Cisco IR530 Series Resilient Mesh Range Extenders

Product overview

The Cisco® IR500 range extender provides unlicensed 902-928MHz, ISM-band IEEE 802.15.4g/e/v Wireless Personal-Area Network (WPAN) communications to diverse Internet of things (IoT) applications. It extends the range of the RF wireless mesh network, providing longer reach between WPAN endpoints and other WPAN networks. There are two products in the family: The IR529 and IR530. IR530 represents a high performance, new generation of the Cisco RF Mesh range extender.

The IR530 Range extenders take full advantage of world class Cisco networking expertise in IPv6, security. It provides an open, high performance RF mesh solution based on the following standards:

- IEEE 802.15.4 g/e/v
- IETF 6LoWPAN
- IETF Routing Protocol for Low Power and Lossy Networks (RPL)
- IETF Constrained Application Protocol (CoAP)

Figure 1.   Cisco Resilient Mesh Range Extender IR530 for Industrial IoT


Solution overview

The IR530 are components of the Cisco Industrial IoT FAN Solution, which meets these challenges using designs from the industry-leading Cisco GridBlocks™ Architecture. A typical communications network for the distribution grid is a two-tier architecture with a Neighborhood Area Network (NAN) and a Wide Area Network (WAN).

The NAN connects smart endpoints via meshing and the mesh network is aggregated at an intelligent device such as Field Area Router (FAR) mounted on a pole top of in secondary substations. The WAN tier provides network connectivity from the FAR to the utility's control center, over either a public cellular network or Ethernet fiber network. For areas that need extended RF coverage, a range extender is deployed rather than another CGR to increase the field RF coverage at lower cost.

The Cisco FAN solution comprises important elements as shown below:

- Cisco Resilient Mesh End point reference design, which provide Resilient Mesh connectivity to end points such as DA devices, sensors and smart meters.
- Cisco IR509 or IR510 (DA gateway).
- Cisco IR529 or IR530 (Range extender).
- Cisco 1000 Series Industrial IoT Routers providing FAR capabilities.
- Cisco ASR 1000 Series Aggregation Services Routers providing Headend Router (HER) capabilities.
- Cisco IoT Field Network Director and Industrial Operations Kit for network management.

Figure 2.   Cisco Industrial IoT field area network solution
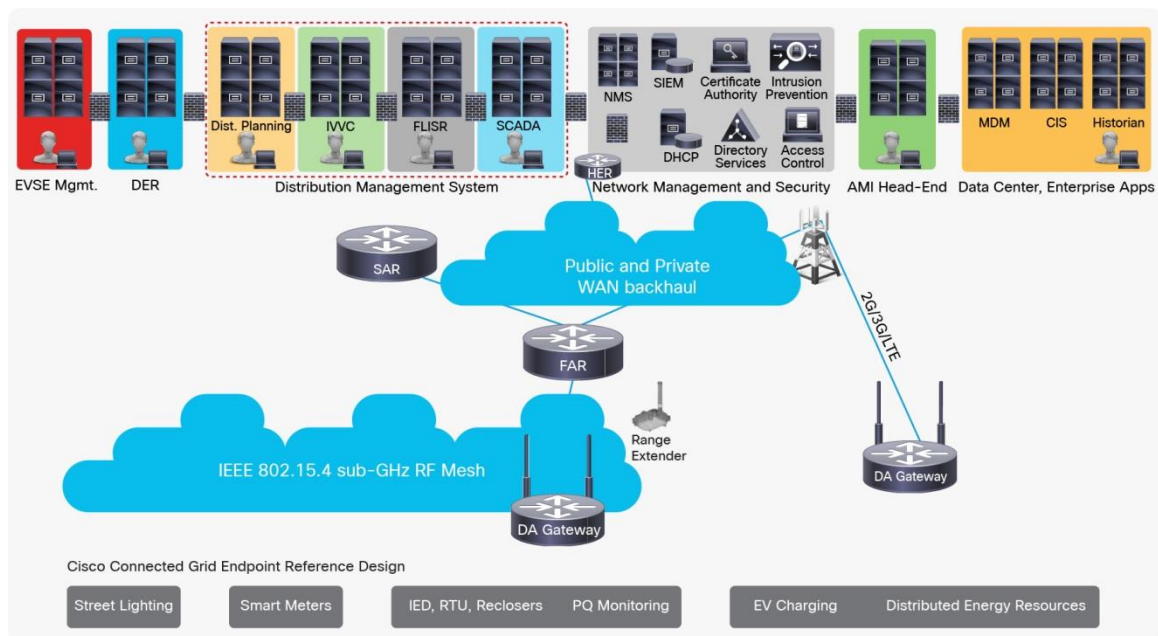
Key benefits

- Lowers Total Cost of Ownership (TCO) by consolidating disparate communications networks used for Advanced Metering Infrastructure (AMI) and DA applications.
- Delivers a communications platform for standards-based, interoperable smart grid and IoT applications using IP-based technologies and innovations.
- Increases communications network uptime and grid availability, helps ensure message delivery through a rugged industrial hardware design and highly resilient solution architecture.
- Improves visibility, availability, and reliability of the distribution grid through enterprise-class network.
- Facilitates graceful migration and integration of legacy assets with support for several IoT-specific protocols.

Cisco IR530 range extender features

IR530 family includes three product SKUs for different region profiles:

Model	Description
IR530SB-OFD-FCC/K9	IR530 with single antenna and battery, 915MHz-WPAN. For North and South America except Brazil.
IR530SB-OFD-BRZ/K9	IR530 with single antenna and battery, 915MHz-WPAN. For Brazil.
IR530SB-OFD-ANZ/K9	IR530 with single antenna and battery, 915MHz-WPAN. For Australia and New Zealand.

Table 1.   Cisco IR530 hardware specifications

Feature	IR530 Hardware Specifications
Dimensions (W x D x H)	5.2" x 7.23" x 10.37"
Typical Weight Fully Configured	8.4 lbs. (3.8 kg)
Pole Mount	Yes
Operating Temperature	-40°C to +70°C (-40°F to 158°F) with IEEE 1613 type test up to 85°C (185°F) for 16 hours
Typical Power Consumption or Dissipation	Normal operation: 6W Max With BBU charging: 23W Max
IEEE 802.15.4 WPAN	IEEE 802.15.4g/e/v
Frequency Support	902-928 MHz (and subset of it to comply with national regulations) ● North America- ISM: 902-928 MHz ● Australia: 915-928 MHz ● Brazil: 902-907.5, 915-928 MHz
RF Modulations and PHY Data Rates	Frequency Hopping Spread Spectrum (FHSS) OFDM: 31 channels in 902 – 928 MHz, 800kHz channel spacing. OFDM PHY data rates of 50 kbps, 200 kbps, 400 kbps, 800 kbps and 1200 kbps FHSS 2FSK 150 kbps: 64 channels in 902 – 928 MHz, 400 kHz channel spacing FHSS 2FSK 50 kbps: 129 channels in 902 – 928 MHz, 200 kHz channel spacing
Average Conducted Transmitter Output Power	30 dBm typical at all FSK rates 28 dBm typical at 50 kbps and 200 kbps OFDM 27 dBm typical at 400 kbps OFDM 25 dBm typical at 800 kbps OFDM 24 dBm typical at 1200 kbps OFDM
Antenna Connector	RF Mesh N connector (female)
RS 232 Serial Console Port	1
Digital Alarm Inputs	1
Integrated AC Power Supply Input Range	85 – 264 VAC, 47 – 63 Hz
Smart Grid Compliance	● IEC-61850-3 ● IEEE1613
Immunity	● EN61000-6-2 ● EN61000-3-3 (ESD) ● EN61000-4-2 (ESD) ● EN61000-4-3 (RF) ● EN61000-4-4 (EFT) ● EN61000-4-5 (SURGE) ● EN61000-4-6 (CRF) ● EN61000-4-11 (VDI) ● EN 55024, CISPR 24 ● EN 55035, CISPR 35 ● EN61000-6-1

Feature	IR530 Hardware Specifications
Emissions	• 47 CFR, Part 15 • RSS-247 • EN61000-3-2 (Harmonics) • EN61000-3-3 (Flicker) • ICES-003 Class A • EN55032 Class A • CISPR32 Class A • AS/NZS 3548 Class A • VCCI V-3 • CNS 13438 • EN 300-386
Safety	• USA: UL 60950-1 • Canada: CAN/CSA C22.2 No. 60950-1 • Australia/New Zealand: AS/NZS 60950.1 • Rest of world: IEC 60950-1 • UL certified to UL/CSA 60950-1, 2nd Ed. CB report to IEC60950-1, 2nd Ed., covering all group differences and national deviations
Ingress Protection (dust/water)	IEC 60529, IP67 UL 50E, type 4X

Table 2.   Cisco IR530 software specifications

Feature	Software Specification IR530
PHY/MAC Layer	• IEEE 802.15.4g WPAN • IEEE 802.15.4e WPAN MAC extensions • IEEE 802.15.4.v Wi-SUN PHY • 6LoWPAN – RFC 4919, 4944 and 6282

Network and Transport Layer	• RFC RFC 2460 IP6
	• RFC 0768: User Datagram Protocol
	• RFC 1661: The Point-to-Point Protocol (PPP)
	• RFC 2460: Internet Protocol, Version 6 (IPv6) Specification
	• RFC 3306: Unicast-Prefix-based IPv6 Multicast Addresses
	• RFC 3315: Dynamic Host Configuration Protocol for IPv6 (DHCPv6)
	• RFC 3484: Default Address Selection for Internet Protocol version 6 (IPv6)
	• RFC 3748: Extensible Authentication Protocol (EAP)
	• RFC 4291: IP Version 6 Addressing Architecture
	• RFC 4492: Elliptic Curve Cryptography (ECC) Cipher Suites for Transport Layer Security (TLS)
	• RFC 4861: Neighbor Discovery for IP version 6 (IPv6)
	• RFC 4862: IPv6 Stateless Address Autoconfiguration
	• RFC 5072: IP Version 6 over PPP
	• RFC 5216: The EAP-TLS Authentication Protocol
	• RFC 5280: Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile
	• RFC 5915: Elliptic Curve Private Key Structure
	• RFC 5958: Asymmetric Key Packages
	• RFC 6090: Fundamental Elliptic Curve Cryptography Algorithms
	• IETF Routing Protocol for Low Power and Lossy Networks (RPL) (RFC 6206, 6550, 6551, 6553, 6554, 6719)
	• Adopted data rates:
	  ◦ 1200, 800, 400, 200, 50 kbps OFDM
	  ◦ 150 and 50 kbps 2FSK

Feature	Software Specification IR530
Application Features	• DHCPv6 (RFC 3315) for IPv6 address allocation • IETF Draft RFC Constrained Application Protocol (CoAP) for network management
Security	• Encryption: AES-128 (IEEE 802.11i for WPAN key management) • Authentication and authorization: IEEE 802.1x for WPAN authentication and encryption; X.509 certificate support with integration into customer's PKI • Hardware-based device identity: IEEE 802.1AR (hardware-ready) • Role-Based Access Control (RBAC) for device configuration • Secure boot loader and signed firmware images

Table 3.   Cisco IR530 antenna options

Item	Specification
ANT-WPAN-OD-OUT-N	• Omnidirectional antenna for 863 - 915 MHz WPAN • N male connector • Outdoor, direct mount to IR530 • 1.5 dBi gain
ANT-WPAN-OM-OUT-N	• Omnidirectional antenna for 902 - 928 MHz WPAN • N female connector • Outdoor, mast mount • 4 dBi gain
ANT-LPWA-DB-O-N-5	• Omnidirectional antenna for 863 - 928 MHz WPAN • N female connector • Outdoor, mast mount • 5.6 dBi gain

Table 4.   Cisco R530 RF cable options

Items	Specification
Outdoor Cable Options	
CAB-L400-5-N-N	5-ft (1.5 m) Low Loss LMR 400 Cable with N Connectors (straight to right angle)
CAB-L400-5-N-NS	5-ft (1.5 m) Low Loss LMR 600 Cable with N Connectors (straight to straight)
CAB-L400-20-N-N	20-ft (6 m) Low Loss LMR 400 Cable with N Connectors
CAB-L600-30-N-N	30-ft (9.14 m) Ultra Low Loss LMR 600 Cable with N Connectors

Table 5.   Cisco IR530 RF accessories

Items	Specification
CGR-LA-NM-NF	Lightning arrestor, N male to N female

Ordering information

The Cisco IR530 range extenders are available to any Cisco authorized partner. For more information, please contact your Cisco representative.

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For more information

- To find out more about the Cisco 500 WPAN Industrial Router family, visit https://www.cisco.com/go/ir500.
- For more information on the Cisco CGR 1000, visit https://www.cisco.com/go/cgr1000.
- For more information on the Cisco IoT Field Network Director, visit https://www.cisco.com/en/US/products/ps12360/index.html.
- For more information on the Cisco ASR 1000, visit https://www.cisco.com/go/asr1000.
- For more information on the Cisco Field Area Network solution, visit https://www.cisco.com/go/fan.

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