

VENUS

SOFTWARE DEFINED RADIO

ONDAS
NETWORKS

The versatile **Venus Radio** is an IEEE 802.16t compliant radio which is utilized in Point-to-Multipoint and Direct Peer-to-Peer architectures. Venus can operate as a base station, fixed remote, mobile remote, or as a direct peer-to-peer 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 1 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 -126 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 any 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 radios may operate over multiple sub-channels.

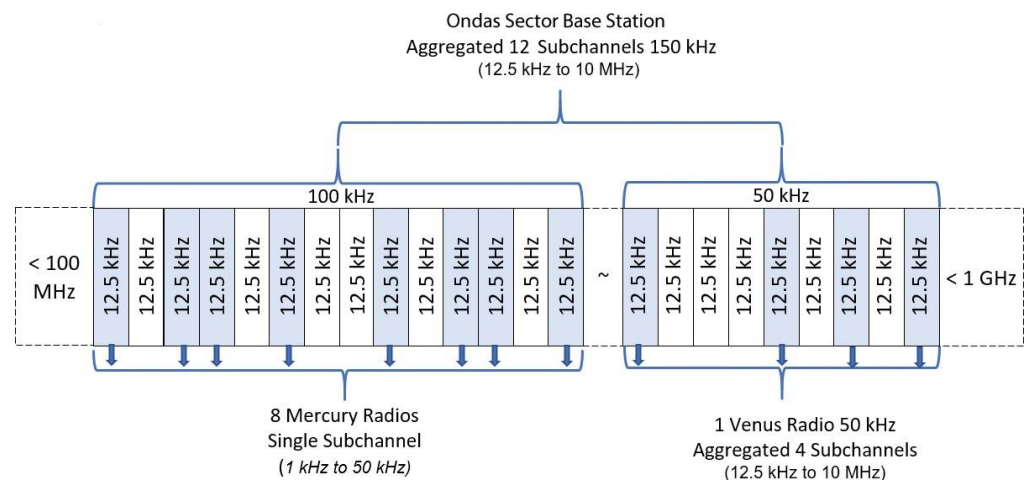
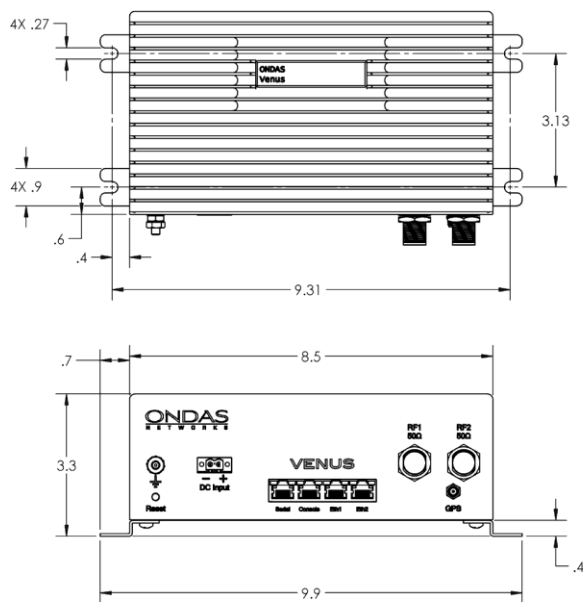


Diagram 1: Ondas MC-IoT Architecture

RADIO SPECIFICATIONS	
Frequency Range	70 MHz to 1 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 -126 dBm
Waveform	OFDMA
Modulation	QPSK, 16-QAM, 64-QAM
FEC in Downlink Direction	Convolutional Coding (CC) with rates 1/2, 2/3, & 3/4 Convolutional Turbo Coding (CTC) with rates 1/2, 2/3, 3/4, 5/6
FEC in Uplink Direction	Convolutional Coding (CC) with rates 1/2, 2/3, & 3/4 Convolutional Turbo Coding (CTC) with rates 1/2, 2/3, 3/4, 5/6
Duplex Method	TDD
Topology	Point to MultiPoint, Direct Peer-to-Peer
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 Unsolicited Grant Service (UGS)
CONNECTORS / INTERFACES	
DC Input	Phoenix 1777989 plug
Grounding Terminal	10x32 thread screw
Console	RJ45 Cisco serial
Serial Data	RJ45
Ethernet	2 X RJ45 (10/100 Mb)

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

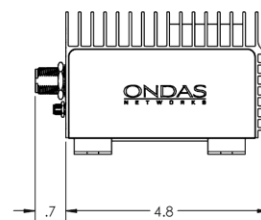
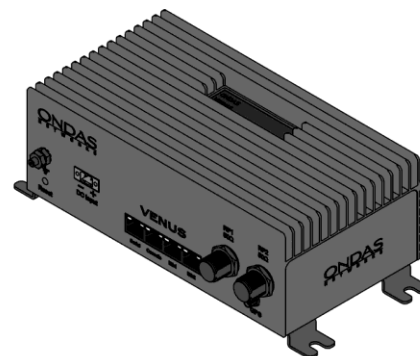
Physical Dimensions



DIMENSIONS ARE IN INCHES
THIRD ANGLE PROJECTION

PHYSICAL CHARACTERISTICS	
RF Antenna (2X)	50Ω
GPS Antenna	Active 3.3VDC
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	

Specifications subject to change.



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