

# Peregrine for Licensed Frequencies

## Mobile Wireless Mesh Network Node

**The Rajant Peregrine for Licensed Frequencies is Rajant's new military-grade, high-performance BreadCrumb platform.** The Peregrine for Licensed Frequencies supports a maximum combined data rate of 4.3 Gbps and up to 6X enhanced throughput performance over existing BreadCrumbs. It offers up to four MIMO radio interfaces, high throughput, and enhanced security performance with up to 256-QAM and 80 MHz channels.



### Peregrine for Licensed Frequencies Key Features

- Rajant's patented<sup>1</sup> InstaMesh® networking software enables the network to quickly adapt to rapidly deployed and quickly (or constantly) moving network elements
- Multiple concurrent transceivers for high levels of network reliability, redundancy, and diversity, and fewer problems due to interference, congestion, and equipment outages
- Up to 4.3 Gbps of physical layer data rate combined over four transceivers
- Multiple radio frequencies – 2.4 GHz, 5 GHz, 605 — 1400 MHz, 700 MHz, 1.4 GHz, 2.2 GHz, 3.6 GHz, 4.8 GHz, 4.9 GHz as well as military, licensed, public service, and other proprietary radio frequencies
- Multiple antenna-port configurations with up to 3x3 MIMO (multiple-input, multiple-output), substantially increasing the capacity of transceivers
- Support for several strong cryptographic options used for data and MAC-address encryption and per-hop, per-packet authentication
- Rugged and environmentally sealed enclosures
- High bandwidth for data, voice, and video applications
- Scalability to hundreds of mobile, high-bandwidth nodes
- Integrated 802.11ac Wi-Fi Access Point and client mode service for compatibility with millions of commercial off-the-shelf Wi-Fi client and access point devices such as laptops, tablets, smartphones, IP cameras, sensors, and other IP devices
- Self-forming and self-healing operation for fast and easy deployments
- Reliable and fast off-loading to Ethernet via multiple, simultaneous bridge-mode links through the Automatic Protocol Tunneling (APT) feature

<sup>1</sup> U.S. Patent 9,001,645

### Utilizing the Peregrine for Licensed Frequencies Platform to Your Advantage

The Peregrine for Licensed Frequencies is our high-performance BreadCrumb platform. Combined with Rajant's patented InstaMesh protocol, the Peregrine for Licensed Frequencies can integrate Kinetic Mesh wireless networks with other networks such as LTE/5G. The Peregrine for Licensed Frequencies is part of Rajant's initiative to develop deeply integrated solutions that securely combine data from connected people, vehicles, machines, and sensors, with machine learning. This data combination unlocks the benefits of process optimization, digital twins, predictive analytics, condition-based maintenance, augmented reality, and virtual reality while improving worker safety. The Peregrine for Licensed Frequencies is interoperable with all of our BreadCrumb models to expand market capabilities for industries like rail, shipping ports, military, mining, and heavy construction.

### InstaMesh®

InstaMesh is the advanced, patented<sup>1</sup> protocol developed by Rajant that directs the continuous and instantaneous forwarding of packets from wireless and wired connections. It enables complete network mobility, high throughput, and low latency with very low maintenance and administrative requirements. Operating at Layer 2 and not requiring a root node or LAN Controller, InstaMesh provides robust fault tolerance even if there is a connection or node outage. No matter how you configure your network, InstaMesh networking software always determines the most efficient pathway between any two points, even when those points are in motion.

Model	Description
<b>Custom 3-Radio</b>	Custom BreadCrumb® FE1, three transceivers, up to 3x3 MIMO per transceiver, up to 9 total antenna ports, includes licensed or restricted radio frequencies.
<b>Custom 4-Radio</b>	Custom BreadCrumb® FE1, four transceivers, up to 3x3 MIMO per transceiver, up to 10 total antenna ports, includes licensed or restricted radio frequencies.

Wireless	2.4 GHz	4.9/5 GHz	5 GHz
<b>Antenna Connector</b>	(2) Type N (female)	(2) Type N (female)	(2) Type N (female)
<b>Frequency<sup>2</sup></b>	2402 – 2482 MHz	4940 – 4990 MHz U-NII-1: 5150 – 5250 MHz U-NII-2A: 5250 – 5350 MHz U-NII-2C: 5470 – 5725 MHz U-NII-3: 5725 – 5850 MHz	U-NII-1: 5150 – 5250 MHz U-NII-2A: 5250 – 5350 MHz U-NII-2C: 5470 – 5725 MHz U-NII-3: 5725 – 5850 MHz
<b>Modulation</b>	DSSS, CCK, OFDM with up to 64-QAM	OFDM with up to 64-QAM	OFDM with up to 256-QAM
<b>Max. Physical Layer Data Rate</b>	300 Mbps (throughput varies)	300 Mbps (throughput varies)	866.7 Mbps (throughput varies)
<b>Max. RF Transmit Power<sup>3, 4</sup></b>	30 dBm	29 dBm	30 dBm
<b>Receive Sensitivity<sup>5, 6</sup></b>	-100 dBm (@ 1 Mbps, 20 MHz channel bandwidth) to -76 dBm (@ 300 Mbps, 40 MHz channel bandwidth)	-96 dBm (@ 6 Mbps, 20 MHz channel bandwidth) to -69 dBm (@ 300 Mbps, 40 MHz channel bandwidth)	-94 dBm (@ 6 Mbps, 20 MHz channel bandwidth) to -68 dBm (@ 866.7 Mbps, 80 MHz channel bandwidth)

<sup>2</sup> Channel, frequency, and bandwidth options vary based upon regional and local regulations and certifications

<sup>3</sup> RF transmit power is governed by local regulations and varies by frequency

<sup>4</sup> Transmit power tolerance is  $\pm 2$  dB

<sup>5</sup> Receive sensitivity tolerance is  $\pm 2$  dB

<sup>6</sup> Receive sensitivity criteria is less than 10% packet error rate (PER)

Wireless Cont.	605 – 1400 MHz	700 MHz	1.4 GHz
<b>Antenna Connector</b>	(2) Type N (female)	(2) Type N (female)	(2) Type N (female)
<b>Frequency<sup>2</sup></b>	605 – 1400 MHz	785 – 805 MHz	1425 – 1525 MHz
<b>Modulation</b>	OFDM with up to 256-QAM	OFDM with up to 256-QAM	OFDM with up to 256-QAM
<b>Max. Physical Layer Data Rate</b>	866.7 Mbps (throughput varies)	144 Mbps (throughput varies)	866.7 Mbps (throughput varies)
<b>Max. RF Transmit Power<sup>3, 4</sup></b>	31 dBm (tentative)	31 dBm (tentative)	30 dBm
<b>Receive Sensitivity<sup>5, 6</sup></b>	TBD	-100 dBm (@ 6.5 Mbps, 20 MHz channel bandwidth) to -76 dBm (@ 144 Mbps, 20 MHz channel bandwidth) (tentative)	-100 dBm (@ 6.5 Mbps, 20 MHz channel bandwidth) to -76 dBm (@ 144 Mbps, 20 MHz channel bandwidth)

Wireless Cont.	2.2 GHz	3.6 GHz	4.8 GHz
<b>Antenna Connector</b>	(2) Type N (female)	(2) Type N (female)	(3) Type N (female)
<b>Frequency<sup>2</sup></b>	2200 – 2300 MHz	3600 – 3700 MHz	4800 – 4940 MHz
<b>Modulation</b>	OFDM with up to 256-QAM	OFDM with up to 256-QAM	OFDM with up to 256-QAM
<b>Max. Physical Layer Data Rate</b>	866.7 Mbps (throughput varies)	866.7 Mbps (throughput varies)	1300 Mbps (throughput varies)
<b>Max. RF Transmit Power<sup>3, 4</sup></b>	31 dBm	28 dBm	32 dBm
<b>Receive Sensitivity<sup>5, 6</sup></b>	-100 dBm (@ 6.5 Mbps, 20 MHz channel bandwidth) to -76 dBm (@ 144 Mbps, 20 MHz channel bandwidth)	-99 dBm (@ 6.5 Mbps, 20 MHz channel bandwidth) to -75 dBm (@ 144 Mbps, 20 MHz channel bandwidth)	-96 dBm (@ 6.5 Mbps, 20 MHz channel bandwidth) to -74 dBm (@ 144 Mbps, 20 MHz channel bandwidth)

<sup>2</sup> Channel, frequency, and bandwidth options vary based upon regional and local regulations and certifications

<sup>3</sup> RF transmit power is governed by local regulations and varies by frequency

<sup>4</sup> Transmit power tolerance is  $\pm 2$  dB

<sup>5</sup> Receive sensitivity tolerance is  $\pm 2$  dB

<sup>6</sup> Receive sensitivity criteria is less than 10% packet error rate (PER)

## Network & Security

<b>Network Functionality</b>	VLAN and QoS support; Access Point; Bridge; Gateway; DHCP; NAT and Port Forwarding; Automatic Protocol Tunneling (APT).
<b>Security</b>	<ul style="list-style-type: none"> <li>Multiple cryptographic options, including NSA Suite B algorithms (implementation not certified). For information on models with full Suite B certification, contact Rajant or your authorized Rajant partner.</li> <li>Separately configurable data and MAC address encryption via AES256-GCM, AES192-GCM, AES128-GCM, AES256-CTR, AES192-CTR, AES128-CTR, XSalsa20, XSalsa20/12, and XSalsa20/8.</li> <li>Configurable per-hop, per-packet authentication between BreadCrumbs via AES256-GMAC, AES192-GMAC, AES128-GMAC, HMAC-SHA512, HMAC-SHA384, HMAC-SHA256, HMAC-SHA224, HMAC-SHA1, and Poly-1305-AES.</li> <li>Supports IEEE 802.11i: AES-CCMP and TKIP encryption, WPA-Personal/Enterprise, WPA2-Personal/Enterprise, iPSK, 802.1x; 64/128-bit WEP; Access Control Lists; Compatible with Layer-2 and Layer-3 client/server and peer-to-peer security solutions.</li> </ul>

## Input/Output

<b>Ethernet</b>	(2) M12 X-Code female connector, 10/100/1000 Mbps, IEEE 802.3, auto MDI/MDIX
<b>USB</b>	USB 2.0 Type A female host port for firmware upgrade, USB-based zeroize and GPS device add-on
<b>LED</b>	(2) Status LED
<b>Switch</b>	LED configuration / zeroize keys and restore factory defaults (reset) switch
<b>PWR</b>	M12 L-Code male connector for DC power

## Power

<b>DC Power</b>	20 — 60 VDC
<b>PoE</b>	IEEE 802.3bt Type 3 / PoE++ or 38 — 60 VDC Passive PoE
<b>Power Consumption<sup>7</sup></b>	4 transceivers: 10 W (average, idle); 45 W (maximum, peak) @ 48 V

<sup>7</sup> Power consumption depends on transceiver configuration

## Physical

<b>Dimensions</b>	264.9 mm x 253.7 mm x 46.2 mm (10.43 in x 9.99 in x 1.82 in)
<b>Weight<sup>8</sup></b>	2946 g (6 lbs 7.9 oz)
<b>Temperature</b>	Startup: -40 °C to +70 °C (-40 °F to 158 °F) Ambient (operating): -40 °C to +70 °C (-40 °F to 158 °F) Storage: -40 °C to +80 °C (-40 °F to 176 °F)
<b>Enclosure</b>	IP67 (6: Dust-tight, 7: Waterproof)
<b>Certification</b>	TBD
<b>MTBF (*base model)</b>	139,907 hours (Telcordia SR-332, Issue 4, Temp +40°C, Ground Mobile 2, 100% duty cycle, 90% confidence)
<b>Warranty</b>	1 year

<sup>8</sup> Weight depends on transceiver configuration

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Updated 03/05/2024

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