

Cisco IR529 Resilient Mesh Range Extenders

The Cisco® IR529 Resilient Mesh Range Extenders provide unlicensed 902-928 MHz ISM band IEEE 802.15.4g/e RF mesh communications to enable a diverse set of Internet of Things (IoT) applications such as Advanced Metering Infrastructure (AMI), Distribution Automation (DA), and smart city wireless sensor networks. These platforms provide enterprise-class RF connectivity to other Cisco Field Area Network (FAN) infrastructure devices such as CGR 1000 routers, IR509 DA gateways, and Cisco IoT partner endpoint devices, including industrial wireless sensors and electricity. In addition, the IR529 Range Extenders withstand harsh environments and are purpose built to be installed on pole mounts in demanding outdoor environments.

IR529 range extenders provide a cost-effective means for extending the coverage area of RF mesh networks so that more IPv6 endpoints can connect to Cisco's mesh network across greater distances and challenging RF environments. These devices take full advantage of Cisco world-class networking technologies. The IR529 Series Range Extenders offer innovative capabilities in IPv6, self-healing mesh networking, end-to-end security, standards-based solutions for legacy protocol transport, network management, and ease of deployment.

Figure 1 displays the Cisco IR529 Base Range Extender (IR529WP-915S/K9) and the Cisco IR529 Advanced Range Extender (IR529UBWP-915D/K9).

Figure 1. Cisco IR529 base (single omni antenna) range extender and IR529 advanced (dual antenna) range extender



Benefits

- IPv6 multihop networking to extend the reach and coverage of IoT IEEE 802.15.4g/e RF mesh networks
- 2FSK 150kbs modulation or 75kpbs with Forward Error Correction (FEC)
- Compact ruggedized IP67 form factor with optional battery backup units
- Flexible antenna options that provide pervasive local area RF coverage or directional antennas for connecting RF nodes across greater distances
- Delivers state-of-the-art IPv6 communications platform that is standards-based and interoperable for large-scale smart grid and IoT sensor deployments
- Lowers Total Cost of Ownership (TCO) by aggregating hard-to-reach wireless sensor endpoints into existing RF mesh networks

- Supports graceful migration and integration of legacy assets with support for several industry-standard protocols
- Increases communications network uptime and grid availability to help ensure message delivery based on rugged industrial hardware design and highly resilient solution architecture

Architectural capabilities

Table 1. Architectural capabilities of Cisco IR529 range extenders

Architectural principles	Cisco IR500 range extender capabilities
Network reliability and Disaster Recovery (DR) architectures	Highly resilient design that optimizes communications network uptime and grid availability to help ensure message delivery: <ul style="list-style-type: none"> • Standards-based routing protocol for low-power and lossy networks (IETF RPL) extends to last mile with route propagation to other routing protocols such as Open Shortest Path First (OSPF) • Interference-avoiding frequency hopping spread spectrum and per-device spatial frequency reuse • Rugged industrial design and compliance with IEC-61850-3 and IEEE 1613 for utility environments More details on standards support can be found in Table 3.
Network security	Comprehensive security capabilities based on open standards and Cisco innovation: <ul style="list-style-type: none"> • Access control based on X.509 certs, IEEE 802.1x, and utility Public Key Infrastructure (PKI) • Data confidentiality and privacy based on link-layer AES-128 bit encryption and IEEE 802.11i • Device and platform integrity based on firmware signing and cert-based, role-based access control More details on security capabilities can be found in Table 3.
Ease of use to reduce TCO	Enterprise-class network management and device management capabilities, based on open standards and Cisco innovation: <ul style="list-style-type: none"> • Network and device management tools for easy deployment, upgrades, and remote monitoring • Highly secure, automated, zero-touch deployment solution • Comprehensive wireless monitoring capabilities for multiple communication technologies
Unified FAN architecture	Architecture based on different choices of wired and wireless technologies: <ul style="list-style-type: none"> • Media-independent network services based on IP architectures • Separation of network services and applications

Cisco IR529 range extenders specifications

Table 2 lists hardware specifications, and Table 3 lists software features for IR529 Range Extenders.

Table 2. Cisco IR529 series hardware specifications

	Base RE hardware specifications	Advanced RE with single-antenna hardware specifications	Advanced RE with dual-antenna hardware specifications
Cisco product ID	IR529WP-915S/K9	IR529UBWP-915S/K9	IR529UBWP-915D/K9 w/BBU IR529UWP-915D/K9 w/o BBU
Dimensions (W x D x H)	9.4 cm x 14.5 cm x 19.3 cm (3.7 in. x 5.7 in. x 7.6 in.)	18.36 cm x 26.34 cm x 12.32 cm (7.23 in. x 10.37 in. x 4.85 in.)	18.36 cm x 26.34 cm x 12.32 cm (7.23 in. x 10.37 in. x 4.85 in.)
Pole mount	Yes	Yes	Yes
Typical weight fully configured	2.3 kg (5.1 lbs)	3.8 kg (8.4 lbs)	Without optional BBU: 3.2 kg (7.0 lbs) With optional BBU: 3.9 kg (8.5 lbs)
Operating temperature	-40°C to +60°C (-40°F to 140°F)	-40°C to +70°C (-40°F to 158°F) with type test up to 85°C (185°F) for 16 hours	-40°C to +70°C (-40°F to 158°F) with type test up to 85°C (185°F) for 16 hours
Typical power consumption or dissipation	4-5W depending on configuration	4-5W depending on configuration	4-5W depending on configuration
Maximum power consumption	9W peak; 6W steady state	9W peak; 6W steady state With BBU charge: 23W max	9W peak; 6W steady state With BBU charge: 23W max
Maximum power consumption	8W peak, 5W steady state	8W peak, 5W steady state	8W peak, 5W steady state

	Base RE hardware specifications	Advanced RE with single-antenna hardware specifications	Advanced RE with dual-antenna hardware specifications
Frequency support	902-928 MHz (and FW configurable subsets to comply with in-country regulations) <ul style="list-style-type: none"> North America - ISM: 902-928 MHz Australia: 915-928 MHz Brazil: 902-907.5, 915-928 MHz Hong Kong: 920-925 MHz Singapore: 920-925 MHz 	902-928 MHz (and FW configurable subsets to comply with in-country regulations) <ul style="list-style-type: none"> North America - ISM: 902-928 MHz Australia: 915-928 MHz Brazil: 902-907.5, 915-928 MHz Hong Kong: 920-925 MHz Singapore: 920-925 MHz 	902-928 MHz (and FW configurable subsets to comply with in-country regulations) <ul style="list-style-type: none"> North America - ISM: 902-928 MHz Australia: 915-928 MHz Brazil: 902-907.5, 915-928 MHz Hong Kong: 920-925 MHz Singapore: 920-925 MHz
Spread spectrum technology	FHSS	FHSS	FHSS
Receiver sensitivity	-105 dBm	-105 dBm	-101 dBm
Transmitter output	30 dBm	30 dBm	26.5 dBm
Antenna connector	Type N, female	Type N, female	Type N, female (x2)
Direct-mount antenna	1.5 dBi omnidirectional	1.5 dBi omnidirectional	1.5 dBi omnidirectional
Externally mounted antenna	5 dBi omnidirectional	5 dBi omnidirectional	5 dBi omnidirectional 10 dBi yagi-directional
Battery backup options	No	Yes Charging operates -40°C to +45°C (-40°F to 113°F) Discharge operates -40°C to +55°C (-40°F to 131°F)	Optional Charging operates -40°C to +45°C (-40°F to 113°F) Discharge operates -40°C to +55°C (-40°F to 131°F)
Console and AUX port (RJ-45)	1	1	1
Integrated AC/DC power supply	85 – 264 VAC, 47 – 63 Hz	90 - 264 VAC, 47 – 63 Hz	90 - 264 VAC, 47 – 63 Hz
Environmental compliance	<ul style="list-style-type: none"> IEC-61850-3 (Temperature) IEC-61850-3 (Temp/Humidity) IEC-61850-3 (Transport) IEC-61850-3 (Transport) IEC-61850-3 Cm (Vibe/Shock/Drop) IEC-61850-3 S3 (Earthquake) IEEE1613 VS2 (Op Vibe) 	<ul style="list-style-type: none"> IEC-61850-3 (Temperature) IEC-61850-3 (Temp/Humidity) IEC-61850-3 (Transport) IEC-61850-3 (Transport) IEC-61850-3 Cm (Vibe/Shock/Drop) IEC-61850-3 S3 (Earthquake) IEEE1613 VS2 (Op Vibe) 	<ul style="list-style-type: none"> IEC-61850-3 (Temperature) IEC-61850-3 (Temp/Humidity) IEC-61850-3 (Transport) IEC-61850-3 (Transport) IEC-61850-3 Cm (Vibe/Shock/Drop) IEC-61850-3 S3 (Earthquake) IEEE1613 VS2 (Op Vibe)
Smart grid	<ul style="list-style-type: none"> C37.90 high-voltage impulse 	<ul style="list-style-type: none"> IEC-61850-3 IEEE1613 C37.90 high-voltage impulse 	<ul style="list-style-type: none"> IEC-61850-3 IEEE1613 C37.90 high-voltage impulse
Immunity	<ul style="list-style-type: none"> EN61000-6-2 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 EN50082-1 	<ul style="list-style-type: none"> EN61000-6-2 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 EN50082-1 	<ul style="list-style-type: none"> EN61000-6-2 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 EN50082-1
EMC	<ul style="list-style-type: none"> 47 CFR, Part 15 ICES-003 Class A EN55022 Class A CISPR22 Class A AS/NZS 3548 Class A VCCI V-3 CNS 13438 EN 300-386 	<ul style="list-style-type: none"> 47 CFR, Part 15 ICES-003 Class A EN55022 Class A CISPR22 Class A AS/NZS 3548 Class A VCCI V-3 CNS 13438 EN 300-386 	<ul style="list-style-type: none"> 47 CFR, Part 15 ICES-003 Class A EN55022 Class A CISPR22 Class A AS/NZS 3548 Class A VCCI V-3 CNS 13438 EN 300-386

	Base RE hardware specifications	Advanced RE with single-antenna hardware specifications	Advanced RE with dual-antenna hardware specifications
Safety	<ul style="list-style-type: none"> USA: UL 60950-1 Cat II Overvoltage Category II Canada: CAN/CSA C22.2 No. 60950-1 Cat II Rest of world: IEC 60950-1 Cat II UL/cUL certified to UL/CSA 60950-1 Cat II, 2nd Ed. CB report to IEC60950-1 Cat II, 2nd Ed., covering all group differences and national deviations 	<ul style="list-style-type: none"> USA: UL 60950-1 Cat IV Overvoltage Category II Canada: CAN/CSA C22.2 No. 60950-1 Cat IV Rest of world: IEC 60950-1 Cat IV UL/cUL certified to UL/CSA 60950-1 Cat IV, 2nd Ed. CB report to IEC60950-1 Cat IV, 2nd Ed., covering all group differences and national deviations 	<ul style="list-style-type: none"> USA: UL 60950-1 Cat IV Overvoltage Category II Canada: CAN/CSA C22.2 No. 60950-1 Cat IV Rest of world: IEC 60950-1 Cat IV UL/cUL certified to UL/CSA 60950-1 Cat IV, 2nd Ed. CB report to IEC60950-1 Cat IV, 2nd Ed., covering all group differences and national deviations
Ingress protection (dust/water)	IEC 60529, IP67 UL 50E, type 4X	IEC 60529, IP67 UL 50E, type 4X	IEC 60529, IP67 UL 50E, type 4X

Table 3. Cisco range extender software specifications

	Software specifications for base range extender, advanced RE with single antenna, and advanced RE with dual antenna
Layer-2	<ul style="list-style-type: none"> IEEE 802.15.4g WPAN IEEE 802.15.4e WPAN MAC extensions 6LoWPAN – RFC 4944 and 6282
IP/Layer-3	<ul style="list-style-type: none"> IPv4 (RFC 791, 826, 1918) 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 4346: The Transport Layer Security (TLS) Protocol Version 1.1 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 RFC 6282: Compression Format for IPv6 Datagrams in Low Power and Lossy Networks (6LoWPAN) RFC 6550: RPL: IPv6 Routing Protocol for Low power and Lossy Networks
Application layer	<ul style="list-style-type: none"> DHCPv6 (RFC 3315) - for IPv6 address allocation IETF Constrained Application Protocol (CoAP) (draft RFC CoAP) - for CSMP network management
Security	<ul style="list-style-type: none"> Encryption: AES-128 (IEEE 802.11i – for WPAN key management) Authentication, 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 for device configuration Secure boot loader and signed firmware images
Quality of service	<ul style="list-style-type: none"> Classification and marking: Layer 3- Differentiated Services Code Point (DSCP) Congestion management: Priority Queuing (PQ)

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