Cisco 829 Industrial Integrated Services Routers

Cisco® 829 Industrial Integrated Services Routers are ruggedized integrated services routers designed for deployment in harsh industrial environments. The 829 Industrial Integrated Services Routers have a compact form factor, integrated 9-32 VDC power input, and multimode 3G and 4G LTE wireless WAN and WLAN connections. With it, you can rapidly deploy a wide variety of Internet of Things (IoT) solutions, including fleet management, mass transit, and remote asset monitoring. The 829 routers are designed to withstand hostile environments including shock, vibration, dust, humidity, and water sprayed from all directions, as well as a wide temperature range (-40°C to +60°C). The 829 brings together enterprise-grade wireline-like services such as quality of service (QoS), dynamic multipoint VPN (DMVPN) and multi-VRF for cellular, highly secure data, voice, and video communications and Cisco IOx, an open, extensible environment for hosting applications at the network edge.

Figure 1. Cisco 829 Industrial Integrated Services Router with 4G LTE and Dual 802.11n a/g/n (WiFi) Radios

Product Overview

The 829 supports the latest Third-Generation Partnership Project (3GPP), Release 9, Category 3 LTE standards. The routers provide persistent, reliable LTE connectivity transparent hand-offs between LTE and 3G networks.

The following models are available:

- **IR829GW-LTE-NA-AK9:** Multimode Cisco LTE 2.0 for carriers operating in LTE 700 MHz (band 17), 1900 MHz (band 2 PCS), or 1700/2100 MHz (band 4 AWS) frequencies; backward-compatible with UMTS and HSPA+: 850 MHz (band 5), 900 MHz (band 8), 1900 MHz (band 2 PCS), and 1700/2100 MHz (band 4 AWS).

- **IR829GW-LTE-VZ-AK9:** Multimode Cisco LTE 2.0 for carriers operating in LTE 700 MHz (band 13), 1700/2100 MHz (band 4 AWS), or 1900 MHz (band 25 extended PCS) frequencies; backward-compatible with EVDO Rev A/CDMA 1x BC0, BC1, BC10.

- **IR829GW-LTE-GA-EK9 and IR829GW-LTE-GA-ZK9:** Multimode Cisco LTE 2.0 for carriers operating in LTE 800 MHz (band 20), 900 MHz (band 8), 1800 MHz (band 3), 2100 MHz (band 1), or 2600 MHz (band 7) frequencies; backward-compatible with UMTS and HSPA+: 850 MHz (band 5), 900 MHz (band 8), 1900 MHz (band 2), and 2100 MHz (band 1).

The Cisco 829 Industrial Integrated Services Routers support Mobile IP delivering transparent roaming across multiple wireless networks capable of covering wide geographic areas; additionally, the 829 supports enterprise-class built-in Wireless LAN (WLAN) capability. The 829 concurrently supports both 4G LTE wireless WAN and Cisco dual-radio WLAN backhaul on the same platform. The 802.11a/b/g/n 2X3 MIMO built in the 829 creates a self-healing, self-optimizing WLAN. Moreover, with the advantage of dual radio, the integrated access point can serve as both an access point and a client to a wireless mesh network. This combined functionality provides another source for WAN diversity along with Gigabit Ethernet, serial, and cellular. The Cisco ClientLink feature of the access point improves reliability and coverage for legacy devices and dynamic frequency selection (DFS) enables radar detection and avoidance to comply with regulatory domains.

The Cisco 829 Industrial Integrated Services Routers offer a broad range of features for industrial and enterprise IoT:

- **Accelerometer and gyroscope:** monitor speed and angular momentum for automotive applications and detect tampering.
- **GPS** to enable real-time location tracking of remote assets.
- **Zero-touch provisioning** with network management tools, such as Cisco IoT Field Network Director and simplifying deployment of a secure network headend using the Cisco Industrial Operations Kit.
- **Security services,** such as firewall, intrusion prevention, VPN, and Cisco Web Security, which requires no additional hardware or client software. With these security services, fleet vehicle management and mass transit systems, for example, can intelligently redirect web traffic to the cloud to enforce granular security and acceptable use policies over user web traffic. With this solution, businesses can deploy the market-leading web security solution quickly and easily to protect assets from web-based threats, such as viruses, while saving bandwidth, money, and resources.
- **Additional WAN options,** such as serial and Gigabit Ethernet WAN interfaces and a 4-port 10/100 Fast Ethernet managed switch with an optional module for Power-over-Ethernet (PoE) LAN connectivity. QoS features are included for optimizing voice and video applications.
- **4G LTE wireless WAN (WWAN) data services**. With enhanced data rates and improved latency (30 milliseconds or less), WWAN services provide an ideal way to supplement traditional wire-line services. 4G LTE WWAN data services have average data rates well in excess of ISDN speeds, with theoretical limits of 100 Mbps on the downlink and 50 Mbps on the uplink. Actual data speed depends on a service provider's network. With 4G LTE data rates, the 829 routers offer a primary WAN link capable of running comprehensive branch office services, including voice and video services. The 4G LTE WWAN data services can also be used as a cost-effective alternative in areas where broadband services are either not available or very expensive. Cisco is building on these performance milestones and adding support for wireless to our wide variety of WAN interface alternatives.
- **Multiple-PDN (packet data network)** feature allows the router to connect to different access point names (APN) enabling traffic segregation. For example, public internet traffic can be kept separate from corporate traffic.
- **4G LTE multiple-bearer QoS for cellular.** The 829 router supports 4G LTE multiple bearers enabling differentiated treatment of traffic based on the QoS policies. The QoS feature depends on a service provider's ability to classify and enforce QoS policies and hence requires providers to launch this service in their networks.

- **Multi-VRF for cellular.** The 829s support Multi-VRF for cellular network. Multi-VRF is a Cisco proprietary implementation over and above the 3GPP specification and requires Cisco ASR 5000 Series Packet Data Network Gateway as the headend at the service provider's network. The Multi-VRF feature is service provider dependent, and requires a service provider to launch this service.

Business Benefits and Application Examples

IoT gives the transportation industry an opportunity to connect people, improve safety, communicate more effectively, and change transportation centers into community hubs. The829 offers the automotive industry - including commercial fleets, emergency-response and public safety vehicles, rail, and roadways - standards-based, scalable, and highly secure solutions.

Fleet Vehicles

The 829 router can withstand severe weather and environmental conditions, such as extreme temperatures, high vibrations, and shocks often encountered on buses and trains. The 829 4G LTE routers use standards-based Mobile IP features in Cisco IOS® Software to host networks in motion. Transitioning to different wireless networks is transparent to users and devices (such as laptops, smart devices, sensors and cameras), and applications maintain continuous connectivity without the manual intervention of users as WAN links change. In addition to allowing a single node or device to stay connected, the 829 4G LTE routers allow an entire mobile network or subnet to stay connected. The dual-radio WLAN on the 829 can serve as both a client and an access-point. Our products also help transit operators effectively track vehicle fleets through built-in GPS systems.

Mass Transit

Public-safety personnel can move critical video data and other sensitive information from incident commanders to field officers over a secure network, giving public safety agencies and their personnel access to real-time, multimedia data in the field. This access helps agencies increase cost efficiencies, provide better response time, and improve safety and security.

Primary Features and Benefits

Table 1 lists the features and benefits of Cisco 829 Industrial Integrated Services Routers.

Table 1.   Features and Benefits

Features	Benefits
IoT Enablement	
Compact ruggedized form factor	Designed for mobile and hostile outdoor environments, such as fleet vehicle management, mass transit, and many other on-the-move IoT applications.
Raw socket transport and SCADA	Raw socket can be used to transport supervisory control and data acquisition (SCADA) data from remote terminal units (RTUs). This method is an alternative to the Block Serial Tunnel (BSTUN) protocol. The 829 provides DNP3 serial to IP translation and IEC 60870 T101 to IEC 60870 T104 protocol translation to serve as a SCADA gateway to do the following: ● Receive data from RTUs (T101 or DNP3 serial) and relay configuration commands from the Control Center (T104 or DNP3 IP) RTUs. ● Receive configuration commands from the Control Center and relay RTU data to the Control Center. ● Terminate incoming T104 DNP3 IP requests from the Control Center, when an RTU is offline.
Cisco IOx Application Support	Provides an open, extensible environment for hosting OS and applications at the network edge; expansion module slot to enable additional future communication technologies.
Cisco IOT Field Network Director	Available as the optional Cisco Industrial Operations Kit. This is a software platform that manages a multiservice network and security infrastructure for IoT applications such as transportation, smart grid, services, distribution automation and substation automation.
Lightweight, compact size with low-power consumption	● Can be deployed in many different environments where space, heat dissipation, and low-power consumption are critical factors.

Features	Benefits
Increased performance to run concurrent services	• Performance allows customers to take advantage of broadband network speeds while running highly secure, concurrent data, voice, video, and wireless services.
Enhanced security	• An integrated stateful and application inspection firewall provides network perimeter security and high-speed IP Security (IPsec); Triple Data Encryption Standard (3DES) and Advanced Encryption Standard (AES) encryption offer data privacy over the Internet. • Intrusion prevention enforces security policies in a larger enterprise or service provider network. • Content filtering offers category-based URL classification and blocking, and thus providing increased productivity and better use of company resources. • Cisco Web Security and its filtering solution requires no additional hardware or client software. Enables remote locations to intelligently redirect web traffic to the cloud to enforce granular security and acceptable use policies over user web traffic.
Integrated WLAN access point	• Integrates the Cisco 1530 802.11 a/b/g/n access point for mission-critical applications. By intelligently avoiding interference, the WLAN feature offers performance protection for 802.11n networks to help ensure reliable application delivery. • With dual radios, the Cisco access point can serve both as an access point and as a client to a wireless mesh network concurrently, providing another source for WAN diversity. • The Cisco ClientLink feature of the access point improves reliability and coverage for legacy devices. • Dynamic frequency selection (DFS) allows detecting and avoiding interference with radar signals to comply with regulatory domains. More information on the Cisco 1530 access point is available at http://www.cisco.com/c/en/us/products/wireless/aironet-1530-series/index.html.
Multiple WAN and LAN Connections	
Four Gigabit Ethernet PoE/PoE+ interfaces	• Allows for multiple Ethernet device connectivity in a small office or other remote location with the ability to designate a port as the network edge. • VLANs allow for secure segmentation of network resources. • 30W of PoE/PoE+ shared across the four Gigabit Ethernet interfaces.
Two serial interfaces	• Two serial interfaces (one RS232 port and one RS232/RS485 port) to provide two serial connections to local RTU for SCADA transport and RTU management.
WAN diversity	• Multiple WAN links are supported: Gigabit Ethernet, serial, and 4G LTE provide for business continuity and WAN diversity. With 4G LTE WWAN, Cisco Intelligent WAN (IWAN) provides transport independent, intelligent path control, application optimization, and secure connectivity on any device, over any connection, and to any cloud.
Transparent Roaming Between Wireless Networks	
Dual subscriber identity module (SIM) support	• Dual SIM feature provides reliability and multihoming capabilities over LTE and HSPA-based networks.
Cisco IOS Mobile IP features	• Mobile IP offers transparent roaming for mobile networks, establishing a transparent Internet connection regardless of location or movement. This enables mission-critical applications to stay connected even when roaming between networks. • Assigned IP addresses to the home network are maintained in private or public networks.
Cisco IOS Mobile network features	• Allows an entire subnet or mobile network to maintain connectivity to the home network while roaming.
Multiple wireless WAN technologies	• Users can use the best wireless (4G LTE, 3.7G, 3.5G, or 3G) technology or network available.
Advanced IP Services in Standards-Based Cisco IOS Software	
Advanced security features	• Authorization and authentication determine which individuals and devices have access to the network. • Firewall protection provides perimeter security when using public networks. • 3DES and AES encryption provide for highly secure VPNs when transmitting and receiving data over public networks. • Intrusion detection monitors potential malicious activity on the network.
QoS features	• Provides traffic precedence to delay-sensitive or prioritized applications. • Facilitates low-latency routing of delay-sensitive applications, such as streaming video.
IP multicast	• Allows efficient broadcast of data or video for increased situational awareness, multiuser communications, or surveillance applications.

Features	Benefits
Management and manageability	● Network managers can remotely manage and monitor networks with SNMP, Telnet, or HTTP, and locally through a console port. ● Support for extensive 3G and 4G LTE-based MIBs allows for centralized management of remote devices and gives network managers visibility into and control over the network configuration at the remote site. ● Network managers can reset to a predesignated golden image, as well as configure an 829 through Cisco IOS Software or through an external reset button. ● Network managers can upgrade 3G, 3.5G, 3.7G, and 4G LTE firmware and router configurations remotely. The tight integration with Cisco IOS Software enables router to self-monitor the LTE WAN link and automatically recover from a radio link failure.

Product Specifications

Table 2: 4G LTE specifications for the Cisco 829 Industrial Integrated Services Routers.

Table 2.   4G LTE Specifications

Region Theaters	IR829GW-LTE-GA-EK9 and IR829GW-LTE-GA-ZK9	IR829GW-LTE-NA-AK9	IR829GW-LTE-VZ-AK9
Bands	LTE bands 1, 3, 7, 8, 20 800 (band 20), 900 (band 8), 1800 (band 3), 2100 (band 1), and 2600 (band 7) MHz	LTE band 2 PCS 1900, band 4 AWS (1700/2100), band 17 (700), band 13 (700), band 25 extended PCS 1900	LTE band 13 (700), band 4 AWS (1700/2100) and band 25 extended PCS (1900)
Theoretical Download and upload speeds*	100 and 50 Mbps	100 and 50 Mbps	100 and 50 Mbps
Australia	✓	X	X
Europe	✓	X	X
Middle East	✓	X	X
LATAM and APAC	✓ (Dependent on specific operators supporting the above LTE bands)	✓ (Dependent on specific operators supporting the above LTE bands)	X
United States	X	✓ ATT	✓ Verizon
Canada	X	✓	X

Item	Specification
4G LTE modem form factor	● Embedded (included with the router) ● Upgrade - GA firmware image provisioning switching from flash (FW-MC7304-LTE-AU or FW-MC7304-LTE-GB) ● Upgrade - NA firmware image provisioning switching from flash (FW-MC7354-LTE-AT or FW-MC7354-LTE-CA)
Important 4G LTE features	● Automatic switch failover between primary and backup link ● Multichannel interface processor (MIP) profile configuration ● CDMA data retry ● 3G MIB with 3G MIB extension and traps ● Remotely initiated data callback using voice ● Remotely initiated data callback using Short Message Service (SMS) ● Remote firmware upgrade over 4G LTE ● Virtual diagnostic monitoring ● Mobile Equipment Personalization (MEP) lock and unlock capabilities ● SIM lock and unlock capabilities
Dual SIM support	● High reliability, and cellular multihoming support for dual SIM card socket; compliant with ISO-7816-2 (SIM mechanical)

Item	Specification
SMS and global positioning system (GPS)	• GPS antenna: SMA connector (separate active GPS with SMA antenna option) (Available early Q1, 2016) • Send and receive SMS (maximum 160 characters) • Standalone GPS, needs line of sight • Configure multiple profile
MIBs	• Enhanced 3G MIB with 4G MIB extension (4G parameters are covered with 3G MIB and 3G MIB extension) • ENTITY MIB • IF MIB • 3G WWAN MIB persistence
4G LTE network management and diagnostics	• In-band and out-of-band management using Telnet (Cisco IOS Software command-line interface [CLI]) and SNMP, including MIB II and other extensions • Industry-standard 4G LTE diagnostics and monitoring tools (QUALCOMM CDMA Air Interface Tester [CAIT] and Spirent Universal Diagnostic Monitor [UDM])
Modem information	• **Modem form factor:** Embedded peripheral component interconnect (PCI) mini card • **IR829GW-LTE-GA-EK9 and IR829GW-LTE-GA-ZK9:** Sierra Wireless MC7304 with Qualcomm MDM9215 • **IR829GW-LTE-NA-AK9:** Sierra Wireless MC7354 with Qualcomm MDM9615 • **IR829GW-LTE-VZ-AK9:** Sierra Wireless MC7350 with Qualcomm MDM9615
Programming interfaces	• Cisco IOS Software command line interface (CLI)
Wireless technologies supported (performance and throughput)	**IR829GW-LTE-GA-EK9 and IR829GW-LTE-GA-ZK9** Cisco LTE 2.0 800 MHz (band 20), 900 MHz (band 8), 1800 MHz (band 3), 2100 MHz (band 1), and 2600 MHz (band 7) Backward compatibility: • UMTS and HSPA+: 850, 900, 1900, and 2100 MHz • Quad-band EDGE, GPRS, and GSM: 800, 900, 1800, and 1900 MHz • HSPA+ speed DL up to CAT20 (42.2 Mbps) and UL up to CAT6 (5.76 Mbps) • DC-HSPA+ speed DL with CAT24 (42.2 Mbps) and UL up to CAT6 (5.76 Mbps) **IR829GW-LTE-NA-AK9** Cisco LTE 2.0 1900 MHz (band 2 PCS), 1700/2100 MHz (band 4 AWS), 700 MHz (band 17) Backward compatibility: • UMTS and HSPA+: 850 (band 5), 900 (band 8), 1700/2100 (band 4 AWS), 1900 (band 2), and 2100 (band 1) MHz • Quad-band EDGE, GPRS, and GSM: 800, 900, 1800 and 1900 MHz • HSPA+ speed DL up to CAT20 (42.2 Mbps) and UL up to CAT6 (5.76 Mbps) • DC-HSPA+ speed DL with CAT24 (42.2 Mbps) and UL up to CAT6 (5.76 Mbps) **IR829GW-LTE-VZ-AK9** Cisco LTE 2.0 700 MHz (band 13), 1700/2100 MHz (band 4 AWS), 1900 MHz (band 25 extended PCS) Backward compatibility: • EVDO Rev A/CDMA 1x BC0, BC1, BC10 WiFi domain: Refer to the Cisco1530 Series access points data sheet: http://www.cisco.com/c/en/us/products/wireless/aironet-1530-series/index.html
Included antenna	• Two multiband swivel-mount dipole antennae (ANT-4G-DP-IN-TNC) and one extender (4G-AE010-R) are included with all the IR829s. • WLAN: Three Cisco Multiband Swivel-Mount Dipole Antennae. (AIR-ANTM2050D-R) are included for all IR829 SKUs that have WLAN functionality.
LED indicators	• Refer to Table 5 for LED specifications
Carrier support	• For an updated list of carriers that offer services on the Cisco IR829, visit http://www.cisco.com/go/ir829.

Note: [*] LTE CAT 3 download and upload speeds depend on specific carrier channel bandwidth and carrier LTE network provisioning.

Table 3 lists the software features supported on the Cisco 829 Industrial Integrated Services Routers.

Table 3.   Cisco IOS Software Features on 829 Routers: Advanced IP Features Set (Default)

Feature	Description
Cisco IOS Software requirement	• Cisco IOS Software feature set: Universal Cisco IOS Software • Cisco IOS Software Release - 15.5(3)M, or later, and modem firmware - 5.5.58, or later
IP and IP services features	• Routing Information Protocol Versions 1 and 2 (RIPv1 and RIPv2) • Generic routing encapsulation (GRE) and multipoint GRE (MGRE) • Cisco Express Forwarding • Standard 802.1d Spanning Tree Protocol • Layer 2 Tunneling Protocol (L2TP) • Layer 2 Tunneling Protocol Version 3 (L2TPv3) • Network Address Translation • Dynamic Host Configuration Protocol (DHCP) server, relay, and client • Dynamic DNS (DDNS) • DNS Proxy • DNS Spoofing • Access control lists (ACLs) • IPv4 and IPv6 Multicast • Open Shortest Path First (OSPF) • Border Gateway Protocol (BGP) • Performance Routing (PfR) • Enhanced Interior Gateway Routing Protocol (EIGRP) • Virtual Route Forwarding (VRF) Lite • Next Hop Resolution Protocol (NHRP) • Bidirectional Forwarding Detection (BFD) • Web Cache Communication Protocol (WCCP) • Data-Link Switching (DLSW)
Switch features	• Auto Media Device In/Media Device Cross Over (MDI-MDX) • 16 802.1Q VLANs • MAC filtering • Switched Port Analyzer (SPAN) • Storm control • Smart ports • Secure MAC address • Internet Group Management Protocol Version 3 (IGMPv3) snooping • 802.1X
Security features	**Secure connectivity:** • Secure Sockets Layer (SSL) VPN for secure remote access • Hardware-accelerated DES, 3DES, AES 128, AES 192, and AES 256 • Public-key-infrastructure (PKI) support • 20 IPsec tunnels • Cisco Easy VPN Solution client and server • Network Address Translation (NAT) transparency • Dynamic Multipoint VPN (DMVPN) • Tunnel-less Group Encrypted Transport VPN • Flex VPN • IPsec stateful failover • VRF-aware IPsec • IPsec over IPv6 • Adaptive control technology • Session Initiation Protocol (SIP) application layer gateway **Cisco IOS Firewall:** • Zone-based policy firewall • VRF-aware stateful inspection routing firewall

Feature	Description
	• Stateful inspection transparent firewall
	• Advanced application inspection and control
	• Secure HTTP (HTTPS), FTP, and Telnet Authentication Proxy
	• Dynamic and static port security
	• Firewall stateful failover
	• VRF-aware firewall
	Content Filtering:
	• Subscription-based content filtering with Trend Micro
	• Support for Websense and SmartFilter
	• Cisco IOS Software blacklists and whitelists
	Integrated Threat Control:
	• Intrusion prevention system (IPS)
	• Control Plane Policing
	• Flexible Packet Matching
	• Network foundation protection
QoS features	• Low Latency Queuing (LLQ)
	• Weighted Fair Queuing (WFQ)
	• Class-Based WFQ (CBWFQ)
	• Class-Based Traffic Shaping (CBTS)
	• Class-Based Traffic Policing (CBTP)
	• Policy-Based Routing (PBR)
	• Class-Based QoS MIB
	• Class of service (CoS) to-differentiated services code point (DSCP) mapping
	• Class-Based Weighted Random Early Detection (CBWRED)
	• Network-Based Application Recognition (NBAR)
	• Link fragmentation and interleaving (LFI)
	• Resource Reservation Protocol (RSVP)
	• Real-Time Transport Protocol (RTP) header compression (cRTP)
	• Differentiated Services (DiffServ)
	• QoS preclassify and prefragmentation
	• Hierarchical QoS (HQoS)
Management features	• Cisco IoT Field Network Director and Industrial Operations Kit
	• Cisco Configuration Professional
	• Cisco Configuration Express
	• Cisco Configuration Engine support
	• Cisco AutoInstall
	• IP service-level agreement (IP SLA)
	• Cisco IOS Embedded Event Manager (EEM)
	• Cisco Prime
	• Cisco Security Manager
	• Telnet, SNMPv3, Secure Shell (SSH) Protocol, CLI, and HTTP management
	• RADIUS and TACACS+
	• Out-of-band management with external modem through virtual auxiliary port
High-availability features	• Virtual Router Redundancy Protocol (VRRP) (RFC 2338)
	• Hot Standby Router Protocol (HSRP)
	• Multigroup HSRP (MHSRP)
	• Dial backup with external modem through virtual auxiliary port
	• Dual SIM support for cellular multihoming
Metro Ethernet features	• Ethernet operations, administration, and maintenance (OAM)
	• Ethernet Local Management Interface (LMI)
	• IP SLA for Ethernet

Feature	Description
IPv6 features	● IPv6 addressing architecture ● IPv6 name resolution ● IPv6 statistics ● IPv6 translation: transport packets between IPv6-only and IPv4-only endpoints (NAT-PT) ● Internet Control Message Protocol Version 6 (ICMPv6) ● IPv6 DHCP
Number of recommended users	20

Table 4 lists the system specifications, and Table 6 lists antenna specifications for Cisco 829 Industrial Integrated Services Routers.

Table 4.   System Specifications

Feature	Specification
Memory	
Default and maximum DRAM	2 GB
Default and maximum flash memory	8 GB eMMC (4GB usable)
IP rating	IP40 (IP54 with optional kit guard)
Interface Support	
Console	● Mini type-B: also supports remote 4G LTE diagnostics and monitoring tools
WAN interfaces	● Wireless WAN with multimode 4G LTE, 3.7G, 3.5G, 3G and 2G speeds ● SFP for copper and fiber options
802.11n Wi-Fi wireless interface	● 2x2 (2.4GHz) 802.11n MIMO and 2x2 (5GHz) 802.11n MIMO ● Up to 300 Mbps data rate per radio
WLAN features	● 2 x 3 multiple-input multiple-output (MIMO) with two spatial streams ● Maximal ratio combining (MRC) ● Legacy beamforming ● 20- and 40-MHz channels ● PHY data rates up to 300 Mbps ● Packet aggregation: A-MPDU (Tx/Rx), A-MSDU (Tx/Rx) ● 802.11 dynamic frequency selection (DFS) ● Cyclic shift diversity (CSD) support
LAN interfaces	● Four 10/100 Fast Ethernet ports
LEDs	● System OK (green/amber) ● Activity (green) ● Speed and link for Gigabit Ethernet WAN port (green) ● Speed and link for all Fast Ethernet LAN ports (green)
Serial interface	● 1 RS-232 and 1 RS-232/RS-485 ● Supports asynchronous modes
Serial protocol support	● SCADA, DNP3, T101-104 translations
Physical Characteristics	
Physical dimensions (H x W x D)	1.73 x 11 x 7.7 in. (43.9 x 279 x 196 mm) and 1.73 x 11 x 10.55 in (43.9 x 279 x 268 mm) with IP54 cable guard
Weight	4.5 lbs. (2 kg)
Mounting options	Panel/door mount
Mean time between failure (MTBF - ground benign)	5,477,730 hours (in a fixed environment with PoE module)
Maximum platform power consumption	40 Watts without PoE and 70 Watts with PoE

Feature	Specification
Environmental operating range	-40° to 140°F (-40° to 60°C) in a sealed NEMA cabinet with no airflow -40° to 158°F (-40° to 70°C) in a vented cabinet with 40 lfm of air -29.2° to 167°F (-34° to 75°C) in a forced air enclosure with 200 lfm of air
Operating altitude	Maximum altitude: 13.800 ft.
Standard safety certifications	• UL 60950-1, 2nd edition • CAN/CSA C22.2 No. 60950-1, 2nd edition • EN 60950-1, 2nd edition • CB to IEC 60950-1, 2nd edition with all group differences and national deviations • EN50155 • Non-NEBS 3396 • RoHS compliant
EMC emissions	EN55022/CISPR22, CFR 47 Part 15, ICES003, EN300-386, EN61000-3-2, EN61000-3-3, and EN61000-6-1
EMC immunity	EN55024/CISPR24, (EN61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-5, EN61000-4-6, EN61000-4-11), and EN300-386
Radio immunity	EN301 489-1, EN 301 489-7, and EN301 489-24
Cellular radio	EN 301 908-1, EN 301 908-2, EN 301 511, 47 CFR Part 22, 47 CFR Part 24 and EN 301 908-13
Power requirement	Nominal voltage: 12V, 24V DC Min/max voltage: 9-32V DC input Max/Min current: 7.8 A, 2.8 A

Table 5.   LED specifications

LED	Activity	Color(s)	Description
PWR	Power Status	Bicolor Green/ Yellow	Off: no power Green Steady on: normal operation Green Blink: boot up phase or in ROM Monitor mode Yellow: Power OK but FPGA is not programmed Yellow Blink: the system has issues but has network connectivity
GE LAN	Link Status/ POE Status GE[3:0]	Bicolor Green/ Yellow	Off: No link Green Steady on: link Green Blink: TXD/RXD data Yellow: POE Fault, implies no link
GE WAN	Link Status	Green	Off: No link Steady Green: link Blink: TXD/RXD data
POE	POE Power Supply Status	Bicolor Green/ Yellow	Off: No -54V PoE power supply detected or no PoE board installed Green Steady on: -54V POE power supply good and all powered port operating normally Yellow Steady on: -54V POE power supply good but one or more POE ports has a fault.
WLAN	Link/Status[1:0]	Tricolor Red/ Green/ Yellow	Off: Radio is down (no SSID configured) Blinking Green: Bootloader, IOS Ethernet Init, IOS Start Up, IOS Start Up - after system init Green->Red->Yellow: Discovery/Join Process Chirping Green: Joined to a controller Green: One wireless client associated

LED	Activity	Color(s)	Description
3G/4G	Modem0 RSSI [2:0] Modem1 RSSI [2:0]	Green and Bicolor Green/ Yellow	RSSI is a 3 LED bar graph, LEDs are lit as follows: {table}
	Activity0 Activity1	Green Green	Off: Module not powered On: Module is powered on and connected but not transmitting or receiving Slow Blink: Module is powered on and searching for connection Fast Blink: Module is transmitting or receiving.
	GPS	Green	Off: GPS not configured On: GPS acquired Slow Blink: GPS acquiring in Standalone GPS Fast Blink: GPS acquiring in Assisted GPS (Slow blink: In a cycle of 1 second, GPS LED will be 'ON' for 0.25 seconds and 'OFF' for 0.75 seconds. Fast blink: In a cyle of 0.5 seconds, GPS LED will be 'ON' for 0.25 seconds and 'OFF' for 0.25 seconds.)
	USIM[1:0]	Green	Off: No USIM Green: USIM installed and active
VPN	VPN	Green	Off: no tunnel Steady Green: at least one tunnel is up
MST	Module Status[1:0]	Tricolor Red/ Green/ Yellow	BYOI module dependent

RSSI bar graph table:

RSSI	RSSI[2]	RSSI[1]	RSSI[0]
	Green	Green	Green/Yellow
<110dBm	Off	off	off
-110~90dBm	Off	off	yellow
-90~75dBm	Off	off	green
-75~-60dBm	Off	green	green
>-60dBm	green	green	green

Table 6.   Antenna Specifications

Item	Specification
ANT-5-4G2WL2G1-O	**Description: Cisco Quinta 5 element 5-in-1 transportation antenna** ● 2x 4G cellular, 2x dual band WiFi (2.4 GHz / 5GHz), 1xGPS ● Color: Black radome ● RoHS compliant ● Environment: Outdoor
ANT-2-WLAN-D-O	**Description: Cisco Quinta 2 element 2-in-1 transportation antenna** ● 2x dual band WiFi (2.4 GHz / 5GHz) ● Color: Black radome ● RoHS compliant ● Environment: Outdoor

Item	Specification
ANT-4G-OMNI-OUT-N	**Description: Cisco outdoor omnidirectional antenna for 2G, 3G, and 4G LTE cellular** • UV-stable radome • Mast-mounting bracket • Applicable for both 2G and 3G solutions • Domestic LTE 700 band and global LTE 2600 band • Domestic cellular and global GSM **Electrical Specifications:** • **Frequency ranges:** 698 to 960 MHz, 1710 to 2170 MHz, and 2300 to 2700 MHz • **Nominal gain (dBi):** 698 to 960 MHz = 1.5 dBi, and 1710 to 2700 MHz = 3.5 dBi • **3 dB beam width (E plane):** 698 to 960 MHz = 81 degrees, 1710 to 2170 MHz = 75 degrees, and 2300 to 2700 MHz = 100 degrees • **3 dB beam width (H plane):** 360 degrees, omnidirectional • **Polarization:** Vertical and linear • **Normal impedance:** 50 ohms • **VSWR:** < 2.5:1 (698 to 960 MHz) and < 2.0:1 (1710 to 2690 MHz) • **Radiation pattern:** Omnidirectional **Mechanical Specifications:** • **Mount style:** Mast mount, upright position only • **Environment:** Outdoor • **Connector:** N-type socket • **Antenna length (height):** 9.8 x 1 in. (24.9 x 2.45 cm) • **Weight:** 1.5 lb. (0.68 kg) • **Dimensions (H x Outside dimensions):** 9.8 x 1 in. (248 x 24.5 mm) • **Operating temperature range:** -22° to 158°F (-30° to 70°C) • **Storage temperature:** -40° to 185°F (-40° to 85°C) • **Maximum power:** 20W • **Radome:** Polycarbonate, UV, white **Material substance compliance:** ROHS compliant
ANT-4G-PNL-OUT-N	**Description - Cisco multiband panel outdoor 4G LTE antenna:** • Supports 3G and 4G LTE solutions • Supports bands • Wall mount and mast mount • Indoor and outdoor • Dual type-N socket connector **Electrical specifications:** • Frequency Ranges: 698 to 960 MHz and 1710 to 2700 MHz • VSWR: 2.0:1 maximum • Gain: 5.5 to 10.5 dBi (698 to 960 MHz) and 6.5 to 9.0 dBi (1710 to 2700 MHz) • 3-dB beam width (vertical plane): 55 to 70 degrees = 698 to 960 MHz, 53 to 98 degrees = 1710 to 2200 MHz, 60 to 70 degrees = 2200 to 2500 MHz, and 55 to 70 degrees = 2500 to 2700 MHz • 3-dB beam width (horizontal plane): 55 to 70 degrees = 698 to 960 MHz and 50 to 90 degrees = 1710 to 2200 MHz • F/B ratio: > 15 dB, typical 20 dB = 698 to 960 MHz, and > 17 dB, typical 23 dB = 1700 to 2700 MHz • Isolation: > 30 dB • Polarization: Slant +/- 45 degrees • Nominal impedance: 50 ohms • Radiation pattern: directional **Mechanical specifications:** • Mount style: wall or mast mount • Environment: Outdoor • Connector: Dual type N female (direct connect or dual 12 in (30 cm)) • Antenna length (height): 11.6" (2.95 cm) • Temperature Range (Operating): -22 to 158-degrees F (-30 to 70-degrees C) • Storage temperature: -40 to +85° C • Wind rating: 160 Km/H • IP rating: IP 54 • Radome: Polycarbonate, UV resistant, white Material substance compliance: ROHS compliant

Item	Specification
ANT-4G-SR-OUT-TNC	**Description - Cisco integrated 4G LTE low-profile outdoor saucer antenna:** ● Applicable for both 3G and 4G LTE solutions ● Domestic LTE 700 band and global LTE 2600 band ● Domestic cellular and global GSM ● Weatherproof UV stable radome ● Performance optimized ● Excellent flame rating **Electrical specifications:** ● Frequency ranges: 698 to 960 MHz and 1710 to 2700 MHz ● Peak gain with 1-ft cable: 1.5 dBi (698 to 960 MHz) and 3.7 dBi (1710 to 2700 MHz) ● Peak gain with 15-ft cable: 0.8 dBi (698 to 960 MHz) and 0.2 dBi (1710 to 2700 MHz) ● Average efficiency with 1-ft cable: 90% (698 to 960 MHz) and 82% (1710 to 2700 MHz) ● Average efficiency with 15-ft cable: 60% (698 to 960 MHz) and 40% (1710 to 2700 MHz) ● Nominal impedance: 50 ohms ● VSWR (maximum): 2.0:1 (698 to 960 MHz) and 2.0:1 (1710 to 2700 MHz) **Mechanical specifications:** ● H-plane 3 dB beam width: omnidirectional ● Polarization: linear and vertical ● Power: 3W ● Cable: 15-ft LMR 195 ● RF connector: Type N (f); TNC (plug) available ● Mount style: Ceiling mount ● Radome: PC/ABS, UV stable, black ● Material substance compliance: RoHS compliant ● Operational temperature: -22° to 158°F (-30° to 70°C) ● Storage temperature: -40° to 185°F (-40° to 85°C) ● Environment: Indoor Dimensions (H x Outside dimensions): 3.4 x 7.9 in. (87 x 200 mm)
ANT-4G-DP-IN-TNC	**Description - Cisco indoor swivel-mount dipole antenna:** ● Low-profile blade style sheath ● Applicable for both 3G and 4G solutions ● Domestic LTE 700 and global LTE 2600 bands ● Domestic cellular and global GSM ● Conformance to RoHS ● Complete cellular and 3G and 4G data communications in a single antenna **Electrical specifications:** ● Operating frequency ranges: 698 to 806 MHz, 824 to 894 MHz, 880 to 960 MHz, 1710 to 1880 MHz, 1850 to 1990 MHz, 1920 to 2170MHz, 2100 to 2500 MHz and 2500 to 2690 MHz ● Peak gain: 0.5 dBi (698 to 960 MHz) and 2.2 dBi (1710 to 2700 MHz) ● Average efficiency: 55% (698 to 960 MHz) 73% (1710 to 2700 MHz) ● Maximum input power: 3 watts ● Voltage standing wave ratio (VSWR): < 2.5:1 ● Characteristic impedance: 50 ohms ● Polarization: linear **Mechanical specifications:** ● Type: dipole ● Antenna dimensions (L x W x D): 229 mm x 30.5 mm x 15 mm ● Mount style: direct mount ● Environment: indoor ● RF Connector: TNC (m) ● Antenna weight: 49 g ● Temperature rating: -31 to 158 degrees F (-35 to +70 degrees C)
4G-LTE-ANTM-O-3-X	**Description:** ● Multiband low-profile indoor or outdoor omnidirectional antenna (IP67 ingress protection) ● Ceiling mount, dual 4G LTE and standalone GPS **Electrical specifications:** ● Frequency range: 698 to 960 MHz and 1710 to 2700 MHz

Item	Specification
	● Gain: 2.5 dBi ● Maximum power: 3W ● Connector: SMA with TNC male adapters, and SMA for GPS ● VSWR: < 2.5:1 ● Nominal impedance: 50 ohms ● Polarization: linear vertical **Mechanical specifications:** ● Radome material: white, black, red, or blue ABS, UL-94 V0 ● Cable: 4 ft. RG174 VW-1 compliant ● Height and base diameter: 90 mm and 137 mm ● Temperature rating: -40° to 185°F (-40° to 85°C) ● Mounting: 5/8 inch lug with serrated face nut (5/8 inch diameter hole through mounting surface) ● Can be used with the following cable extensions: 4G-CAB-ULL-20 and 4G-CAB-ULL-50
4G-ANTM-OM-CM	**Description:** ● Multiband indoor omnidirectional antenna ● Ceiling mount **Electrical Specifications:** ● Frequency range: 698 to 960 MHz, 1575 MHz, and 1710 to 2690 MHz ● Gain: 1 and 1.5 decibels relative to isotropic (dBi) (700 to 960 MHz), 1.7 and 3.2 dBi (1700 to 2200 MHz), 3 and 4 dBi (2500 to 2700 MHz) ● Maximum power: 50W ● Connector: TNC male ● VSWR: 2.0:1 and 3.01:1 or less for GPS ● Nominal impedance: 50 ohms ● Polarization: linear vertical **Mechanical specifications:** ● Radome material: white ABS ● Dimensions (outside dimensions x height): 5.64 in. x 2.0 in. (143.3 X 50.8 mm) ● Weight: 6.0 oz. (170.1 g ● Temperature rating: -40° to 185°F (-40° to 85°C) ● Can be used with the following cable extensions: 3G-CAB-ULL-20 and 3G-CAB-ULL-50
4G- LTE-ANTM-D	**Description:** ● Cisco 4G LTE and 3G omnidirectional dipole antenna ● Articulating joint; can be rotated 360 degrees and is capable of maneuvering into three stop positions: 0 degrees, 45 degrees, and 90 degrees ● Plug-threaded TNC connector: Directly mount the antenna on the 829 with a TNC connector; the threads on the connector must comply with the ANSI 7/16-28 UNEF 2B thread specification ● Multiband swivel-mount dipole antenna ● Faceplate mount (dual units included with all Cisco 4G LTE WWAN) **Electrical specifications:** ● Operating frequency ranges: 698 to 806 MHz, 824 to 894 MHz, 925 to 960 MHz, 1710 to 1885 MHz, 1920 to 1980 MHz, 2110 to 2170 MHz, and 2500 to 2690 MHz ● Maximum peak gain: 2 dBi ● Maximum input power: 3W ● Connector: TNC plug ● Voltage standing wave ratio (VSWR): < 2.5:1 or less ● Characteristic impedance: 50 ohms **Mechanical specifications:** ● Antenna dimensions (L x W x D): 9 x 1.2 x 7/16 in. (229 x 30.5 x 11 mm) ● Temperature rating: -22° to 158°F (-30° to 70°C) ● Antenna base and random color: Cisco Raven Black
Antenna extension **4G-AE015-R**	**Description:** ● Single-unit antenna extension base (15 ft [457.2 cm]) **Electrical specifications:** ● Frequency range: 6 GHz ● Attenuation: less than 3 dB at or below 2.5 GHz

Item	Specification
	● Base connector: TNC socket
	● Pigtail connector: TNC plug
	Mechanical specifications:
	● Base material: Cisco gray UL94 V0 PC/ABS plastic
	● Dimensions: 2.8 x 2.4 x 1.8 in. (7.1 x 6.1 x 4.6 cm)
	● Weight: 6 oz. (0.17 kg)
	● Cable: 15 ft. (457.2 cm) non-plenum rated Pro-Flex Plus 195
Antenna extension 4G-AE010-R	**Description:**
	● Single-unit antenna extension base (10 ft [304.8 cm], one cable included)
	Electrical specifications:
	● Frequency range: 6 GHz
	● Attenuation: less than 3 dB at or below 2.5 GHz
	● Base connector: TNC socket
	● Pigtail connector: TNC plug
	Mechanical specifications:
	● **Base material:** UL 94 V0PC and ABS plastic
	● **Dimensions:** 2.8 x 2.4 x 1.8 in. (7.1 x 6.1 x 4.6 cm)
	● **Weight:** 6 oz. (0.17 kg)
	● **Cable:** 10 ft. (304.8 cm) nonplenum-rated Pro-Flex Plus 195
AIR-ANT5170P-R	**Description: Cisco Aironet 7-dBi Diversity Patch Antenna**
	Antenna type: diversity patch
	Operating frequency range: 5150 to 5850 MHz
	Nominal input impedance: 50 Ohms
	2:1 VSWR bandwidth: 5150 to 5850 MHz
	Peak Gain: 7 dBi
	Polarization: vertical
	E-Plane 3-dB beamwidth: 50 degrees
	H-Plane 3-dB beamwidth: 70 degrees
	Length: 5.7 in. (14.5 cm)
	Width: 4.3 in. (10.9 cm)
	Height: 0.7 in. (1.8 cm)
	Weight: 8 oz. (0.2 kg)
	Connector type: RP-TNC plug
	Environment: indoor and outdoor
	Operating temperature range: -22°F - 158°F (-30°C -70°C)
	Storage temperature range: -40°F - 185°F (-40°C - 85°C)
	Wind rating: 80 mph (128.7 kph)
AIR-ANT2413P2M-N	**Description: Cisco Aironet 2.4-GHz 13-dBi Directional Antenna**
	Antenna type: two-element patch array
	Operating frequency range: 2400 - 2500 MHz
	Nominal input impedance: 50 Ohms
	Peak Gain: 13 dBi
	Polarization: linear, dual
	E-Plane 3-dB beamwidth: 30 degrees
	H-Plane 3-dB beamwidth: 30 degrees
	Length: 7.8 in. (19.8 cm)
	Width: 7.8 in. (19.8 cm)
	Height: 1.2 in. (3 cm)
	Weight: 21.6 oz. (0.61 kg)
	Connector type: N male
	Environment: outdoor
	Operating temperature range: -40°F to 131°F (-40°C to 55°C)
AIR-ANT5114P2M-N	**Description: Cisco Aironet 5-GHz 14-dBi Directional Antenna**
	Antenna type: Two element patch array
	Operating frequency range: 5150 - 5900 MHz

Item	Specification
	Nominal input impedance: 50 Ohms Peak Gain: 14 dBi Polarization: linear, dual E-Plane 3-dB beamwidth: 30 degrees H-Plane 3-dB beamwidth: 30 degrees Sidelobe level: < -15 dBc Front-to-back ratio: > 25 dB Length: 7.8 in. (19.8 cm) Width: 7.8 in. (19.8 cm) Height: 1.2 in. (3 cm) Weight: 21.6 oz. (0.61 kg) Connector type: N male Environment: outdoor Operating temperature range: -40°F to 131°F (-40°C to 55°C)
AIR-ANT2547V-N	**Description: Cisco Aironet Dual-Band Omnidirectional Antenna** Antenna type: Omnidirectional colinear array Operating frequency range: 2400–2483 MHz; 5150-5875 MHz 2:1 VSWR bandwidth: 2400-2483 MHz; 5150-5875 MHz Nominal input impedance: 50 Ohms Gain (2400-2483 MHz): 4-dBi Gain (5250-5875 MHz): 7-dBi Polarization: Linear E-plane 3-dB beamwidth: 30° for 2.4-GHz; 14° for 5-GHz H-plane 3-dB bandwidth: Omnidirectional Length: 11.1 in. (28.2 cm) Diameter: 1.25 in. (3.17 cm) Weight: 6.0 oz. (170.0 g) Connector type: N-Male Operating temperature: -40° to 185°F (-40° to 85°C) Water/Foreign Body Ingress: IP66, IP67 Wind rating: 100 mph (161 kph) operational 165 mph (265 kph) survival
AIR-ANT2547V-N-HZ	**Description: Cisco Aironet Dual-Band Omnidirectional Antenna**
AIR-ANT4941	**Description: Cisco Aironet 2.4 Ghz Articulated Dipole Antenna** Antenna type: Dipole Operating frequency range: 2402-2495 MHz 2:1 VSWR bandwidth: 2385 - 2515 Mhz Nominal input impedance: 50 Ohms Peak Gain 2 dBi Polarization: Linear, vertical E-plane 3-dB beamwidth: 70° H-plane 3-dB bandwidth: Omnidirectional Dimension: 5.5 in. (13 cm) Weight: 1 oz. Connector type: RP-TNC plug Environment: Indoor Operating temperature: 32oF to 140oF (0oC to 60oC)
AIR-ANT5135	**Description: Cisco Aironet 3.5-dBi Articulated Dipole Antenna** Antenna type: Dipole Operating frequency range: 5150 - 5850 MHz 2:1 VSWR bandwidth: 5150 - 5850 MHz Nominal input impedance: 50 Ohms Gain 3.5 dBi Polarization: Linear, vertical E-plane 3-dB beamwidth: 40° H-plane 3-dB bandwidth: Omnidirectional

Item	Specification
	Length: 5.3 in. (13.4 cm) Radome length: 3.4 in. (8.6 cm) Width: 0.62 in. (1.5 cm) Connector type: RP-TNC plug Environment: Indoor, office Operating temperature: -22°F - 158°F (-30°C - 70°C)
AIR-ANT1728	**Description: Cisco Aironet High Gain Omnidirectional Ceiling Mount Antenna** Antenna type: Dipole Operating frequency range: 2.4- to 2.483-GHz VSWR bandwidth: Less than 2:1, 1.5:1 nominal Nominal input impedance: 50 Ohms Gain 5.2 dBi Polarization: Vertical E-plane 3-dB beamwidth: 40° H-plane 3-dB bandwidth: Omnidirectional Cable length and type: 3 ft (0.91 m) Plenum rated RG-58 Dimensions (H x W): 11.5 in. x 1.25 in. (29.2 cm x 3.2 cm) Weight: 4.6 oz (131 g) Length: 7.8 in. (19.8 cm) Width: 7.8 in. (19.8 cm) Height: 1.2 in. (3 cm) Weight: 21.6 oz. (0.61 kg) Connector type: N male Environment: outdoor Operating temperature range: -40°F to 131°F (-40°C to 55°C)
AIR-ANT5160V-R	**Description: Cisco Aironet 6-dBi Omnidirectional Antenna** Antenna type: Omnidirectional colinear array Operating frequency range: 5150-5875 MHz 2:1 VSWR bandwidth: 5150-5850 MHz Nominal input impedance: 50 Ohms Peak Gain 6 dBi Polarization: Linear E-plane 3-dB beamwidth: 17° H-plane 3-dB bandwidth: Omnidirectional Cable length and type: 36 in. (91.4 cm) Plenum rated Length: 11.5 in. (29.2 cm) Diameter: 1 in. (2.5 cm) Weight: 12 oz. (0.34 kg) Width: 0.62 in. (1.5 cm) Connector type: RP-TNC Male Operating temperature: -22°F - 158°F (-30°C - 70°C) Environment: Indoor/outdoor
AIR-ANT24020V-R	**Description: Cisco Aironet 2.4-GHz Diversity Omnidirectional Antenna** Antenna type: Diversity omnidirectional Operating frequency range: 2400-2500 MHz VSWR: 1.5:1 Peak Gain 2.2 dBi Polarization: Linear Azimuth plane (3 dB beamwidth): Ominidirectional Elevation plane (3 dB beamwidth): 97° Length: 6.9 in (17.5 cm) Width: 3 in (7.6 cm) Depth: <1 in (< 2.5 cm) Cable: 3 ft. (91.4 cm) plenum rated, UV stable Connector type: RP-TNC Operating temperature: 32° F to 131° F (0° C to 55° C) Environment: Indoor

Item	Specification
AIR-ANT2465P-R	**Description: Cisco Aironet 6.5-dBi Diversity Patch Antenna** Antenna type: Diversity patch Operating frequency range: 2400 - 2484 MHz 2:1 VSWR bandwidth: 2400 - 2484 MHz Peak Gain 6.5 dBi Polarization: Linear, vertical E-plane 3-dB beamwidth: 65° H-plane 3-dB beamwidth: 75° Front-to-back ratio: 15 dB Cross-pol discrimination: 15 dB Cable length and type: 36 in. (91.4 cm) Times AA-9303 or equivalent (plenum rated) Connector type: RP-TNC Length: 4.4 in. (11.1 cm) Width: 6.6 in. (16.7 cm) Height: 1 in. (2.5 cm) Operating temperature: -22°F to 158°F (-30°C to 70°C) - Environment: Indoor/outdoor
AIR-ANT5145V-R	**Description: Cisco Aironet 4.5-dBi Low Profile Omnidirectional Antenna** Antenna type: Omnidirectional TM02 Mode Patch Operating frequency range: 5150 - 5850 MHz 2:1 VSWR bandwidth: 5000 - 6000 MHz Gain 4.5 dBi Polarization: Linear E-plane 3-dB beamwidth: 50° H-plane 3-dB beamwidth: Omnidirectional Front-to-back ratio: 10 dB Cable length and type: 36 in. (91.4 cm) Plenum rated UV stable LMR-185 Connector type: 2 RP-TNC Male Length: 5 in. (12.7 cm) Width: 3 in. (7.6 cm) Height: 0.75 oz (21.2 g) Operating temperature: -22°F - 158°F (-30°C - 70°C) UL2043 compliant: Yes Environment: Indoor, office
AIR-ANT2524DB-R	**Description: Cisco Aironet Dual-band Dipole Antenna** Antenna type: Dual-band dipole Operating frequency range: 2400 to 2500 MHz; 5150 to 5850 MHz VSWR: Less than 2:1 Nominal input impedance: 50 Ohms Peak Gain @ 2.4. GHz: 2 dBi Peak Gain @ 5 GHz: 4 dBi Elevation plane 3dB beamwidth @2.4 GHz: 63 degrees Elevation plane 3dB beamwidth @ 5 GHz: 39 degrees Connector type: RP-TNC plug Length: 6.63 in. (168.5 mm) Width: 0.83 in (21 mm) Weight: 1.3 oz Operating temperature: 20°C to 60°C (-4° to 140°F) Environment: Indoor, office
AIR-ANT2451V-R	**Description: Cisco Aironet Four-Element Dual-Band Omnidirectional Antenna** Antenna type: Omnidirectional Operating frequency range: 2400 to 2500 MHz; 5150 to 5850 MHz 2:1 VSWR bandwidth: 2400-2500 MHz 5150-5850 MHz Nominal input impedance: 50 Ohms Peak Gain (dBi): 2.4-GHz band: 2 5-GHz band: 3 Polarization: Linear

Item	Specification
	E-plane 3-dB beamwidth (degrees): 2.4-GHz band: 80 5-GHz band: 50
	H-plane 3-dB beamwidth: Omnidirectional
	Cable length and type: 18 in. (45.7-cm) plenum rated
	Connectors: Right angle RP-TNC male
	Length: 8.5 in. (21.5-cm)
	Width: 6 in. (15.2-cm)
	Height: 0.93 in. (2.4-cm)
	Radome material: UV stable ABS
	UL rating: UL-94 V0
	Operating temperature: -32°F to 122°F (0°C to 50°C)
	Environment: Indoor
GPS-ACT-ANTM-SMA	**Description: Cisco 4G Indoor/Outdoor Active GPS Antenna**
	Maximum input power: 1 W
	Connector: SMA male
	VSWR: 2:1 or less
	Characteristic impedance: 50 Ohm
	Antenna base and radome color: Black
	Antenna dimensions: 1.7 (L) x 1.4 (W) x 0.55 (H) in. (44 x 36 x 14mm)
	Operating temperature: -40° to 185°F (-40° to 85°C)
	Operating frequency ranges: 1574.42-1576.42 MHz
	Polarization: RHCP
	Maximum peak gain (at Boresight): 4 dBic
	Shocks: 50G
	Drop test: 10x3 axis / 1 meter drop 6 axis
	Cable Length: 17 ft (5.18 meters)
	Mount Bracket: Metal
	Anchor: 1 inch. The anchor drill size is 3/16.
	Screws: 3 stainless-steel screws that are self-drilling pan head #2 Phillips.

[*]-N antenna works with -N cables and -N lighting arrestor

Ordering Information

For Cisco829 Industrial Integrated Services Routers ordering information, visit the [Cisco Ordering home](#) page. See Tables 7 and 8.

Table 7.   Ordering Information

Product	Description
Cisco IR829GW 4G LTE Integrated Services Routers	
IR829GW-LTE-GA-EK9 and IR829GW-LTE-GA-ZK9	Compact Cisco IR829 Ruggedized Secure Multi-Mode 4G LTE M2M ISR with Qualcomm MDM9215 for Australia and Europe, LTE 800/900/1800/2100/2600 MHz, 850/900/1900/2100 MHz UMTS/HSPA+ bands and Dual WiFi Radio with ETSI
IR829GW-LTE-NA-AK9	Compact Cisco IR829 Ruggedized Secure Multi-Mode 4G LTE M2M ISR with Qualcomm MDM9615 for North America, LTE 700 MHz (band 17), 1900 MHz (band 2 PCS), or 1700/2100 MHz (band 4 AWS) networks; backward-compatible with UMTS and HSPA+: 850 MHz (band 5), 900 MHz (band 8), 1900 MHz (band 2 PCS), and 1700/2100 MHz (band 4 AWS). and Dual WiFi Radio with FCC
IR829GW-LTE-VZ-AK9	Compact Cisco IR829 Ruggedized Secure Multi-Mode 4G LTE M2M ISR with Qualcomm MDM9615 for Verizon in North America, LTE 700 MHz (band 13), 1700/2100 MHz (band 4 AWS), or 1900 MHz (band 25 extended PCS) networks; backward-compatible with EVDO Rev A/CDMA 1x BC0, BC1, BC10.and Dual WiFi Radio with FCC
Power Supplies and Mounting Brackets	
PWR2-20W-AC	AC power adapter for 829 routers (default)
ACS-810-FWM	Floor mount and wall mount kit for the Cisco 810 Series Routers
IR829-DINRAIL	DIN rail kit for the829
C810-POE-SPL	C810 POE+ power supply splitter
IR800-IL-POE	802.3af compatible POE module for Cisco 800 Series Routers
IR829-IP54-KIT	IP54 kit for the 829 router

Product	Description
IOS Software and Licenses	
SL-IR800-DATA-K9	Cisco 800 Series Data License
SL-IR800-SNPE-K9	Cisco 800 Series No Payload Encryption License
SL-IR800-SEC-K9	Cisco 800 Series Security License
SL-IR800-IPB-K9	Cisco 800 Series IP Base License
FW-MC7304-LTE-AU	Cisco Australia MC7304 modem image switching provisioning firmware
FW-MC7304-LTE-GB	Cisco Global MC7304 modem image switching provisioning firmware
FW-MC7354-LTE-AT	Cisco ATT MC7354 modem image switching provisioning firmware
FW-MC7354-LTE-CA	Cisco Canada MC7354 modem image switching provisioning firmware
FW-MC7350-LTE-VZ	Cisco Verizon MC7350 modem image switching provisioning firmware

Table 8.   Antenna Ordering Information

Description	Part Number
Multi-Band Integrated 3-in-1 Indoor/Outdoor IP67 Antenna with GPS	4G-LTE-ANTM-O-3-X 4G-LTE-ANTM-O-3-X= (Spare) X = R (Red); X = B (Black); X = W (White); X = C (Blue);
Multi-Band Swivel Mount Dipole Antenna-Faceplate Mount (dual included)	4G-LTE-ANTM-D 4G-LTE-ANTM-D= (Spare)
Multi-Band Omnidirectional Antenna-Ceiling Mount	4G-ANTM-OM-CM 4G-ANTM-OM-CM= (Spare)
Single Unit Antenna Extension Base (10-ft, one cable included)	4G-AE010-R 4G-AE010-R= (Spare)
Single Unit Antenna Extension Base (15-ft cable)	4G-AE015-R 4G-AE015-R= (Spare)
50-ft (15m) Ultra Low Loss LMR 400 Cable with TNC Connector	4G-CAB-ULL-50 4G-CAB-ULL-50= (Spare)
20-ft (6m) Ultra Low Loss LMR 400 Cable with TNC Connector	4G-CAB-ULL-20 4G-CAB-ULL-20= (Spare)
25-ft (7.5 m) Low Loss LMR 240 Cable with TNC Connector	4G-CAB-LMR240-25 4G-CAB-LMR240-25= (Spare)
50-ft (15 m) Low Loss LMR 240 Cable with TNC Connector	4G-CAB-LMR240-50 4G-CAB-LMR240-50= (Spare)
75-ft (23 m) Low Loss LMR 240 Cable with TNC Connector	4G-CAB-LMR240-75 4G-CAB-LMR240-75= (Spare)
Standalone active SMA GPS antenna with 17-ft (5 m)extender	GPS-ACT-ANTM-SMA GPS-ACT-ANTM-SMA= (Spare)
IR829 Power Cable Lock 25 units spare	IR829-PWRCAB-LCK25= (Spare)
Multiband Omni-Directional Stick Outdoor 4G Antenna	ANT-4G-OMNI-OUT-N
Multiband Low-Profile Saucer Outdoor 4G Antenna	ANT-4G-SR-OUT-TNC
Multiband Panel Outdoor 4G Antenna	ANT-4G-PNL-OUT-N
Indoor swivel-mount dipole antenna	ANT-4G-DP-IN-TNC
50-ft (15 m) Ultra Low Loss LMR 400 Cable TNC-N Connector	CAB-L400-50-TNC-N
20-ft (6 m) Ultra Low Loss LMR 400 Cable with TNC-N Connector	CAB-L400-20-TNC-N
20-ft (6m) Ultra Low Loss LMR 400 Cable with N Connectors	CAB-L400-20-N-N
Lightning Arrestor Kit: female to female	CGR-LA-NF-NF
Lightning Arrestor Kit: male to female	CGR-LA-NM-NF

[*] -N antenna works with -N cables and -N lighting arrestor

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For More Information

For more information about Cisco 829 Industrial Integrated Services Routers, visit http://www.cisco.com/go/ir829 or contact your local Cisco account representative.

For more information about Cisco IOx, visit http://www.cisco.com/go/iox or contact your local Cisco account representative.

Cisco and Partner Services for the Cisco ONE Enterprise Networks Architecture

Enable the Cisco ONE™ Enterprise Networks Architecture and the business solutions that run on it with intelligent, personalized services from Cisco and our partners. Backed by deep networking expertise and a broad ecosystem of partners, these services can help you plan, build, and run a network that enables you to expand geographically, embrace new business models, and promote business innovation. Whether you are looking to transition to a Cisco ONE Enterprise Networks Architecture, solve specific business problems, or improve operational efficiency, we have a service that can help you get the most from your IT environment. For more information, please visit http://www.cisco.com/go/services.

Warranty Coverage and Technical Service Options

The Cisco 829 Industrial Integrated Services Routers come with the Cisco 5-year limited hardware warranty. Adding a contract for a technical service offering such as Cisco SMARTnet® Service provides benefits not available with the warranty, including access to OS updates, Cisco.com online resources, and Cisco Technical Assistance Center (TAC) support services. Table 8 shows the available technical services.

For information about Cisco warranties, visit http://www.cisco.com/go/warranty.

For information about Cisco Technical Services, visit http://www.cisco.com/go/ts.

Table 9.   Cisco Technical Services for the Cisco 829 Industrial Integrated Services Routers

Technical Services
Cisco SMARTnet Service ● Global access to the Cisco TAC 24 hours a day ● Unrestricted access to the extensive Cisco.com resources, communities, and tools ● Next-business-day, 8 x 5 x 4, 24 x 7 x 4, and 24 x 7 x 2 advance hardware replacement[1] and onsite parts replacement and installation available ● Ongoing operating system software updates within the licensed feature set[2] ● Proactive diagnostics and real-time alerts on Smart Call Home-enabled devices
Cisco Smart Foundation Service ● Next-business-day advance hardware replacement as available ● Business-hours access to small and medium-sized business (SMB) Cisco TAC (access levels vary by region) ● Access to Cisco.com SMB knowledge base ● Online technical resources through Smart Foundation Portal ● OS software bug fixes and patches

[1] Advance hardware replacement is available in various service-level combinations. For example, 8 x 5 x next business day (NBD) indicates that shipment will be initiated during the standard 8-hour business day, 5 days a week (the generally accepted business days in the relevant region), with NBD delivery. Where NBD is not available, same-day shipment is provided. Restrictions apply; review the appropriate service descriptions for details.

[2] Cisco OS updates include maintenance releases, minor updates, and major updates within the licensed feature set.

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