

# VENUS RADIO

The versatile **Venus Radio** is capable of operating all Ondas Radio Software Applications including the IEEE 802.16s and 802.16e air interface protocols and operate as a Base Station, Fixed Remote or Mobile Remote Radio.

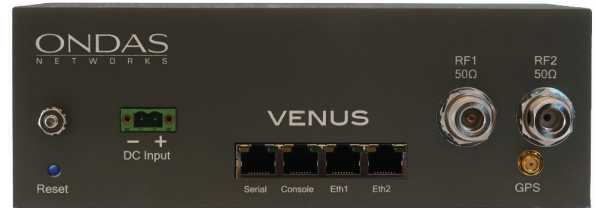
Venus' compact anodized aluminum enclosure hosts three state-of-the-art circuit boards including a powerful **Communications Baseband Board (CBB)**, a wide-ranging **DC Power Supply Unit (PSU)** board and a **Radio Frequency Module (RFM)** board.

Venus' modular hardware can be configured with an RFM board supporting frequency bands from as low as 70 MHz up to 6 GHz. Configured as either a base station or a remote radio, the Venus platform supports flexible channel sizes from 12.5 kHz up to 10 MHz.

The Venus platform supports transmit power up to 4 Watts (36 dBm) at the antenna port with exceptional receiver sensitivity as low as -117 dBm. The combination of transmit power, excellent receiver sensitivity, flexible channel sizes and frequency agility provide for exceptional range within a point-to-multipoint wireless topology with the capability of 30+ mile non-line-of-sight connectivity range.

The passive cooling heatsink design supports operation in environments from -40°C to +70°C without the need for cooling fans. The platform is designed for a 15-year life cycle and operations in conditions of high electromagnetic interference (EMI). Venus complies to the IEEE 1613 standard for operation in electric power substation and is compliant with Class 1, Division 2 for hazardous environments. Combined with a variety of application software and frequency and channel size independence, the Venus platform ensures performance capability today with the flexibility to meet tomorrow's requirements.

When connected to a Ondas Base Station, the Venus radio serves as a remote Ethernet bridge with QoS support from the Ondas Base Station. Venus remote radios can be deployed alongside Mercury endpoint radios which serve low data rate intelligent devices, but with greater range and throughput capability.



**Compact Form Factor with up to 36 dBm (4 Watts) Tx Power Functions as Base Station, Fixed or Mobile Remote Security includes AES 256 VLAN AAA Radius**

## Key characteristics of the Ondas MC-IoT architecture:

### Sector Bandwidth

The bandwidth available in the sector may consist of a contiguous band or an aggregation of multiple adjacent or nonadjacent channels, including Private Land Mobile Radio (PLMR).

### Sub-channels

The sector bandwidth is partitioned into multiple sub-channels. When the sector bandwidth consists of multiple adjacent or nonadjacent PLMR channels, the individual PLMR channels will be configured as sub-channels.

### Aggregate

The Ondas Base Station will operate over the entire channel while Mercury will operate over a single sub-channel. Venus Remote Radio may operate over multiple sub-channels.

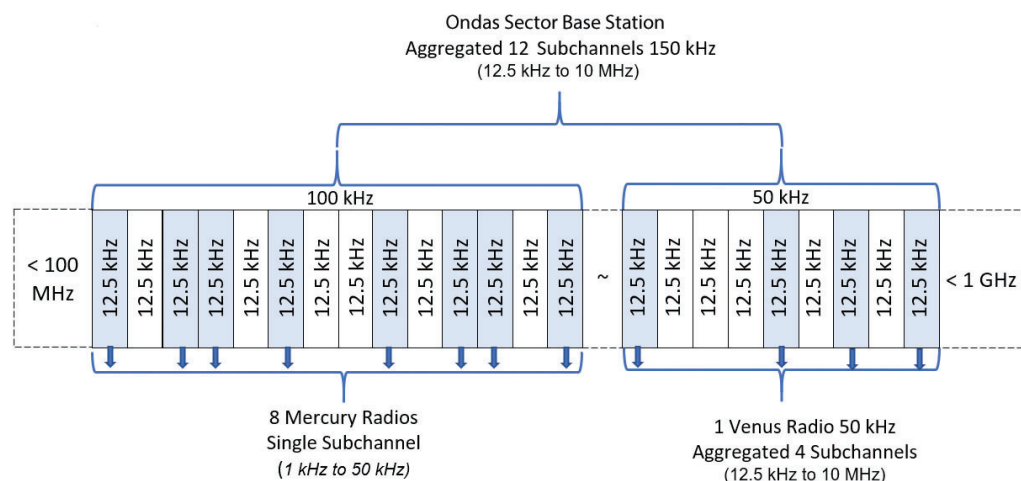


Diagram 1: Ondas MC-IoT Architecture

RADIO SPECIFICATIONS	
Frequency Range	70 MHz to 6 GHz
Channel Sizes	12.5 kHz to 10 MHz
Throughput	Up to 10 Mbps
TX Power	36 dBm @ Antenna Port
Rx Sensitivity	As low as -117 dBm
Waveform	OFDMA
Modulation	QPSK, 16-QAM, 64-QAM
FEC in downlink direction	Convolutional Coding (CC) with rates 1/2, 2/3, & 3/4
FEC in uplink direction	Convolutional Turbo Coding (CTC) with rates 1/2, 2/3, 3/4, 5/6
Duplex Method	TDD
Topology	Point to MultiPoint, Point to Point
Air interface protocol	Band AMC 1x6 as per IEEE 802.16s for Channel bandwidth > 12.5 kHz
Modulation Coding Scheme selection	Dynamically Adjusted
QOS	Best effort, Real time polling service
CONNECTORS / INTERFACES	
DC Input	Phoenix 1777989
Grounding Terminal	10-32 Thread Screw
Serial Data	RJ45 8/8 Jack - Cisco Serial
Console CLI	RJ45 8/8 Jack - Cisco Serial
Ethernet (X2)	RJ45 8/8 Jack
Antenna Port RF1	Type N Female Connector
Antenna Port RF2 <sup>(1)</sup>	Type N Female Connector
GPS	SMA Jack Female Connector
LCD Display	16x2 Backlit

(1) Antenna Port RF2 is RFU (Reserved for Future Use)

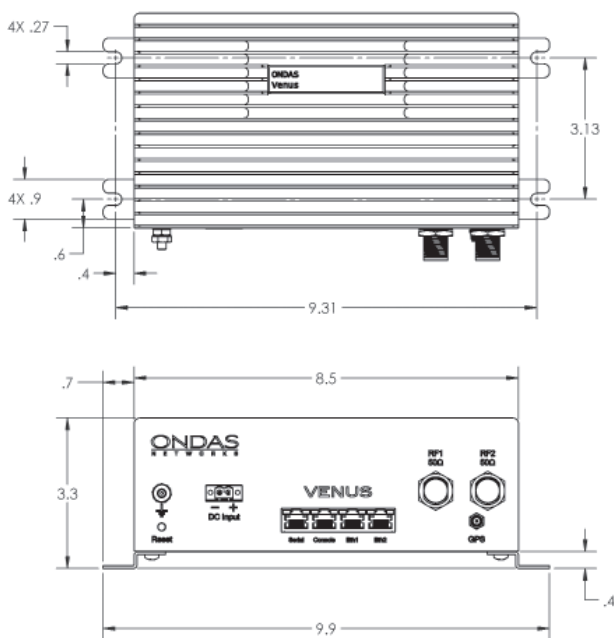
PHYSICAL CHARACTERISTICS	
RF Antenna (2X)	50Ω
GPS	Active 5VDC
Power Input	18 to 60 VDC
Data interface	100 Base T, RS232
Power Consumption	30 W (1.25A @ 24V input) Peak
Indicators	LCD Panel, Power
Dimensions	9.9" x 4.8" x 3.3" (252mm x 122mm x 84mm)
Weight	4 lbs. 2 oz (1.9 kg)
Enclosure Protection Rating	IP 50 Standard
Operating Temperature	-40° C to +70° C

SECURITY FEATURES	
AES-256 Traffic Encryption	
Three-way Handshake Over the Air Rekeying (OTAR)	
EAP-TLS Based Authentication with X.509 Certificate and RSA-4096 Public Key Encryption	
Hardware Based Secure Boot at the Root of the "Chain of Trust"	
NIST Certified Hardware Random Number Generator	
Memory Protection and Access Rights Limitation for Security Robustness	
Trusted Updates: Authenticated and Validated Upgrades and Configuration Changes	
Security Patch Management	
Secured SNMPv3 Remote Management	
SSHv2 Local Management	
Security Events Monitoring, Audit Ready	

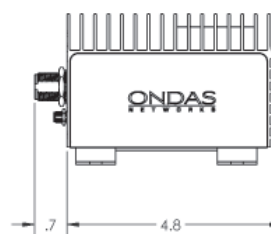
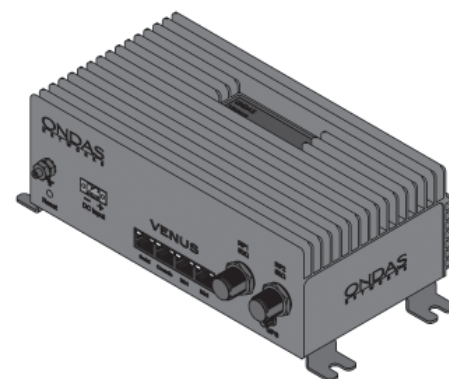
COMPLIANCE	
IEEE 802.16s, IEEE 1613, Class 1 Division 2	

Specifications subject to change.

### Physical Dimensions



DIMENSIONS ARE IN INCHES  
THIRD ANGLE PROJECTION



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