV
Vibration	MIL-STD-810H paragraph 514.8: Minimum Integrity
Ingress Protection	MIL-STD-810H paragraph 512.6: Dust tight, Liquid immersion 1 meter/ 30 minutes
Fungus	MIL-STD-810H paragraph 508.8
Salt Fog	MIL-STD-810H paragraph 509.7
EMI/RFI	MIL-STD-461

¹ Stated at maximum bandwidth. Record time increases linearly with reduced bandwidth.

² Playback and Record times are shared from a common memory module.

T/Rx Weights

Module Weight	
Software Defined Transceiver	5.3 kg (11.6 lb)
Power Amplifier 1	TBD
Power Amplifier 2	5.5 kg (12.1 lb)
Power Amplifier 3	5.7 kg (12.5 lb)
Power Amplifier 4	TBD
Fan Assembly	0.5 kg (1.0 lb)
Battery Case	1.2 kg (2.6 lb)
Backpack Kit ¹	5.0 kg (11.0 lb)
Battery (BB-2590) ²	1.4 kg (3.2 lb)

¹ Manpack kit includes backpack, UI device, cables, and antennas.

² VIAVI Solutions does not supply the BB-2590 batteries.

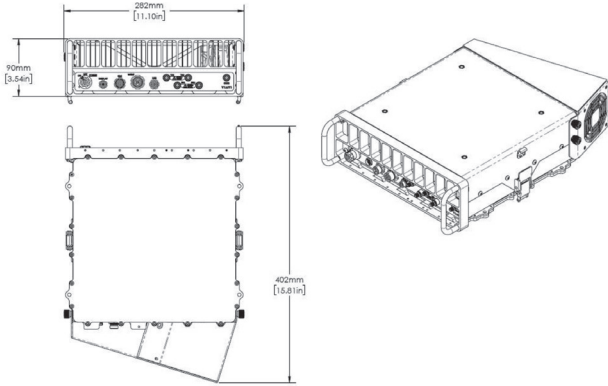
T/Rx Example Configuration Weights

Example Configuration Weight ¹	
Base Manpack (no PA)	11.9 kg (26.2 lb)
Manpack with PA 2	17.8 kg (39.3 lb)
Manpack with PA 3	18.1 kg (39.8 lb)
Fixed Installation (no PA)	
No Battery Case	5.7 kg (12.6 lb)
With Battery Case	6.9 kg (15.2 lb)
Fixed Installation (with PA 2)	
No Battery Case	11.7 kg (25.7 lb)
With Battery Case	12.8 kg (28.3 lb)
Fixed Installation (with PA 3)	
No Battery Case	11.9 kg (26.2 lb)
With Battery Case	13.1 kg (28.8 lb)

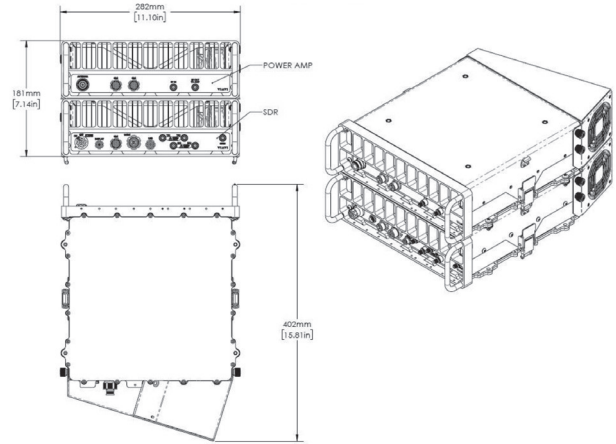
¹ The battery case will enclose 1 to 3 BB-2590 batteries. The weight of batteries not included in the example configuration weights.

SDT Module

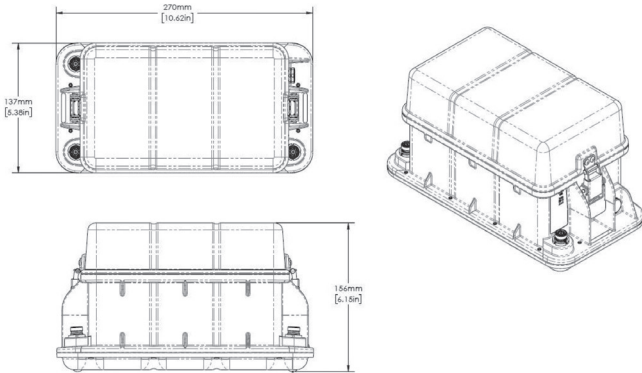
(The Power Amp is identical in size)



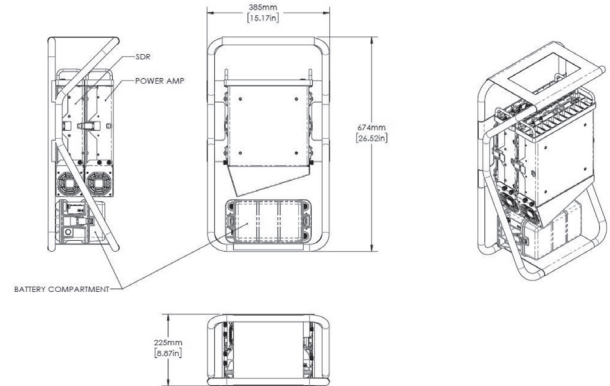
SDT and Power Amp Modules Mounted Together



Battery Compartment



SDT, Power Amp and Battery Compartment Mounted on Frame





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