

Onyx CFS–5250CS BreadCrumb®

Portable Wireless Mesh Network Node

The Rajant Onyx CFS–5250CS is an IP67 Kinetic Mesh® network device

intended for use in harsh environments on everything from heavy-duty machinery to light-duty vehicle applications. The Onyx CFS–5250CS is ideal for non-autonomous tele-remote construction and mining applications. This portable mesh network node contains two transceivers with up to four external antenna ports and provides Ethernet and Wi-Fi access point interfaces to enable data, voice, and low-bandwidth video applications. Housed in an environmentally robust metal case, the Onyx CFS–5250CS provides operational ruggedness, outstanding shock and vibration characteristics, and a wide-range temperature rating.



Rajant Onyx CFS–5250CS Key Features

- Combines Kinetic Mesh backhaul, Wi-Fi access, and layer 2 switching across interfaces in a single device
- Outdoor-rated:
 - -40°C to +65°C (-40°F to 149°F) temperature range
 - IP67 rating for protection against dust and water ingress
- Rajant's InstaMesh® networking software enables the network to quickly adapt to rapidly-deployed and quickly or constantly moving network elements
- 2.4 GHz, 4.9 GHz, and 5 GHz radio frequencies supporting a wide variety of applications and environments
- Embedded ultra-robust, meter-level GNSS receiver with concurrent reception of up to four L1 GNSS (GPS, GLONASS, BeiDou, Galileo) constellation signals. Requires an external GNSS antenna.
- Includes a peripheral interface that allows connecting add-on modules, such as a 5G mobile network interface (pending).
- Lightweight and portable
- Support for several strong cryptographic options used for data and MAC-address encryption and per-hop, per-packet authentication
- High bandwidth for data, voice, and video applications
- Scalability to hundreds of mobile, high-bandwidth nodes
- Integrated 802.11ax Wi-Fi Access Point service for compatibility with millions of commercial off-the-shelf (COTS) client devices such as laptops, tablets, smart phones, IP cameras, sensors, and other IP devices
- Self-configuring operation for fast and easy deployments
- Reliable and fast off-loading to Ethernet via multiple, simultaneous bridge-mode links through Automatic Protocol Tunneling (APT) feature

Rajant Onyx CFS–5250CS Advantages

At Rajant, we solve your Wi-Fi and LTE problems by extending the range of standard Wi-Fi and LTE, enabling machine-to-machine communications to see around obstructions, and providing sitewide ubiquitous Wi-Fi coverage to connect to Wi-Fi IoT devices including VoIP handsets.

The Onyx CFS–5250CS is intended for industrial IoT markets, including mining, construction, airports, oil and gas, utilities, solar, wind, smart cities, and public safety.

This is a robust product that can add connectivity to an existing network. The Onyx CFS–5250CS can be deployed as a mobile or infrastructure wireless node.

This industrial network node not only offers reliability, performance, and scalability, but also security to support virtually any application operating in outdoor environments.

These BreadCrumbs adapt quickly to changing environments to eliminate communication gaps and provide higher reliability than any other wireless network available.

InstaMesh®

InstaMesh is the advanced, patented¹ 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.

¹ U.S. Patent 9,001,645

Model	Description
CFS-5250CS	CFS-5250CS with (1) dual-band 2.4/4.94-5.85 GHz, 2x2 MIMO, 573.5/1201 Mbps and (1) 4.94-5.85 GHz, 2x2 MIMO, 1201 Mbps transceivers.

Wireless	Dual-Band 2.4 GHz	Dual-Band 4.94-5.85 GHz	4.94-5.85 GHz
Antenna Connector	(2) Type N (female)	(2) Type N (female)	(2) Type N (female)
Frequency²	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	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
Modulation	DSSS, CCK, OFDM with up to 1024-QAM	OFDM with up to 1024-QAM	OFDM with up to 1024-QAM
Max. Physical Layer Data Rate	573.5 Mbps (throughput varies)	1201 Mbps (throughput varies)	1201 Mbps (throughput varies)
Max. RF Transmit Power³	30 dBm ± 2 dB	30 dBm ± 2 dB	30 dBm ± 2 dB
Receive Sensitivity^{4,5,6}	TBD	TBD	TBD

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 encryption, WPA-Personal/Enterprise, WPA2-Personal/Enterprise, iPSK, 802.1x; Access Control Lists; Compatible with Layer-2 and Layer-3 client/server and peer-to-peer security solutions.

Power

PoE	IEEE 802.3bt Type 3 / PoE++ or 41.1 — 57.0 VDC Passive PoE
Power Consumption⁷	Without an add-on module: 8.0 W (average, idle); 27 W (maximum, peak) @ 57 V With an add-on module: 44 W (maximum, peak) @ 57 V

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 Receive sensitivity tolerance is ± 2 dB

⁵ Receive sensitivity criteria is less than 10% packet error rate (PER)

⁶ Pending test results

⁷ Power consumption depends on transceiver configuration

Input/Output

Ethernet	(1) M12 X-Code female connector, 10/100/1000 Mbps, IEEE 802.3, auto MDI/MDIX
USB	USB port for firmware upgrades
LED	Status LED
Switch	LED Configuration / Zeroize Keys and Restore Factory Defaults (through optional adapter cable)
Peripheral Interface	Allows connecting add-on modules, such as a 5G mobile network interface (pending).

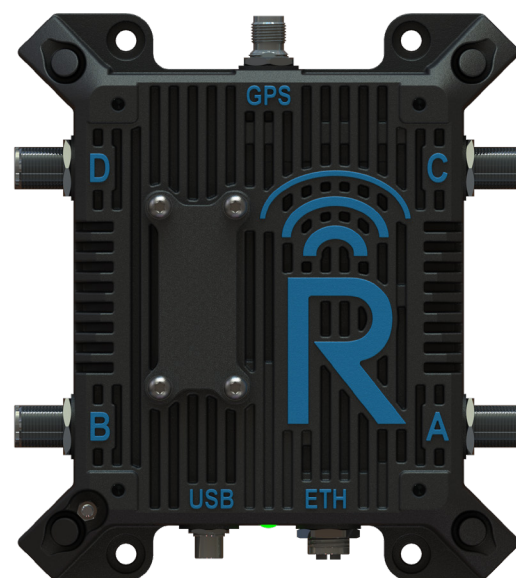
GNSS Receiver

Supported GNSS systems		GPS/QZSS	GLONASS	Galileo	BeiDou
Signal		L1C/A (1575.42 MHz)	L1OF (1602 MHz + $k \cdot 562.5$ kHz, $k = -7, \dots, 5, 6$)	E1-B/C (1575.42 MHz)	B1I (1561.098 MHz)
Acquisition	Cold Start	29 s	27 s	32 s	42 s
	Hot Start	2 s	2 s	2 s	2 s
	Aided Start	2 s	2 s	2 s	5 s
Max. Navigation Update Rate	PVT	25 Hz	25 Hz	25 Hz	25 Hz
Sensitivity	Tracking and Navigation	-166 dBm	-166 dBm	-160 dBm	-159 dBm
	Reacquisition	-160 dBm	-156 dBm	-158 dBm	-154 dBm
	Cold Start	-148 dBm	-145 dBm	-145 dBm	-140 dBm
	Hot Start	-159 dBm	-156 dBm	-159 dBm	-154 dBm
Position Accuracy	PVT	2.0 m CEP	4.0 m CEP	3.0 m CEP	3.0 m CEP
Antenna	Requires an external GNSS antenna				
Antenna Connector	TNC female				
Power Output for Active Antenna	3.2 V, max 50 mA				

Physical

Dimensions	184.9 mm x 160.9 mm x 50.4 mm (7.28" x 6.33" x 1.99")
Weight	1238 g (2 lb 11.7 oz)
Temperature⁸	Ambient (operating): -40°C to 65°C (-40°F to 149°F) System internal (operating): -40°C to 85°C (-40°F to 185°F) Storage: -40°C to 85°C (-40°F to 185°F)
Enclosure	IP67
Certification	FCC, IC, Peru (pending)
Warranty	1 Year

⁸ The temperature specs apply to the Onyx only, without add-on modules connected to it



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