RAJANT

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SPEC SHEET

Peregrine LTE BreadCrumb®

Mobile Wireless Mesh Network Node

The Rajant Peregrine LTE BreadCrumb® is Rajant's latest quad transceiver industrial-grade, high-performance BreadCrumb. The Peregrine LTE supports a maximum combined data rate of 2.6 Gbps and up to 6X enhanced throughput performance over existing BreadCrumbs. It offers LTE capabilites, multiple-input, multiple-output (MIMO) radio interfaces, high throughput, and enhanced security performance with up to 256-QAM and 80 MHz channels.

Peregrine LTE BreadCrumb Key Features

- Rajant's patented InstaMesh® networking software enables the network to quickly adapt to rapidly-deployed and quickly (or constantly) moving network elements
- Up to four concurrent transceivers for high levels of network reliability, redundancy and diversity, and fewer problems due to interference, congestion, and equipment outages
- Up to 2.6 Gbps of physical layer data rate combined over four transceivers
- Multiple radio frequencies – 2.4 GHz, 5 GHz, carrier and private LTE as well as military, licensed, public service, and other proprietary radio frequencies
- Multiple antenna-port configurations with 2x2 MIMO radio interfaces to substantially increase the capacity of the 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 of wireless traffic to Ethernet via multiple, simultaneous bridge-mode links through the Automatic Protocol Tunneling (APT) feature
- Secure connections to back-end networks using Rajant's APT and Remote Protocol Tunneling (RPT) features

Advantages of a Hybrid InstaMesh / LTE Network

The Rajant Peregrine LTE BreadCrumb networking device supports the Long-Term Evolution (LTE) standard. In the LTE BreadCrumb platform, an LTE core provides industrial-grade long-range, high-capacity, high-performance capabilities to support private and carrier-based video streaming and high bandwidth applications. Rajant introduced this platform to develop deeply integrated secure solutions that incorporate machine learning (ML).

A Rajant BreadCrumb is a wired or wireless radio device that connects to other BreadCrumbs and networking devices to form a Rajant Kinetic Mesh® network. BreadCrumbs use Rajant's patented InstaMesh® networking software to dynamically optimize network performance. Each BreadCrumb may be mobile while attached to clothing, vehicles, machines and sensors. InstaMesh routes data packets through a network as customers locally add or remove or radio frequencies become open or blocked. Thus, InstaMesh enables reliable machine-to-machine, peer-to-peer communication for applications across the network.

The LTE BreadCrumb platform provides secure connections to back-end networks using Rajant's APT and RPT tunneling. The active use of multiple frequencies prevents interference and network congestion. Real-time automated packet routing selects the best path for each packet. These features provide reliable connections in highly obstructed, cluttered or shadowed areas.

InstaMesh and LTE capabilities combine to provide process optimization, digital twins, predictive analytics, condition based maintenance, augmented reality and virtual reality while improving worker safety.

Rajant LTE BreadCrumb models can interoperate with all Rajant BreadCrumb models to expand support for industry and military markets.

InstaMesh®

InstaMesh is the advanced, patented[1] protocol developed by Rajant that directs the continuous and instantaneous forwarding of packets from wireless and wired connections. InstaMesh 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. In any network configuration, InstaMesh networking software always determines the most efficient path between any two points, even when those points are in motion.

Model	Description
FE1–2455LW	Peregrine LTE with one LTE (Type 1) 2x2 MIMO, Cat 12 600 Mbps downlink and Cat 13 150 Mbps uplink, one 2.4 GHz, 2x2 MIMO, 300 Mbps and two 5 GHz, 2x2 MIMO, 866.7 Mbps transceivers. Up to 2.6 Gbps of data rate combined over four transceivers.
FE1–2455LS	Peregrine LTE with one LTE (Type 2) 2x2 MIMO, Cat 20 2 Gbps downlink and 200 Mbps uplink, one 2.4 GHz, 2x2 MIMO, 300 Mbps and two 5 GHz, 2x2 MIMO, 866.7 Mbps transceivers. Up to 4.0 Gbps of data rate combined over four transceivers.

Wireless	2.4 GHz	5 GHz	LTE (Type 1)	LTE (Type 2)
Antenna Connector	(2) Type N (female)	(2) Type N (female)	(2) Type N (female)	(2) Type N (female)
Frequency[2]	2402 – 2482 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	**Supported RF Bands:** 1-5, 7-9, 12, 13, 18-20, 26, 28-30, 32, 41-43, 46, 48, 66	**Supported RF Bands:** 1-5, 7-8, 12-14, 17-20, 25-26, 28-30, 32, 34, 38-43, 46, 48, 66, 71
Modulation	DSSS, CCK, OFDM with up to 64-QAM	OFDM with up to 256-QAM	OFDM with up to 256-QAM	OFDM with up to 256-QAM
Max. Physical Layer Data Rate	300 Mbps (throughput varies)	866.7 Mbps (throughput varies)	**Downlink:** Cat 12 with 3CA, 256-QAM = 600 Mbps, **Uplink:** Cat 13 with 2CA contiguous, 64-QAM = 150 Mbps	**Downlink:** Cat 20 with 7CC (20 layers max), 256-QAM, 2x2 MIMO = 2 Gbps, **Uplink**: Cat 18 with 2CC (2 layers max), 256-QAM, SISO = 200 Mbps
Max. RF Transmit Power[3, 4]	30 dBm	30 dBm	23 dBm	25 dBm
Receive Sensitivity[5, 6]	-100 dBm (@ 1 Mbps, 20 MHz channel bandwidth) to -76 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)	-103 dBm (full RB on downlink; 10 MHz channel bandwidth)	-104 dBm (receiving on both antennas, 10 MHz channel bandwidth)

Power	
DC Power	20 — 60 VDC
PoE	IEEE 802.3bt Type 3 / PoE++ or 38 — 60 VDC Passive PoE
Power Consumption[7]	4 transceivers: 10 W (average, idle); 34 W (maximum, peak) @ 48 V

[1] U.S. Patent 9,001,645
[2] Channel, frequency and bandwidth options vary based upon regional and local regulations and certifications
[3] RF transmit power is governed by local regulations and varies by frequency
[4] Transmit power tolerance is ± 2 dB
[5] Receive sensitivity tolerance is ± 2 dB
[6] Receive sensitivity criteria is less than 10% packet error rate (PER)
[7] Power consumption depends on transceiver configuration

Network & Security	
Network Functionality	VLAN and QoS support; Access Point; Bridge; Gateway; DHCP; NAT and Port Forwarding; Automatic Protocol Tunneling (APT).
Security	• 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. • 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. • 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. • 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.

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

Physical	
Dimensions	264.9 mm x 253.7 mm x 46.2 mm (10.43 in x 9.99 in x 1.82 in)
Weight[8]	2946 g (6 lbs 7.9 oz)
Temperature	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)
Enclosure	Designed for IP67 (6: Dust-tight, 7: Waterproof)
Certification	FCC (US): FE1–2455LW IC (Canada): FE1–2455LW AS/NZS 4268 (Austrailia): FE1–2455LW SUBTEL (Chile): FE1–2455LS

[8] Weight depends on transceiver configuration

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20+ Years OF GAME-CHANGING WIRELESS

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*If it's **moving**, it's Rajant.*
*Industrial Wireless Networks **Unleashed.***