



# Virtual Fiber™ Product Overview

October 2022

# Product Portfolio

## Industrial

Base Stations



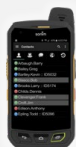
Fixed Wireless Access



Nomadic



Mobile



## Commercial

Base Stations



Fixed Wireless Access



## Accessories

Antennas



Cables



Mounting Kits



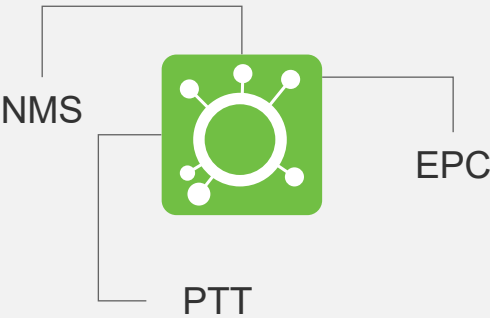
PoEs



Surge Protectors

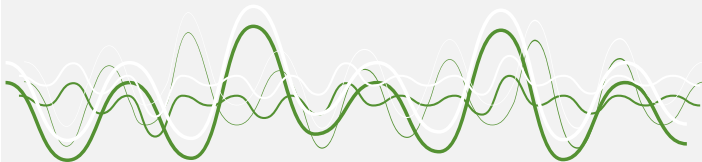


## Software



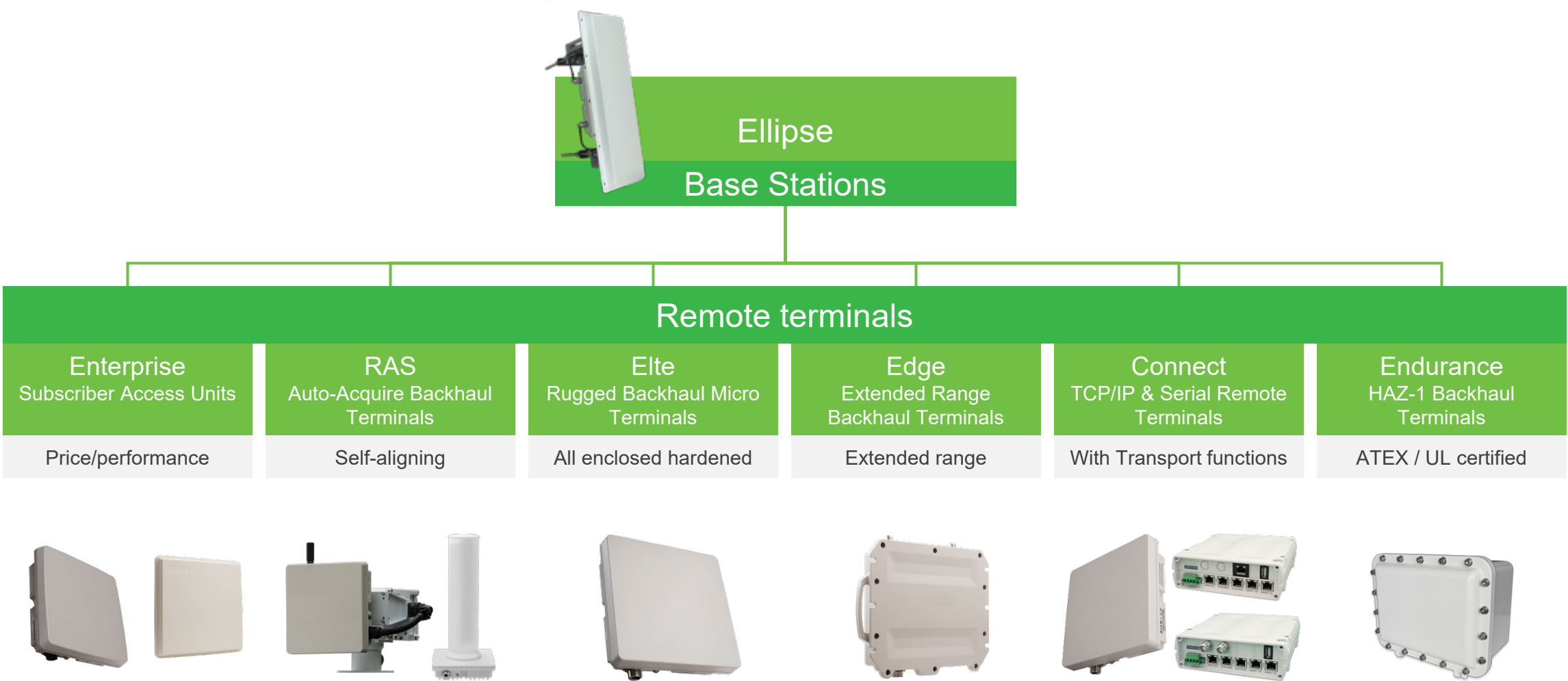
## Frequencies

Virtual Fiber™: 470 to 5875 MHz  
LTE: 3GPP Band Classes



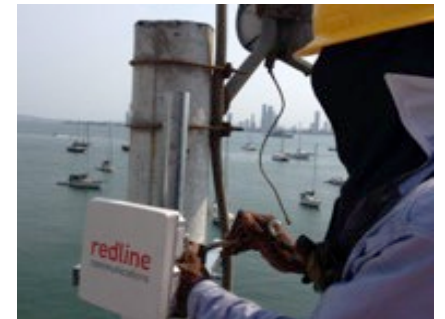
# Wireless Access Solutions

# The Virtual Fiber™ Product Family



# Designed for both Backhaul & Access Networks

- High synchronous data speeds – up to 440Mbps bidirectional traffic
- Point-to-Point & Point-to-Multipoint (Software Defined)
- Small (8"/20cm) or Large (14"/35cm) integrated antenna
- First self-aligned nomadic backhaul remote
- RAS-Extend provides mechanically steered wireless platform for longer links



Aviat's Virtual Fiber™ delivers increased data performance to remote sites over wide area and rugged terrains.

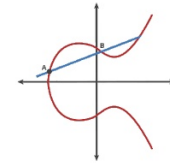
# Designed for both Backhaul & Access Networks cont.

- Industrialized radio for extreme environments up to -40C to +75C
- Support spectrum licensed & licensed exempt from 450MHz to 6GHz
- Security hardened: AES-256 bit encryption, ECDSA
- Serial to IP ethernet gateway with external or built-in radio option available
- Available Zone 1 & Zone 2 Hazloc rated products



**ECDSA**

Elliptic Curve Digital Signature Algorithm

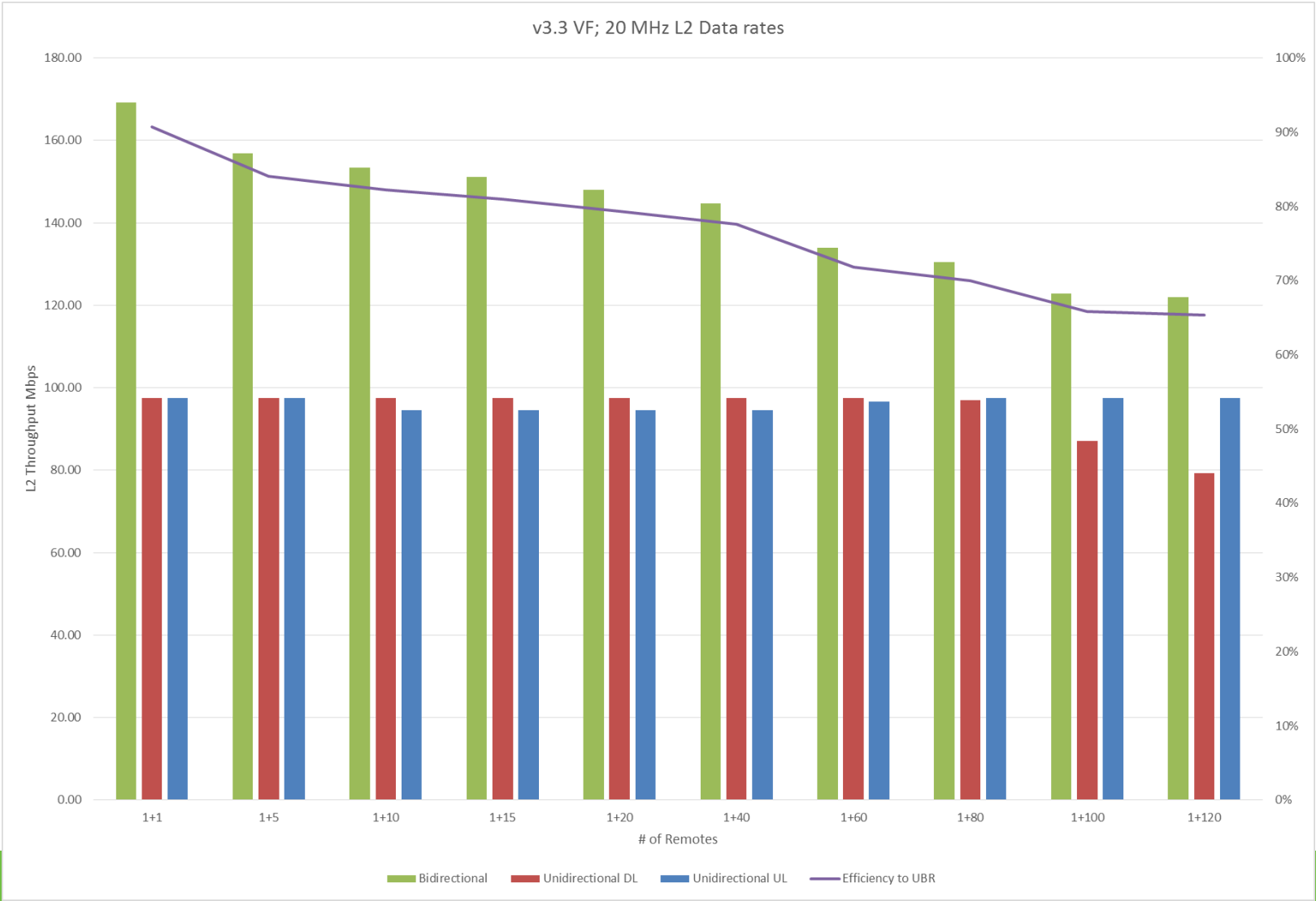


# RDL 3000 Technical details

# Spectrum Efficiency

- Up to 9.3 bits/sec/Hz
  - Provides up to 93% capacity efficiency for PMP
- Supported channel sizes
  - 0.875/1.25/1.75/2.5MHz
  - 3.5/7/14MHz
  - 5/10/20MHz
  - 6/8/12/16MHz for TVWS
- Improved frequency re-use
  - Fixed frame & synchronization
  - Higher noise rejection with Tx/Rx filtering

# Capacity





# Simple Network Integration

- Support for L2 architecture
  - Provides for transparent access & minimal operator configuration
- Multiple services support
  - Addresses focused market verticals
- Extensive VLAN support including
  - 802.1p
  - 802.1Q
  - Radio-wide filtering
  - Provides for differentiated services & prioritized traffic streams
- Support for HTTP, Telnet & SNMP
- Over the air encryption supporting AES 128/256
- Secure user interfaces include
  - HTTPS, SSH & SNMPv3

# Managing Interference – Maximizing Range & Capacity

Fusion fast  
algorithm for link  
adaptation

Addresses fast fading &  
bursty interference  
conditions

Fully scheduled  
MAC

Control intra-system  
interference for predictable  
data-rates

Fast dynamic  
ARQ with hitless  
ACM

Provides improved signal-to-  
noise for higher capacity

ATPC for  
managing intra-  
system  
interference

Allows for configurable  
transmit power to support  
what is required for link  
capacity target

Automatic  
ranging and  
windowing

Allows for maximum data  
rates based on link  
conditions

MIMO A/B with  
STBC & MRRC

Improves performance for a  
more robust wireless link

Fixed-frame  
support with  
integrated GPS  
receiver

Improves spectrum  
efficiency with ability to  
manage intra-system  
interference

Smaller channel  
sizes

Supports congested RF  
environments

Highest quality  
RF and antenna  
designs

Inherent radio, antenna  
design & rejection of  
unwanted signals that could  
reduce link capacity

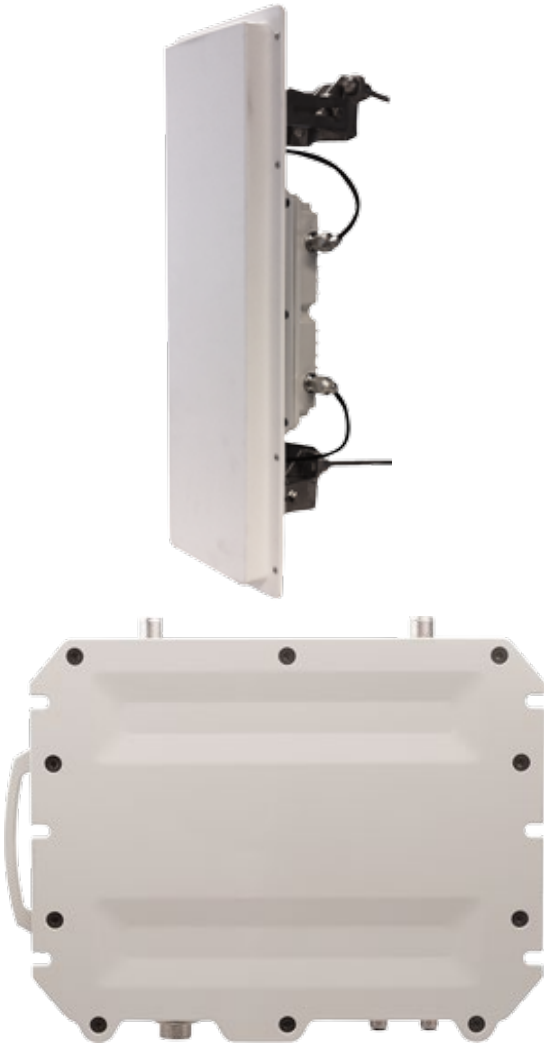
# Environmental Benefits

- Operational in harsh environments
  - Nickel plated housings and connectors
  - Stainless steel fasteners
  - Polycarbonate radome
  - A360 Aluminum housing
- MTBF
  - > 271,560 hours (more than 31 years)

# Ellipse Sector Controller

# Ellipse Base Station

Model	Ellipse XP
Technology	OFDM + 2 x 2 MIMO + TDD
Hardware	FPGA
Frequencies	4.9 – 5.8 GHz , 3.3 – 3.8 GHz , 2.3 – 2.7 GHz , 2.0 – 2.3 GHz 470 – 698 MHz (Standard Power & High Power)
Modulation & Coding	256QAM7/8, 256QAM5/6, 256QAM3/4, 256QAM2/3 64QAM3/4 , 64QAM2/3, 16QAM3/4, 16QAM1/2, QPSK3/4, QPSK1/2, BPSK1/2
Combined Transmit Power (model & regulatory dependent)	2 x +25 dBm/+26 dBm/+31 dBm UHP 2 x +38.5 dBm
Data Capacity/Sector	186.6 Mbps UBR (20 MHz)
Channels	0.875, 1.25, 1.75, 2.5, 3.5, 5, 6, 7, 10, 12, 14, 20 MHz
Processing Power	>280,000 PPS
Ethernet Interfaces	Ethernet 10/100 BaseT 802.3at Type 2 Class 4
Power	PoE Accepts Either ALT A (1/2 & 3/6) or B (4/5 & 7/8) 36-57 VDC Input , <17W
GPS Receiver	Internal – Location and Sync
Connectors	RJ45 PoE ; 2 x N-(f) ; 1 x TNC-(f)
Environmental	-40C to +75C, IP67
Size and Weight	2.7 Kg – 6 lbs.



# Ellipse Sector Controller

- Software defined radio
- TDD system
- Variable or fixed frame traffic profiles
  - 50/50 – symmetrical
  - 25/75 – uplink centric
  - 75/25 – downlink centric
  - Support for 5/10msec frame size
- Up to 120 remote terminals
- Support for redundancy to improve uptime
- Optional HazLoc version available

# Ellipse Pre-Provisioning of Services

- Up to 16 service templates
- CIR and PIR uplink and downlink
- Based on Subscriber Unit ID – Service Template ID (STID)
- Shared across all sector controllers
- Created and distributed through SNMP
- Automatic frequency scanning with up to 32 channels or frequency ranges
- Up to 8 Services supported per remote unit
- Total of 160 services available per sector controller

# Ellipse Ultra High Power (UHP) Base Station

Model	Ellipse
Technology	OFDM + 2 x 2 MIMO + TDD Fixed-frame mode
Node Type	Sector Controller; Remote Terminal; PTP
Hardware	FPGA
Frequency	3.4 to 3.65 GHz
Modulation & Coding	256QAM7/8, 256QAM5/6, 256QAM3/4, 256QAM2/3 64QAM3/4 , 64QAM2/3, 16QAM3/4, 16QAM1/2, QPSK3/4, QPSK1/2, BPSK1/2
Combined Transmit Power	Up to +41 dBm (varies regulatory restrictions)
Data Capacity/Sector	186.6 Mbps UBR (20 MHz)
Channels	5, 6, 7, 10, 12, 14, 20 MHz
Processing Power	>280,000 PPS
Ethernet Interfaces	Ethernet 10/100 BaseT
Power	48 VDC, 140W
GPS Receiver	Internal – Location and Sync
Connectors	RJ45 Data ; 2 x N-(f) ; 1 x TNC-(f) ; 1x 2-pin DC
Environmental	-40C to +60C, (-40F to 140F)
Size and Weight	505 x 268 x 166 mm (19.878 x 10.563 x 6.537 in) 10.2 Kg (22.5 lb)





# Ellipse Ultra High Power (UHP) Sector & Remote

- Optimal solution for long range connections or high-power base station with Omni antenna
- More cost-effective solution than tracking systems
- Minimal maintenance – no annual preventative maintenance of cleaning
- Higher MTBF – no moving parts
- Support for slant-45 Omni antennas with wider elevation beamwidth
- Currently available for 3400-3650MHz with 2 x +38.5 dBm (7 watts)



# Base Station Antennas

- 90-degree sector and Omni options
- Single antenna will provide full radio band coverage
  - 470-698 MHz
  - 2000-2300 MHz
  - 2300-2700 MHz
  - 2000-2300 MHz
  - 3300-3800 MHz
  - 4900-5900 MHz
- Support for vertical and horizontal polarization
- Embedded high performance GPS antenna
- Flying cable leads for all RF and GPS Antenna connections to radio
- Radio mounts directly to antenna



# Industrial Remote Terminals

# RDL 3000 Connect Overview

- Ruggedized software-defined industrially hardened wireless terminal
  - Multiple options to support all-outdoor or all in-cabinet installation
  - Low power consumption solution with dual-DC inputs
- Support for multiple frequency bands with MIMO
- Extended temperature range -40°C to +75°C
- Platforms available for HazLoc locations
- Standards-based providing interoperability with other systems
  - TCP/IP, Ethernet, Serial, SCADA, and sensor devices
- Option for integrated multi-port serial server and Ethernet switch
  - Provide for cost-effective serial and Ethernet communications in a single platform

# RDL 3000 Models

## Connect OW-ER

TCP/IP Only  
Outdoor Wireless  
In-cabinet PoE



## Connect OWS

TCP/IP + Serial  
Outdoor Wireless  
In-cabinet PoE & Serial Server



## Connect IWS

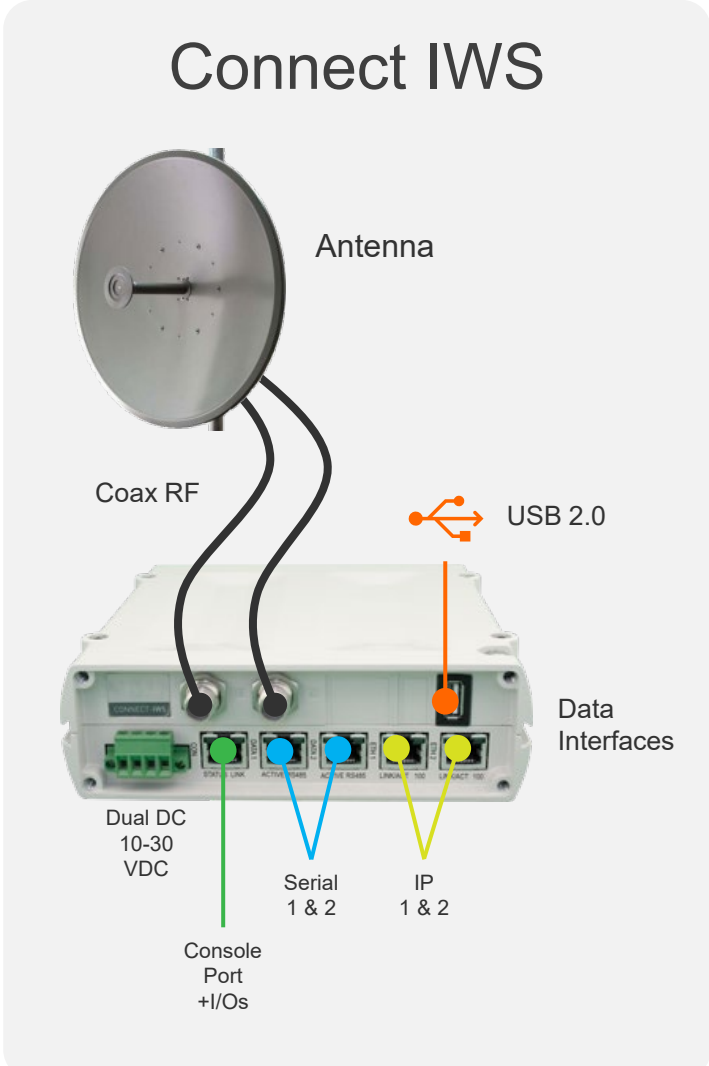
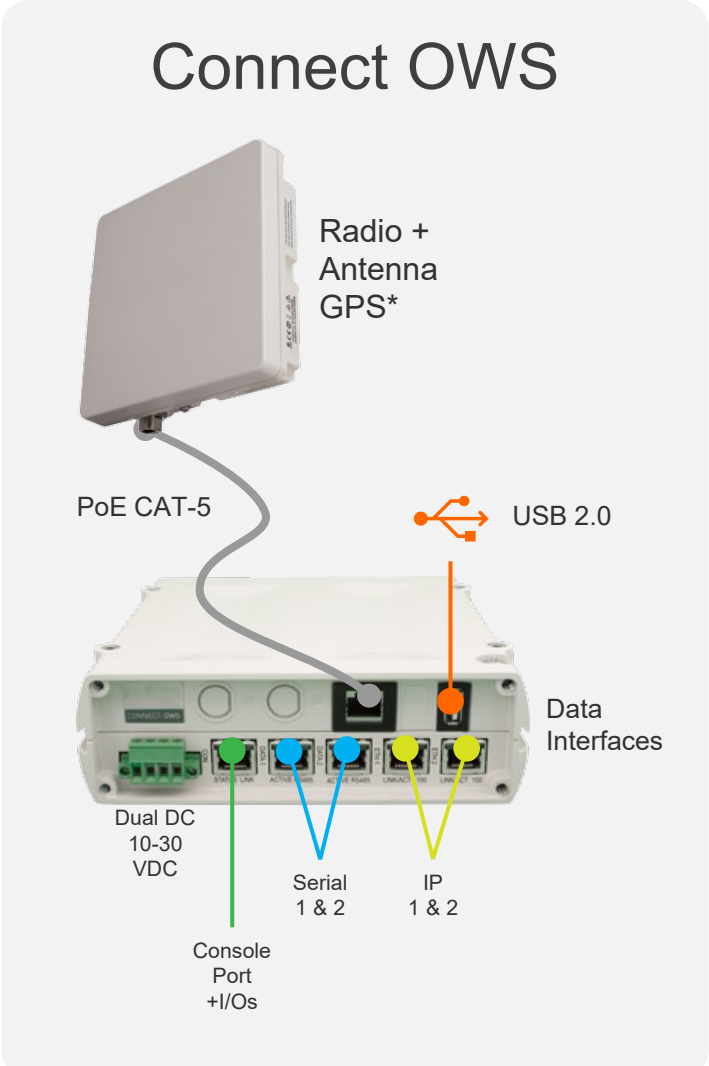
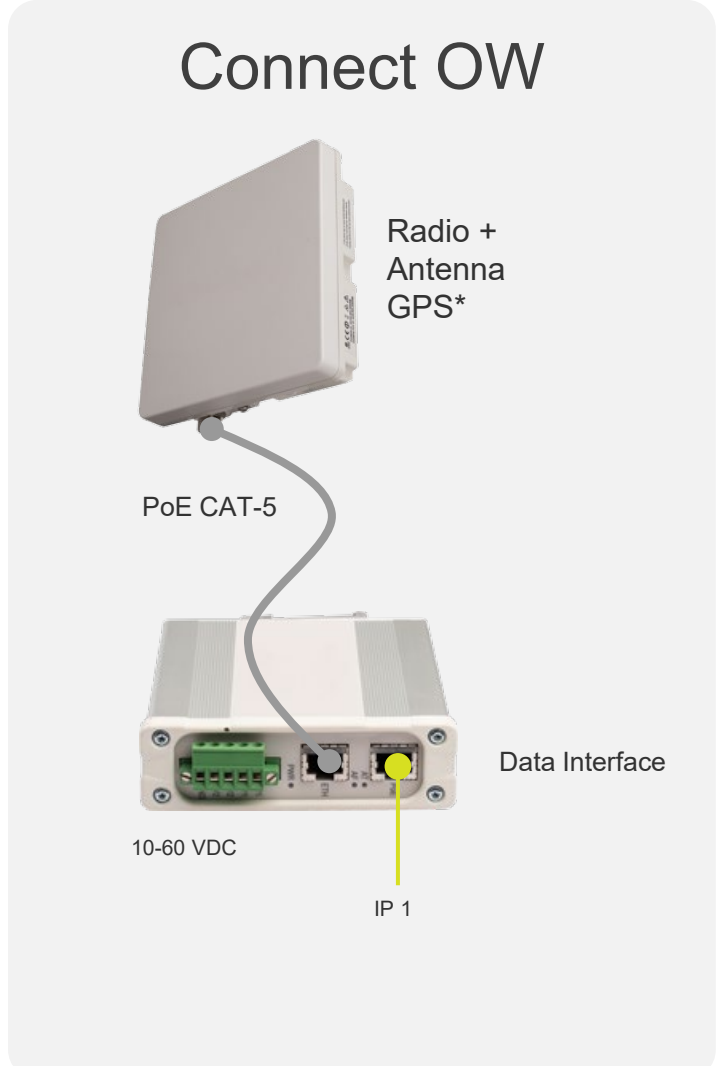
TCP/IP + Serial  
Outdoor Antenna  
In-cabinet Wireless & Serial  
Server



# RDL 3000 Models

Model	Connect-OW-ER	Connect-OWS	Connect-IWS
<b>Type</b>	TCP/IP Only Outdoor Wireless In-cabinet PoE	TCP/IP + Serial Outdoor Wireless In-cabinet PoE & Serial Server	TCP/IP + Serial Outdoor Antenna In-cabinet Wireless & Serial Server
<b>Technology</b>	OFDM + 2x2 MIMO A&B Integrated Antenna	OFDM + 2x2 MIMO A&B Integrated Antenna	OFDM + 2x2 MIMO A&B External Antenna
<b>Frequencies</b>	4.9 – 5.8 GHz 3.3 – 3.8 GHz 2.3 – 2.7 GHz 2.0 – 2.3 GHz 470 – 698 MHz	4.9 – 5.8 GHz 3.3 – 3.8 GHz 2.3 – 2.7 GHz 2.0 – 2.3 GHz 470 – 698 MHz	4.9 – 5.8 GHz 3.3 – 3.8 GHz 2.3 – 2.7 GHz 2.0 – 2.3 GHz 470 – 698 MHz
<b>L2 Data Throughput</b>	10/50/Unlimited Mbps*	10/50/Unlimited Mbps*	10/50/Unlimited Mbps*
<b>Security</b>	AES128/256 Data HTTPs, SSH, SNMPv3 RADIUS User Authentication	AES128/256 Data HTTPs, SSH, SNMPv3 RADIUS User Authentication	AES128/256 Data HTTPs, SSH, SNMPv3 RADIUS User Authentication
<b>Serial Ports &amp; Protocols</b>	None	(2) RJ-45 Ports RS232/485 MODBUS MDLC over TCP/IP	(2) RJ-45 Ports RS232/485 MODBUS MDLC over TCP/IP
<b>Management</b>	WEB / CLI / SNMP / NMS	WEB / CLI / SNMP / NMS	WEB / CLI / SNMP / NMS
<b>Environmental</b>	Surge Protected Outdoor: IP68 Certified, -40C to +75C In-cabinet: IP40, -40C to +75C	Surge Protected Outdoor: IP68 Certified, -40C to +75C In-cabinet: IP40, -40C to +75C	Surge Protected In-cabinet: IP40, -40C to +75C
<b>Hazardous Rating</b>	ATEX Zone 2, IECEx - UL Class 1 / Div 2	ATEX Zone 2, IECEx - UL Class 1 / Div 2	ATEX Zone 2, IECEx - UL Class 1 / Div 2
<b>Power</b>	Dual Input: 10-60VDC / <17 W***	Dual Input: 10-30VDC / <17 W***	Dual Input: 10-30VDC / <17 W***

# Supported Configurations



\*GPS Receiver optional

# Connect OW-ER Terminal Unit

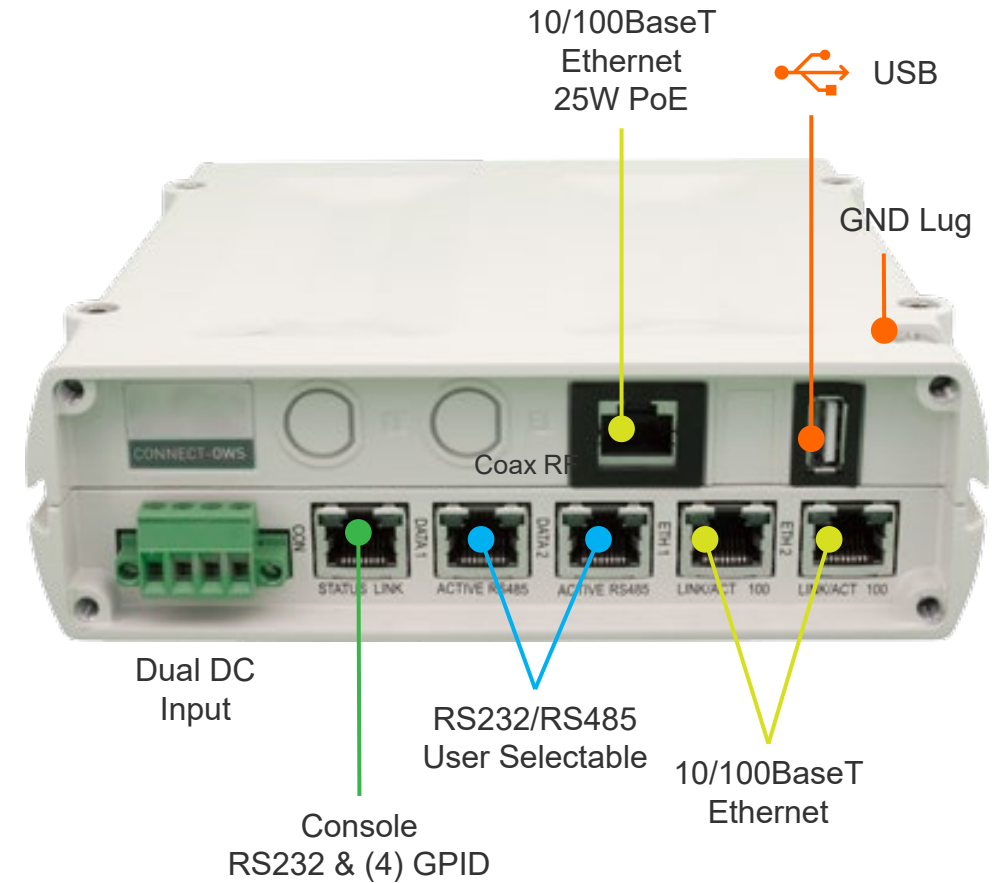
- Supported transmit power
  - 5 GHz up to +22 dBm
  - 3/2 GHz up to +23 dBm
  - 2L GHz and UHF up to +28 dBm
- Industrial grade interfaces & connectors
- 2 x N-female connectors to support variety of antennas
  - Parabolic, Omni, flat panel, etc.
  - Separate mounting kit with RF jumpers





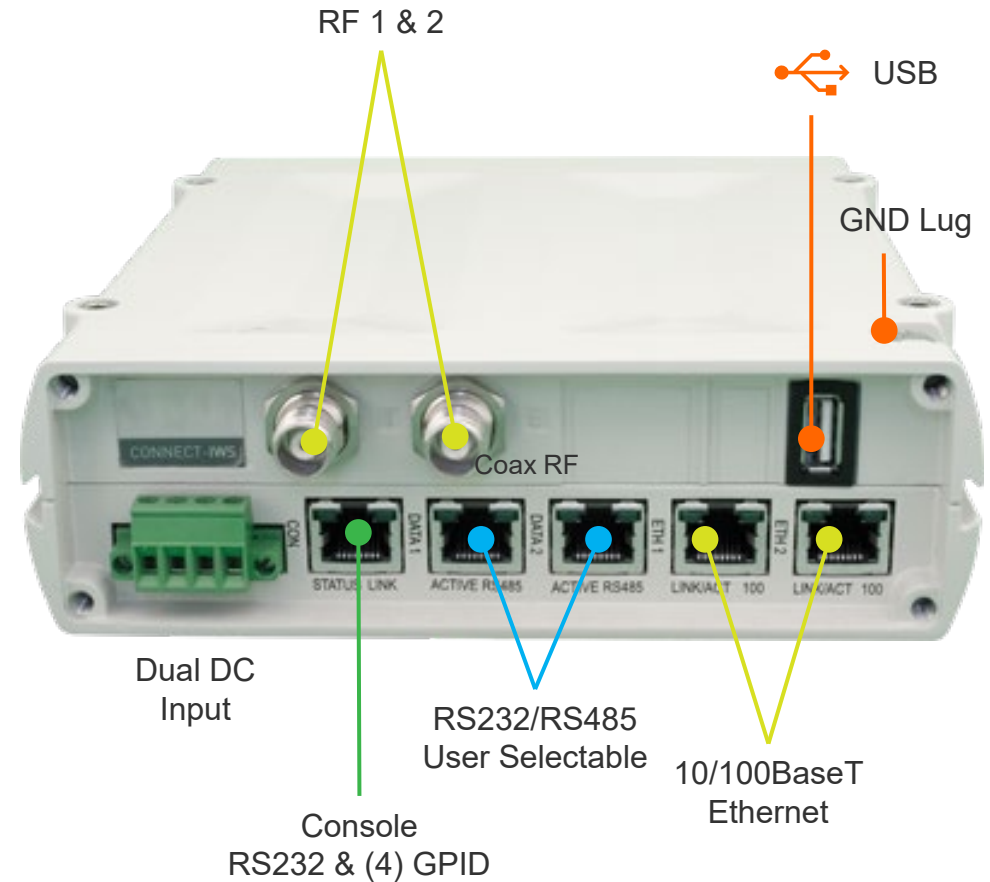
# Connect OWS (Outdoor Radio w/ in-Cabinet Serial Server)

- Solution includes
  - Outdoor radio with cable gland and mounting bracket
  - In-cabinet DC PoE + Serial Server
  - Separate DIN-mount surge arrestor
- Optional outdoor installation kit
  - Used when no space available in cabinet



# Connect IWS (in-Cabinet Radio & Serial Server)

- Solution includes
  - In-cabinet radio + serial server
  - Two (2) RF N-(f) to N-(f) lightning protector
  - Two (2) RF SMA-(m) to N-(m) jumper cable
  - Antenna + required coax jumpers (separate)



# Industrial DC-DC PoE Injector

- Aviat engineered, designed and manufactured
  - Compact industrial design
  - 10 to 60 VDC input range
  - Redundant DC power input
  - IEEE 802.3af/at compliant
  - 10/100/1000 Base-T Ethernet
  - DIN rail mount
  - Temperature range supported -40° to +75° C (-40° to +167° F)
  - Transient voltage suppression
  - Optional HazLoc
    - ATEX Zone 2, IECEx Zone 2 & UL/CSA C1D2



# Commercial CPE Units

# Enterprise Models

Model	Enterprise-CPE	Enterprise-XR	Enterprise-RF
Type	CPE Remote or PTP	CPE Remote or PTP	CPE Remote or PTP
Technology	OFDM + 2x2 MIMO A&B	OFDM + 2x2 MIMO A&B	OFDM + 2x2 MIMO A&B
Frequencies	4.9 – 5.8 GHz 3.3 – 3.8 GHz 2.5 – 2.7 GHz	4.9 – 5.8 GHz 3.3 – 3.8 GHz 2.5 – 2.7 GHz	4.9 – 5.8 GHz 3.3 – 3.8 GHz 2.5 – 2.7 GHz 470 - 698 MHz
EiRP	5 GHz - Up to +44 dBm* 3.5 GHz - Up to +41 dBm* 3.5 GHz - Up to +41 dBm*	5 GHz - Up to +49 dBm* 3.5 GHz - Up to +48 dBm* 3.5 GHz - Up to +48 dBm*	External Antenna
Data Throughput	100 Mbps*	100 Mbps*	100 Mbps*
Encryption	AES-128/256	AES-128/256	AES-128/256
Antenna	Embedded	Integrated	External
Environmental	IP67 Certified	IP67 Certified	IP67 Certified
Power	RJ45 PoE 36-57 VDC Input , <17W	RJ45 PoE 36-57 VDC Input , <17W	RJ45 PoE 36-57 VDC Input , <17W
Operating Temperature	-40C to +60C	-40C to +60C	-40C to +60C
Size	8 x 8 x 2.5 in 200 x 200 x 63.5 mm	14.5 x 14.5 x 2.8 in 370 x 370 x 71 mm	12.1 x 9.1 x 2.4 in 306.8 x 230 x 60.3 mm

# Enterprise CPE Overview

- Optimized for commercial applications
- Support for both PMP or PTP
- Embedded, integrated or external antenna options
- Supported transmit power
  - 5GHz up to 2 x +22 dBm
  - 3.5/2.5GHz & 600MHz up to 2 x +23 dBm
- Software includes the following
  - Rapid auto-provisioning
  - Enhanced video burst handling
  - AES 128/256 wireless encryption
  - Secure user interfaces include HTTPS/SSH/SNMPv3
- Variety of capacity rates controlled through option keys



# Enterprise PMP CPE Bundled Solution Offerings

## Enterprise CPE

Embedded Antenna



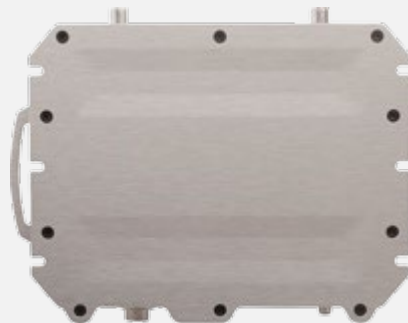
## Enterprise XR

Integrated Antenna

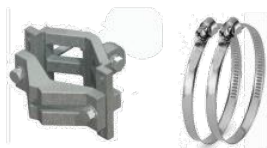


## Enterprise RF

RF connectors to support external antennas



Included with radio:



Lightweight Mounting Kit



Ethernet Port Gland



AC PoE Power Adapter

# Enhanced Security Terminals



# Elte & Edge Models

Model	Elte	Edge
Type	Premium Terminal or PTP	Premium Terminal or PTP
Technology	OFDM + 2x2 MIMO A&B	OFDM + 2x2 MIMO A&B
Frequencies	4.9 – 5.8 GHz 3.3 – 3.8 GHz 2.3 – 2.7 GHz 2.0 – 2.3 GHz 470 - 698 MHz**	4.9 – 5.8 GHz 3.3 – 3.8 GHz 2.3 – 2.7 GHz 2.0 – 2.3 GHz 470 – 698 MHz
Tx Power	Up to +28 dBm*	Up to +28 dBm*
Data Throughput	100 Mbps*	100 Mbps*
Encryption	AES-128/256 FIPS 140-2	AES-128/256 FIPS 140-2
Antenna	Integrated	External 2xN(f)
Environmental	IP68 Certified	IP68 Certified
Power	RJ45 PoE Either ALT A (1/2 & 3/6) or B (4/5 & 7/8) 36-57 VDC Input , <17W	RJ45 PoE Either ALT A (1/2 & 3/6) or B (4/5 & 7/8) 36-57 VDC Input , <17W
Operating Temperature	-40° C to +75°C High power units and UHF rated to +60C	-40° C to +75°C High power units and UHF rated to +60C

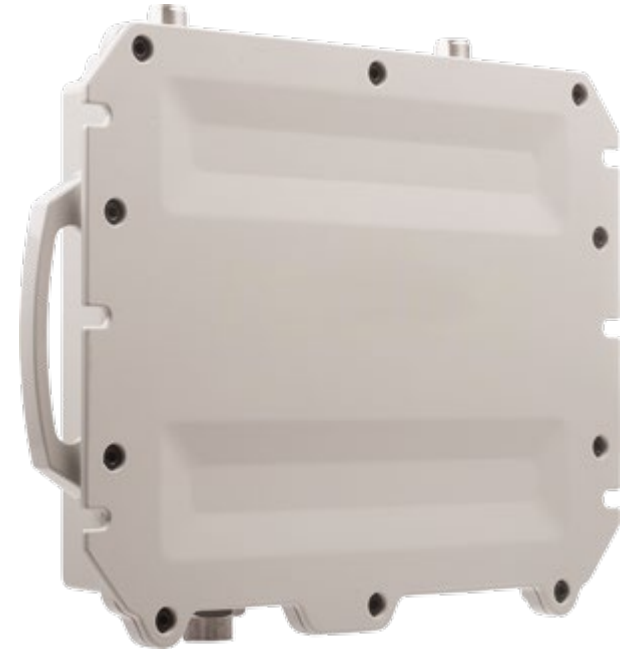
# Elte Overview

- Optimized for high security and encryption with support of FIPS-140-2
- PMP or PTP modes
- Integrated antenna
  - 5 GHz 19 dBi
  - 3 GHz 15 dBi
  - 2 GHz 14.5 dBi / 2L GHz 14 dBi/18dBi
  - 600 MHz 8 dBi
- Transmit Power
  - 5 GHz up to +22 dBm
  - 3/2 GHz up to +23 dBm
  - 2L GHz and UHF up to +28 dBm
- IP68 certification
- Supported capacity up to 100Mbps through option keys



# Edge Overview

- Optimized for high security and encryption with support of FIPS-140-2
- PMP or PTP modes
- Integrated antenna
  - 5 GHz 19 dBi
  - 3 GHz 15 dBi
  - 2 GHz 14.5 dBi / 2L GHz 14 dBi/18dBi
  - 600 MHz 8 dBi
- Transmit Power
  - 5 GHz up to +22 dBm
  - 3/2 GHz up to +23 dBm
  - 2L GHz and UHF up to +28 dBm
- Supported capacity up to 100Mbps through option keys
- External antenna options supported with 2 x N (female) connectors



# Nomadic & Tracking Terminals

# RAS Solution Benefits

- Zero-touch, reliable & fully automated antenna self-alignment
- Provides for easy installation with simple power up & search for optimal signal
- Maximize coverage with higher gain beamforming antenna
- Minimize interference with adjacent base station sector controllers
- Flexible installation options including vehicle roof, telescopic mast and trailer
- Tracking through wireless mobility protocol with Network Topology Awareness (NTA) – supported with RAS-Extend Marine system

# RAS Elite Overview

- Auto self-alignment system
- Support for 4.9 to 5.4 GHz & 5.4 to 5.875 GHz
- Rapid Auto Provision (RAP) support for fast and secure link establishment
- No moving parts, all solid-state
- Rugged construction, IP-67 rated
- Built-in GPS receiver/antenna



# RAS Extend Land Vehicle (LV)

- Integrated solution with radio and antenna
- Single-cable connection (similar to RAS Elite)
- Integrated GPS receiver/antenna
- Support for all frequency bands



# RAS Extend Marine

- Designed for use with marine vessels
- Geo-tracking
  - Use with Network Topology Awareness from sectors
  - Includes geofencing
- Resistant to harsh marine environments (i.e. salt, fog, etc.)
- Integrated dual GPS receiver/antenna
  - Provides bearing even when stationary
- Support for all frequency bands
  - 2.1/2.5/3.5/5GHz with 2' (60cm) parabolic
  - 600MHz with 18" (46cm) panel





**RDL 3100 XG**

# RDL 3100 Overview

- 6th generation, OFDM Software Defined Radio (SDR)
- Leverages FPGA architecture
- Increased performance and capacity
- Supports PTP and small density PMP deployments
- Transparent VLAN aware layer 2 solution
- Provides QoS to support requirements for backhaul of LTE networks
- Data and management traffic supports standards-based IEEE 802.3 Ethernet

# RDL 3100 Ellipse XG Sector Controller

# RDL 3100 Ellipse XG Sector Controller

Model	Ellipse XG
Technology	OFDM, TDD/TDMA 2 x 2 MIMO A/B with STBC & MRRC
Hardware	FPGA
Frequencies	4.940 – 5875 MHz
Modulation & Coding	256QAM7/8, 256QAM5/6, 256QAM3/4, 256QAM2/3 64QAM3/4 , 64QAM2/3, 16QAM3/4, 16QAM1/2, QPSK3/4, QPSK1/2, BPSK1/2
Combined Transmit Power (regulatory dependent)	2 x +25 dBm
Data Capacity/Sector	466 Mbps UBR in 45 MHz
Channels	5/10/20/30/40/45
Processing Power	>780,000 PPS
Ethernet Interfaces	Ethernet 10/100/1000 BaseT 802.3at Type 2 Class 4 Built-in Surge Protection
Power	PoE Accepts Either ALT A (1/2 & 3/6) or B (4/5 & 7/8) 36-57 VDC Input , <17W
GPS Receiver	Internal – Location and Sync
Connectors	RJ45 PoE ; 2 x N-(f) ; 1 x TNC-(f)
Environmental	-40C to +75C, IP67
Size and Weight	306.8 x 230 x 60.3 mm (12.079 x 9.06 x 2.375 in) 2.7 Kg (6 lbs.)



# RDL 3100 Ellipse XG Additional Features

- Improve frequency reuse through fixed frame support
- Layer 2 support similar to RDL-3000
  - Port and tag based VLANs
  - VLAN filtering
  - CIR and PIR assigned per service group
- Device management using HTTP, Telnet & SNMPv1/v2c
- Support for AES 128/256 encryption along with ECDSA device authentication
- Secure access through HTTPS, SSH & SNMPv3

# RDL 3100 Elte XG Remote Terminal

# RDL 3100 Elite XG Remote Terminal Summary

Model	Elite XG
Technology	OFDM, TDD/TDMA 2 x 2 MIMO A/B with STBC & MRRC
Hardware	FPGA
Frequencies	4.940 – 5875 MHz
Modulation & Coding	256QAM7/8, 256QAM5/6, 256QAM3/4, 256QAM2/3 64QAM3/4 , 64QAM2/3, 16QAM3/4, 16QAM1/2, QPSK3/4, QPSK1/2, BPSK1/2
Combined EIRP & Transmit Power (regulatory dependent)	Integrated 24 dBi RF antenna with GPS antenna +49 dBm
Data Capacity/Sector	373 Mbps UBR in 40 MHz
Channels	10/20/40 MHz
Processing Power	>780,000 PPS
Ethernet Interfaces	Ethernet 10/100/1000 BaseT 802.3at Type 2 Class 4 Built-in Surge Protection
Power	PoE Accepts Either ALT A (1/2 & 3/6) or B (4/5 & 7/8) 36-57 VDC Input , <17W
GPS Receiver	Internal – Location and Sync
Connectors	RJ45 PoE
Environmental	-40C to +75C, IP67
Size and Weight	368 x 368 x 98.3 mm (14.5 x 14.5 x 3.87 in) 3.8 Kg (8.5 lbs)



# RDL 3100 Elite XG Additional Features

- Layer 2 support similar to RDL-3000
  - Port and tag based VLANs
  - VLAN filtering
  - CIR and PIR assigned per service group
- Device management using HTTP, Telnet & SNMPv1/v2c
- Support for AES 128/256 encryption along with ECDSA device authentication
- Secure access through HTTPS, SSH & SNMPv3





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