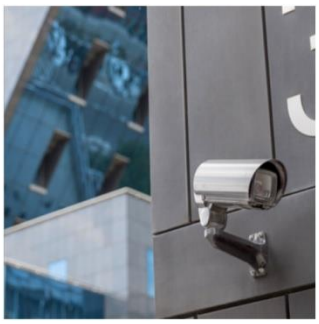
Cisco 829 Industrial Integrated Services Routers

Cisco® 829 Industrial Integrated Services Routers are ruggedized integrated services routers designed for deployment in harsh industrial environments.



The 829 Industrial Integrated Services Routers (IR829) have a compact form factor, integrated 9-32 VDC power input, multimode 3G and 4G LTE wireless WAN (single LTE and dual active LTE models), IEEE 802.11a/b/g/n WLAN, Ethernet (RJ45 and SFP) and Serial connections. The IR829 also extends the connectivity to include low-power wide-area (LPWA) access using Cisco Interface Module for LoRaWANTM. 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, and humidity, as well as a wide temperature range (-40°C to +60°C and type-tested at +85°C for 16 hours). The IR829 brings together enterprise-grade wireline-like services such as quality of service (QoS), Cisco advanced VPN technologies (DMVPN and Flex VPN) and multi-VRF for WAN, 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 (Single LTE or Dual Active LTE) and Dual 802.11 a/b/g/n (2.4 GHz/5 GHz WiFi) Radios

Product Overview

The IR829 supports the latest Third-Generation Partnership Project (3GPP), Release 9, Category 3 and Category 4 LTE standards. The routers provide persistent, reliable LTE connectivity transparent hand-offs between LTE and 3G networks.

The following models are available:

- **IR829-2LTE-EA-BK9, IR829-2LTE-EA-EK9 and IR829-2LTE-EA-AK9[*]:** Dual active LTE connectivity for WAN redundancy and load balancing features with each modem supporting multimode 4G/3G for carriers operating in FDD LTE 2100 MHz (band 1), 1900 MHz (band 2, band 25), 1800 MHz (band 3), 1700 MHz (band 4), 850 MHz (band 5, band 26), 2600 MHz (band 7), 700 MHz (band 12, band 13, band 29), 700 MHz (band 17), 800 MHz (band 20), 1900 MHz (band 25), 850 MHz (band 26), 700 MHz (band 29) and TDD LTE 2500 MHz (band 41); backward-compatible with WCDMA 2100 MHz (band 1), 1900 MHz (band 2), 1800 MHz (band 3), 1700 MHz (band 4), 850 MHz (band 5), 900 MHz (band 8). Dual 802.11n a/g/n 2.4GHz and 5GHz WiFi radios.
- **IR829GW-LTE-LA-[*]K9:** Multimode 4G/3G connectivity to cellular networks operating in FDD LTE 2100 MHz (band 1), 1800 MHz (band 3), 850 MHz (band 5), 2600 (band 7), 900 (band 8), 850 (band18, band19), 1500 (band 21), 700 (band 28) and TDD LTE 2600 (band 38), 1900 (band 39), 2300 (band 40) and 2500 (band 41); backward-compatible with WCDMA 2100 MHz (band 1), 850 MHz (band 5), 800 MHz (band 6, band 19), 900 MHz (band 8), 1700 MHz (band 9) and TD-SCDMA 1900 MHz (band 39). Dual 802.11n a/g/n 2.4GHz and 5GHz WiFi radios.
- **IR829GW-LTE-NA-AK9:** Multimode 4G/3G/2G connectivity to cellular networks operating in LTE 1900 MHz (band 2 PCS), 1700/2100 MHz (band 4 AWS), 850 MHz (band 5), 700 MHz (band 17) and 1900 MHz (band 25 extended PCS) 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). Dual 802.11n a/g/n 2.4GHz and 5GHz WiFi radios.
- **IR829GW-LTE-VZ-AK9:** Multimode 4G/3G/2G connectivity to cellular networks 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. Dual 802.11n a/g/n 2.4GHz and 5GHz WiFi radios.
- **IR829GW-LTE-GA-EK9, IR829GW-LTE-GA-ZK9, IR829GW-LTE-GA-CK9 and IR829GW-LTE-GA-SK9:** Multimode 4G/3G/2G connectivity to cellular networks 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). Dual 802.11n a/g/n 2.4GHz and 5GHz WiFi radios.

  [*] - WiFi regulatory domain. Please refer to table-2 for the list of models and countries supported.

[*] Available in 2H of CY17

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 IR829 supports enterprise-class built-in Wireless LAN (WLAN) capability with Autonomous and Unified mode options. The 802.11a/b/g/n 2X2 MIMO built in the IR829 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 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 IR829 concurrently supports both 4G LTE wireless WAN and Cisco dual-radio WLAN backhaul on the same platform.

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

	**Dual active LTE connectivity[1].** With two LTE modems, the IR829 enables concurrent connectivity to two cellular networks for high reliability, enhanced data throughputs, load balancing and differentiated services.
	**Accelerometer and gyroscope** to monitor speed and angular momentum for automotive applications and to detect tampering.
	**Ignition Power Management** to keep the router up even when the vehicle ignition is turned off.
	**GPS** to enable real-time location tracking of remote assets.
	**Network management tools** such as Cisco IoT Field Network Director, Cisco Prime and APICEM simplifying deployment of a secure network head-end using the Cisco Industrial Operations Kit.

	**Security services,** such as HW cryptography including Cisco's Next Generation Encryption (http://www.cisco.com/c/en/us/about/security-center/next-generation-cryptography.html) that guarantees high performance for IPsec VPN traffic and firewall. 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 Gigabit Ethernet/Fast Ethernet WAN interface with ruggedized SFP options and a 4-port 10/100/1000 Ethernet managed switch with an optional module for Power-over-Ethernet (PoE) LAN connectivity enable seamless connectivity to IP based devices such as cameras, sensors and Programmable Logic Controllers (PLCs).
	Provides an open, extensible environment for hosting OS and applications at the network edge rather than in the Cloud
	**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. The single LTE model of the IR829 supports peak data rates of 100 Mbps on the downlink and 50 Mbps on the uplink. The dual LTE model doubles the throughput by supporting peak data rates of 150 Mbps on the downlink and 50 Mbps on the uplink on each of the two cellular links. Actual data speed depends on the service provider network. With single and dual 4G LTE options, the IR829s offer a flexible, redundant cellular connectivity for mission critical 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.
	**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 mission critical traffic emerging from the sensors and devices connected to the router.
	**4G LTE multiple-bearer QoS for cellular.** The IR829 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.** The IR829s support multi-VRF feature that allows customer to configure and maintain more than one instance of a routing and forwarding table within the same customer edge (CE) device. For service providers, this feature enables them to support two or more Virtual Private Networks (VPNs), where the IP addresses can overlap several VPNs.

[1] – Supported only by the IR829-2LTE-EA-BK9, IR829-2LTE-EA-EK9 and IR829-2LTE-EA-AK9

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. The IR829 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 IR829 can withstand severe weather and environmental conditions, such as extreme temperatures, high vibrations, and shocks often encountered on buses and trains. The IR829s 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 IR829 4G LTE routers allow an entire mobile network or subnet to stay connected. The dual-radio 2.4GHz and 5.0GHz WLAN on the IR829 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 IR829 provides DNP3 serial to DNP3/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) SCADA applications. ● 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.

Features	Benefits
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.
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 hardware-assisted high-speed IP Security (IPsec), Triple Data Encryption Standard (3DES) and next-generation encryption protocols such as Advanced Encryption Standard (AES) and Secure Hash Algorithm (SHA) offer data privacy over the Internet. • Intrusion prevention enforces security policies in a larger enterprise or service provider network.
Integrated WLAN access point	• Integrates the Cisco AP803 802.11 a/b/g/n access point with MIMO technology 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.
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 for switching capabilities. • Inter-VLAN routing capabilities. • 30W of PoE/PoE+ shared across the four Gigabit Ethernet interfaces.
Two serial interfaces	• Two asynchronous serial interfaces (one RS232 port and one RS232/RS485 port) that can be used with Raw Socket, Protocol Translation and IOx applications to provide two serial connections to local RTU for SCADA transport and RTU management.
WAN diversity	• Multiple WAN links are supported: Gigabit Ethernet or Fast Ethernet layer-3 SFP 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.
Dual active LTE interfaces[1]	• Concurrent connectivity to two cellular networks for high reliability, load balancing and differentiated services
LoRaWAN	• Extend the IR829 connectivity to include low-power wide-area (LPWA) access using Cisco Interface Module for LoRaWANTM. For more information, please visit http://www.cisco.com/c/en/us/products/routers/interface-module-lorawan
Transparent Roaming Between Wireless Networks	
Dual subscriber identity module (SIM) support[2]	• Dual SIM feature provides reliability and multihoming capabilities over LTE and HSPA-based networks. Note: Dual SIM active/backup mode is supported only on single LTE models of the IR829.
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.

Features	Benefits
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. • The next-generation protocol suites enable users to monitor potential malicious activity on the network. • IPsec over IPv4 & IPv6, IPsec stateful failover, VRF-aware IPsec, DMVPN, FlexVPN and PMIPv6
Routing	• Enables advanced routing capabilities using E-IGRP, MP-BGP, IPv4 and IPv6 on all interfaces including cellular, IPv4/IPv6 Multicast, Generic Routing Encapsulation (GRE) and multipoint GRE (MGRE), NAT, DNS Proxy and Spoofing, IP SLA and QoS
QoS features	• Provides traffic precedence to delay-sensitive or mission critical services • Facilitates low-latency routing of delay-sensitive industrial applications • Supported on all LAN and WAN interfaces including Cellular • LTE QoS with support for up to 8 concurrent bearers on each cellular WAN interface for traffic classification and prioritization
IP multicast	• Allows efficient broadcast of data or video for increased situational awareness, multiuser communications, or surveillance applications.
Management and manageability	• Network managers can remotely manage and monitor networks with SNMPv1/v2/v3, Telnet, or HTTP/HTTPS/SSHv2, 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 IR829 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.

[2] – The two SIMs operate in active/backup mode on the single LTE models of the IR829 and active/active mode with each of the two SIMs assigned to a specific cellular radio on the dual LTE models.

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-*K9	IR829GW-LTE-NA-AK9	IR829GW-LTE-VZ-AK9	IR829-2LTE-EA-*K9	IR829GW-LTE-LA-*K9
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 5 (850), 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)	LTE bands 1-5, 7, 12, 13, 17, 20, 25, 26, 29, 41	LTE bands 1, 3, 5, 7, 8, 18, 19, 21, 28, 38-41
Theoretical Download and upload speeds*	100 and 50 Mbps	100 and 50 Mbps	100 and 50 Mbps	150 and 50 Mbps	150 and 50 Mbps
Australia	✓	X	X	X	✓ IR829GW-LTE-LA-ZK9
Europe	✓	X	X	✓ IR829-2LTE-EA-EK9	X
Middle East	✓	X	X	✓	X

Region Theaters	IR829GW-LTE-GA-*K9	IR829GW-LTE-NA-AK9	IR829GW-LTE-VZ-AK9	IR829-2LTE-EA-*K9	IR829GW-LTE-LA-*K9
LATAM and APAC	✓ (Dependent on specific operators supporting the above LTE bands) IR829GW-LTE-GA-EK9 – Europe IR829GW-LTE-GA-ZK9 – Australia, New Zealand, Thailand and Philippines IR829GW-LTE-GA-CK9 - Malaysia IR829GW-LTE-GA-SK9 – Singapore	X	X	X	✓ IR829GW-LTE-LA-QK9 – Japan IR829GW-LTE-LA-DK9 – India IR829GW-LTE-LA-KK9 – Korea IR829GW-LTE-LA-NK9 – Panama IR829GW-LTE-LA-SK9 – Hong Kong IR829GW-LTE-LA-LK9[1] – Malaysia IR829GW-LTE-LA-HK9[1] – China
United States	X	✓ ATT	✓ Verizon	✓ ATT, Verizon IR829-2LTE-EA-BK9	X
Canada	X	✓	X	✓ IR829-2LTE-EA-AK9[1]	X

* WiFi regulatory domain

[1] Available in 2H of CY2017

Item	Specification
4G LTE modem form factor	• Embedded (included with the router) • Multiple firmware options available in the ordering tool to select a preferred cellular carrier **Note:** Please refer to table-2 for the details on carriers supported by each model.
Key 4G LTE features	• Single and dual LTE WAN support for WAN redundancy, high reliability and enhanced throughput • LTE QoS with support for up to 8 concurrent bearers on each cellular WAN interface for traffic classification and prioritization • Multiple Packet Data Networks (PDNs) • Automatic switch/failover between primary and backup links • IPv4 and IPv6 support • Multichannel interface processor (MIP) profile configuration • Send and receive SMS (maximum 160 characters) • 4G/3G MIB with extension and traps • 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) • The two SIMs operate in active/backup mode on the single LTE models of the IR829, and active/active mode with each of the two SIMs assigned to a specific cellular radio on the dual LTE models
Global positioning system (GPS) 	• GPS antenna: SMA connector (separate active GPS with SMA antenna option) • Enables location-based services such as geo-fencing, asset tracking and management • 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

Item	Specification
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])
Programming interfaces	• Cisco IOS Software command line interface (CLI)
Wireless technologies supported (performance and throughput)	**IR829GW-LTE-GA-*K9** (* WiFi regulatory domain) Cisco LTE 800 MHz (band 20), 900 MHz (band 8), 1800 MHz (band 3), 2100 MHz (band 1), and 2600 MHz (band 7) at Category 3 LTE speeds. 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 1900 MHz (band 2 PCS), 1700/2100 MHz (band 4 AWS), 700 MHz (band 17) at Category 3 LTE speeds. 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 700 MHz (band 13), 1700/2100 MHz (band 4 AWS), 1900 MHz (band 25 extended PCS) at Category 3 LTE speeds Backward compatibility: • EVDO Rev A/CDMA 1x BC0, BC1, BC10 **IR829-2LTE-EA-BK9, IR829-2LTE-EA-EK9 and IR829-2LTE-EA-AK9** Cisco Dual LTE FDD 2100 MHz (band 1), 1900 MHz (band 2, band 25), 1800 MHz (band 3), 1700 MHz (band 4), 850 MHz (band 5, band 26), 2600 MHz (band 7), 700 MHz (band 12, band 13, band 29), 700 MHz (band 17), 800 MHz (band 20), 1900 MHz (band 25), 850 MHz (band 26), 700 MHz (band 29) and TDD LTE 2500 MHz (band 41) at Category 4 LTE speeds. Backward compatibility: UMTS and HSPA+: 2100 MHz (band 1), 1900 MHz (band 2), 1800 MHz (band 3), 1700 MHz (band 4), 850 MHz (band 5), 900 MHz (band 8) Peak downlink rate: 150 Mbps Peak uplink rate: 50 Mbps **IR829GW-LTE-LA-*K9** (* WiFi regulatory domain) Cisco LTE FDD 2100 MHz (band 1), 1800 MHz (band 3), 850 MHz (band 5), 2600 (band 7), 900 (band 8), 850 (band18, band19), 1500 (band 21), 700 (band 28) and TDD LTE 2600 (band 38), 1900 (band 39), 2300 (band 40) and 2500 (band 41) at Category 4 LTE speeds. Backward compatibility: • UMTS and HSPA+: 2100 MHz (band 1), 850 MHz (band 5), 800 MHz (band 6, band 19), 900 MHz (band 8), 1700 MHz (band 9) and TD-SCDMA 1900 MHz (band 39) • Peak downlink rate: 150 Mbps • Peak uplink rate: 50 Mbps
LED indicators	• Refer to Table 5 for LED specifications

Note: * LTE data rates depend on the IR829 model, 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 the IR829

Feature	Description
Cisco IOS Software requirement	• Cisco IOS Software feature set: Universal Cisco IOS Software • Cisco IOS Software Release - 15.6(3)M1, or later, and modem firmware - 5.5.58, or later
IPv4 and IPv6 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) • 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)
Switch features	• Auto Media Device In/Media Device Cross Over (MDI-MDX) • 16 802.1Q VLANs • MAC filtering • Storm control • 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 **Cisco IOS Firewall:** • Zone-based policy firewall • VRF-aware stateful inspection routing firewall • 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 **Integrated Threat Control:** • Control Plane Policing • Flexible Packet Matching • Network foundation protection

Feature	Description
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) • 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 Application Policy Infrastructure Controller Enterprise Module (APICEM) • Cisco Universal Plug and Play (UPnP) • Cisco Configuration Professional Express • Cisco Configuration Engine support • Cisco AutoInstall • IP service-level agreement (IP SLA) • Cisco IOS Embedded Event Manager (EEM) • Telnet, SNMPv3, Secure Shell (SSH) Protocol, CLI, and HTTP management • RADIUS and TACACS+
High-availability features	• Virtual Router Redundancy Protocol (VRRP) (RFC 2338) • Hot Standby Router Protocol (HSRP) • Multigroup HSRP (MHSRP) • Dual SIMs that operate in active/backup mode on the single LTE models of the IR829, and active/active mode with each of the two SIMs assigned to a specific cellular radio on the dual LTE models
IPv6 features	• IPv6 addressing architecture • IPv6 Unicast and Multicast forwarding • IPv6 ACLs • IPv6 over Cellular • IPv6 routing • IPv6 Domain name resolution

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
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 at 100 Mbps Fast Ethernet and 1000 Mbps Gigabit Ethernet speeds

Feature	Specification
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 • Autonomous and Universal modes
WLAN features	• 2 x 2 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 10/100/1000 Gigabit Ethernet ports with option for 30W of PoE/PoE+ • IEEE 802.1Q VLANs • Power over Ethernet (30W of PoE/PoE+ shared across the four Gigabit Ethernet interfaces)
Serial interface	• 1 RS-232 (DTE) and 1 RS-232/RS-485 (DCE) • Supports asynchronous modes
Serial protocol support	• Raw socket over TCP and UDP, SLIP, DNP3 and T101-104 translations, IOx
Physical Characteristics	
Physical dimensions (H x W x D)	1.73 x 11 x 7.7 in. (43.9 x 279 x 196 mm)
Weight	4.5 lbs. (2 kg)
Mounting options	Panel/door mount
Mean time between failure (MTBF - ground benign)	322,390 hours (in a fixed environment with PoE module)
Maximum platform power consumption	40 Watts without PoE and 70 Watts with PoE
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 -40° to 167°F (-40° to 75°C) in a forced air enclosure with 200 lfm of air
Operating altitude	Maximum altitude: 13.800 ft.
Mechanical and Environmental Standards	Industrial: EN61131-2 Railway: EN50155, Railway Nordic Development Plan NUP T2 Marine: EN60945, DNV Marine Standard for Certification No 2.4 Automotive: SAEJ1455 2b[3], 2c, 3a[4], 3b Military: MIL-STD-810G • Method 514.6: Procedure 1 Category 4, Secured Cargo – Common • Method 514.6: Procedure 1 Category 20, Ground Vehicles • Method 516.6. Procedure 1, Functional Shock • Method 516.6. Procedure 5, Crash Hazard • Method 516.6. Procedure 6, Bench Handling
EMC-Emissions	FCC part 47 CFR Part 15 Subpart C Class A EN 5032/CISPR 32 Class A EN 55022 Class A VCCI Class A AS/NZS CISPR 32 Class A CISPR 11 Class A ICES 003 Class A CNS 13438 Class A KN 32 Class A EN 300 386

Feature	Specification
EMC-Immunity	CISPR 35 EN 55024 KN 35 EN 61000-4-2, 3,4,5,6,8,9,16,17,18,29
Radio-WiFi	FCC Part 15.407 EN 300 328 v1.9.1 EN 301 983 v2.1.1
Radio-Cellular	AS/NZS: ACMA EMR, AS/CA S042.1, 4 Japan: Article 2, 9 EN 301 489-1, 7, 24, 52 EN 301 908 -1, 2, 13 EN 301 511 EN 50385 MPE FCC 47 CFR Part 22 FCC 47 CFR Part 15 Subpart C FCC 47 CFR Part 2 MPE RSS 102/247
EMC-Railroad	EN 50121-1:2013 EN 50121-3-2:2006 EN 50121-4:201 EN 50155:2007 (Clause nrs: 12.2.1, 12.2.3-12.2.8, 12.2.11, 12.2.14)
ITE-Safety	UL/CSA 60950-1 EN 60950-1 IEC-1 CB with all country deviations
Industrial-Safety	UL/CSA 61010-2-201 CB Report and Certificate to IEC/EN 61010-2-201
Hazardous Locations	ANSI/ISA 12.12.01 CSA 213 UL/CSA 60079-0, -15 IEC 60079-0, -15 IECEx Test Report EN 60079-0, -15 ATEX Certificate
Power requirement	Nominal voltage: 12V, 24V DC Min/max voltage: 9-32V DC input Max/Min current: 7.8A, 2.2A

[3] for all instrument mounts except for windshield mount
[4] for 85°C maximum

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 or unconnected Ethernet ports are in administrative enable mode (ie., not shutdown)
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.

LED	Activity	Color(s)	Description			
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			
3G/4G	Modem0 RSSI [2:0]	Green and Bicolor Green/Yellow	RSSI is a 3 LED bar graph, LEDs are lit as follows:			
	Modem1 RSSI [2:0]		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
	Activity0	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.			
	Activity1	Green				
	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			

Table 6. Antenna Specifications

Please refer to antenna guide for all the antenna options available for industrial routers – http://www.cisco.com/c/en/us/td/docs/routers/connectedgrid/antennas/installing-combined/industrial-routers-antenna-guide/Overview.html.

Item	Specification
ANT-5-4G2WL2G1-O	**Description: Cisco transportation omnidirectional 5-element antenna for 2G, 3G, 4G cellular, GPS, and dual-band WiFi 2.4 GHz and 5GHz.** ● MIMO 2 x cellular elements, MIMO 2x dual band WiFi elements, 1 x GPS active antenna. ● Vehicular roof stud/nut mounting, qualified to vehicular shock and vibe standards. ● IP67 waterproof with proper installation on the roof on an 8x8" flat mounting surface. ● Covers 2G, 3G, 4G cellular bands in 698-2700 MHz frequency range. ● Dual band WiFi elements 2.4 and 5 GHz. ● Enables Cellular to WiFi to GPS coexistence with good cross antenna isolation. ● Low noise active GPS antenna. ● Specifications below are given with 1ft diameter ground plane under antenna. **Cellular Electrical Specifications:** (specs apply to both elements) ● **Frequency ranges:** 698 to 960 MHz, 1710 to 2700 MHz ● **Typical gain (dBi):** 698 to 960 MHz = 2.4 dBi, and 1710 to 2700 MHz = 4.9 dBi

Item	Specification
	• **Efficiency:** 60% • **Polarization:** Linear, Vertical • **Port Impedance:** 50 ohms • **VSWR:** < 2.1:1 (698 to 960 MHz) and < 2.0:1 (1710 to 2700 MHz) • **Radiation pattern:** Omnidirectional • **Integrated RF cables:** 2ft, LMR-195 type, TNC(male) **WiFi Electrical Specifications:** (specs apply to both elements) • **Frequency ranges:** dual band 2.4 - 2.5 GHz and 4.9 - 5.875 GHz • **Typical gain (dBi):** 2.4 - 2.5 GHz = 5 dBi, and 4.9 - 5.875 GHz = 6 dBi • **Efficiency:** 50% • **Polarization:** Linear, Vertical • **Port Impedance:** 50 ohms • **VSWR:** < 2.0:1 in both 2.4-2.5 GHz and 4.9-5.875 GHz bands. • **Radiation pattern:** Omnidirectional • **Integrated RF cables:** 2ft, LMR-195 type, RP-TNC(plug) **GPS Electrical Specifications:** • **Frequency range:** 1575.42 MHz +/- 1 MHz (GPS L1) • **Amplifier gain:** 27dB +/- 3dB • **Noise Figure:** 4dB max • **Port Impedance:** 50 ohms • **Output VSWR:** < 2.0:1 • **Radiation pattern:** RHCP • **DC Voltage:** 2.7 – 12 VDC • **DC Current:** < 20mA over -40 to +85C temperature range • **Integrated RF cable:** 17ft, LMR-100 type, SMA(m) **Mechanical And Environmental Specifications:** • **Mount style:** Vehicular roof or similar, stud and nut mount. • **Environment:** Outdoor, vehicular roof, transportation ruggedized and qualified to subset of SAE1455 and MILSTD 810G • **Antenna Dimensions:** 7.1 in diameter x 2.4 in height (18.0 x 6.5 cm), excluding RF cables • **Weight:** 1.65 lb. (0.75kg) • **Operating temperature range:** -40° to +70°C • **Storage temperature:** -40° to 85°C • **Maximum power:** 10W • **Radome:** Polycarbonate, UV, Black • **Material substance compliance:** ROHS compliant
ANT-3-4G2G1-O	**Description: Cisco transportation omnidirectional 3-element antenna for 2G, 3G, 4G cellular and GPS** • MIMO 2 x cellular elements, 1 x GPS active antenna. • Vehicular roof stud/nut mounting, qualified to vehicular shock and vibe standards. • IP67 waterproof with proper installation on the roof on an 8x8” flat mounting surface. • Covers 2G, 3G, 4G cellular bands in 698-2700 MHz frequency range. • LTE MIMO support with low correlation coefficient. • Low noise active GPS antenna. • Specifications below are given with 1ft diameter ground plane under antenna. **Cellular Electrical Specifications:** (specs apply to both elements) • **Frequency ranges:** 698 to 960 MHz, 1710 to 2700 MHz • **Typical gain (dBi):** 698 to 960 MHz = 2.6 dBi, and 1710 to 2700 MHz = 4.6 dBi • **Efficiency:** 60% • **Polarization:** Linear, Vertical • **Port Impedance:** 50 ohms • **VSWR:** < 2.1:1 (698 to 960 MHz) and < 2.0:1 (1710 to 2700 MHz) • **Radiation pattern:** Omnidirectional • **Integrated RF cables:** 2ft, LMR-195 type, TNC(male) **GPS Electrical Specifications:** • **Frequency range:** 1575.42 MHz +/- 1 MHz (GPS L1) • **Amplifier gain:** 27dB +/- 3dB

Item	Specification
	• **Noise Figure:** 4dB max • **Port Impedance:** 50 ohms • **Output VSWR:** < 2.0:1 • **Radiation pattern:** RHCP • **DC Voltage:** 2.7 – 12 VDC • **DC Current:** < 20mA over -40 to +85C temperature range • **Integrated RF cable:** 17ft, LMR-100 type, SMA(m) **Mechanical And EnvironmentalSpecifications:** • **Mount style:** Vehicular roof or similar, stud and nut mount. • **Environment:** Outdoor, vehicular roof, transportation ruggedized and qualified to subset of SAE1455 and MILSTD 810G • **Connectors:** 2 x TNC(m) cellular, 1 x SMA(m) GPS • **Antenna Dimensions:** 7.1 in diameter x 2.4 in height (18.0 x 6.5 cm), excluding RF cables • **Weight:** 1.48 lb. (0.67kg) • **Operating temperature range:** -40° to +70°C • **Storage temperature:** -40° to 85°C • **Maximum power:** 10W • **Radome:** Polycarbonate, UV, Black • **Material substance compliance:** ROHS compliant
ANT-2-WLAN-D-O	**Description: Cisco transportation omnidirectional 2-element antenna dual-band WiFi 2.4 GHz and 5GHz.** • MIMO 2x dual band WiFi elements. • Vehicular roof stud/nut mounting, qualified to vehicular shock and vibe standards. • IP67 waterproof with proper installation on the roof on a 6x6” flat mounting surface. • Dual band WiFi elements 2.4 and 5 GHz. • Specifications below are given with 1ft diameter ground plane under antenna. **WiFi Electrical Specifications:** (specs apply to both elements) • **Frequency ranges:** dual band 2.4 - 2.5 GHz and 4.9 - 5.875 GHz • **Typical gain (dBi):** 2.4 - 2.5 GHz = 4 dBi, and 4.9 - 5.875 GHz = 7 dBi • **Efficiency:** 2.4 – 2.5 GHz = 65-70%, 4.9-5.875 GHz = 64-70% • **Polarization:** Linear, Vertical • **Port Impedance:** 50 ohms • **VSWR:** < 2.0:1 in both 2.4-2.5 GHz and 4.9-5.875 GHz bands. • **Radiation pattern:** Omnidirectional • **Integrated RF cables:** 2ft, LMR-240 type, RP-TNC(plug) **Mechanical And EnvironmentalSpecifications:** • **Mount style:** Vehicular roof or similar, stud and nut mount. • **Environment:** Outdoor, vehicular roof, transportation ruggedized and qualified to subset of SAE1455 and MILSTD 810G • **Antenna Dimensions:** 5 inch diameter x 1.55 inch height (12.7 x 3.9 cm), excluding RF cables • **Weight:** 0.584 lb. (0.265kg) • **Operating temperature range:** -40° to +80°C • **Storage temperature:** -40° to 85°C • **Maximum power:** 50W • **Radome:** PC, UV Resistant, Black • **Material substance compliance:** ROHS compliant
ANT-2-4G2-O	**Description: Cisco transportation omnidirectional 2-element antenna for 2G, 3G, 4G cellular** • MIMO 2 x cellular elements • Vehicular roof stud/nut mounting, qualified to vehicular shock and vibe standards • IP67 waterproof with proper installation on the roof on an 8x8” flat mounting surface • Covers 2G, 3G, 4G cellular bands in 698-2700 MHz frequency range • LTE MIMO support with low correlation coefficient • Specifications below are given with 1ft diameter ground plane under antenna **Cellular Electrical Specifications:** (specs apply to both elements) • **Frequency ranges:** 698 to 960 MHz, 1710 to 2700 MHz • **Typical gain (dBi):** 698 to 960 MHz = 2.6 dBi, and 1710 to 2700 MHz = 4.6 dBi

Item	Specification
	• **Efficiency:** 60% • **Polarization:** Linear, Vertical • **Port Impedance:** 50 ohms • **VSWR:** < 2.1:1 (698 to 960 MHz) and < 2.0:1 (1710 to 2700 MHz) • **Radiation pattern:** Omnidirectional • **Integrated RF cables:** 2ft, LMR-195 type, TNC(male) **Mechanical And Environmental Specifications:** • **Mount style:** Vehicular roof or similar, stud and nut mount. • **Environment:** Outdoor, vehicular roof, transportation ruggedized and qualified to subset of SAE1455 and MILSTD 810G • **Connectors:** 2 x TNC(m) cellular • **Antenna Dimensions:** 7.1 in diameter x 2.4 in height (18.0 x 6.5 cm), excluding RF cables • **Weight:** 1.48 lb. (0.67kg) • **Operating temperature range:** -40° to +70°C • **Storage temperature:** -40° to 85°C • **Maximum power:** 10W • **Radome:** Polycarbonate, UV, Black • **Material substance compliance:** ROHS compliant
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 female • **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

Item	Specification
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 female 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 ● 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
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) ● 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

Item	Specification
	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
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 ● Base connector: TNC female ● Pigtail connector: TNC male **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 female ● Pigtail connector: TNC male **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-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

Item	Specification
	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-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 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-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
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 Cisco 829 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 **IR829GW-LTE-GA-ZK9** **IR829GW-LTE-GA-CK9** **IR829GW-LTE-GA-SK9**	Compact Cisco IR829 Ruggedized Secure Multi-Mode 4G LTE Industrial ISR for Europe, Australia, Malaysia and Singapore;, LTE 800/900/1800/2100/2600 MHz, 850/900/1900/2100 MHz UMTS/HSPA+ bands and Dual WiFi Radio with ETSI compliance
IR829GW-LTE-NA-AK9	Compact Cisco IR829 Ruggedized Secure Multi-Mode 4G LTE Industrial ISR 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 compliance
IR829GW-LTE-VZ-AK9	Compact Cisco IR829 Ruggedized Secure Multi-Mode 4G LTE Industrial ISR 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 compliance
IR829GW-LTE-LA-*K9 * WiFi regulatory domain	Compact Cisco IR829 Ruggedized Secure Multi-Mode 4G LTE Industrial ISR for LATAM and APJC; LTE FDD bands 1, 3, 5, 7, 8, 18, 19, 21, 28 and TDD LTE band 38, 39, 40, 41 bands with carrier aggregation, UMTS/HSPA+ bands and TD-SCDMA band 39; dual WiFi radio with ETSI compliance IR829GW-LTE-LA-DK9 – India IR829GW-LTE-LA-KK9 – Korea IR829GW-LTE-LA-NK9 – Panama IR829GW-LTE-LA-QK9 – Japan IR829GW-LTE-LA-SK9 – Hong Kong IR829GW-LTE-LA-ZK9 – Australia, New Zealand IR829GW-LTE-LA-LK9[1] – Malaysia IR829GW-LTE-LA-HK9[1] – China
IR829-2LTE-EA-*K9	Compact Cisco IR829 Ruggedized Secure Multi-Mode 4G LTE Industrial ISR for North America and Europe; LTE Bands 1-5, 7, 12, 13, 17, 20, 25, 26, 29 and TDD LTE band 41 with carrier aggregation, UMTS/HSPA+ bands 1-5 and 8; dual WiFi Radio with FCC compliance IR829-2LTE-EA-BK9 - USA IR829-2LTE-EA-EK9 – Europe IR829-2LTE-EA-AK9[1] – Canada
IR800-IL-POE	IEEE 802.3at compatible POE module for the IR829
IR829-DINRAIL	DIN rail kit for the IR829
IR829-PWR125W-AC	AC to DC power adapter for the IR829 in lab environment. Meets ITE standards and operating temperature range of -20C to 60C but not suited for industrial environment.
IR829-DC-PWRCORD	DC Power Cord for IR829
IOS Software and Licenses included by default	
SL-IR800-IPB-K9	Cisco 800 Series IP Base License
SL-IR800-DATA-K9	Cisco 800 Series Data License
SL-IR800-SEC-K9	Cisco 800 Series Security License
SL-IR800-SNPE-K9	Cisco 800 Series No Payload Encryption 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
FW-7430-LTE-AU	Cisco LTE modem firmware for Telstra (Australia)
FW-7430-LTE-JP	Cisco LTE modem firmware for NTT DoCoMo (Japan)

Product	Description
FW-7430-LTE-SB	Cisco LTE modem firmware for Softbank (Japan)
FW-7430-LTE-KD	Cisco LTE modem firmware for KDDI (Japan)
FW-7430-LTE-GN	Cisco LTE modem generic firmware
FW-7455-LTE-AT	Cisco LTE modem firmware for AT&T (US)
FW-7455-LTE-VZ	Cisco LTE modem firmware for Verizon (US)
FW-7455-LTE-GN	Cisco LTE modem firmware for Europe and Canada

[1] Available in 2H of CY17

Table 8. Antenna Ordering Information

Note: None of the antennas are included by default along with the IR829.

Description	Part Number
Transportation omnidirectional 5-element antenna for 2G, 3G, 4G cellular, GPS, and dual-band WiFi 2.4 GHz and 5GHz	ANT-5-4G2WL2G1-O ANT-5-4G2WL2G1-O= (Spare)
Cisco transportation omnidirectional 3-element antenna for 2G, 3G, 4G cellular and GPS	ANT-3-4G2G1-O ANT-3-4G2G1-O= (Spare)
Cisco transportation omnidirectional 2-element antenna dual-band WiFi 2.4 GHz and 5GHz	ANT-2-WLAN-D-O ANT-2-WLAN-D-O= (Spare)
Cisco transportation omnidirectional 2-element antenna for 2G, 3G, 4G cellular	ANT-2-4G2-O ANT-2-4G2-O= (Spare)
Multi-Band Omnidirectional Antenna-Ceiling Mount	4G-ANTM-OM-CM 4G-ANTM-OM-CM= (Spare)
Multiband Omni-Directional Stick Outdoor 4G Antenna	ANT-4G-OMNI-OUT-N ANT-4G-OMNI-OUT-N= (Spare)
Multiband Panel Outdoor 4G Antenna	ANT-4G-PNL-OUT-N ANT-4G-PNL-OUT-N= (Spare)
Indoor swivel-mount dipole antenna	ANT-4G-DP-IN-TNC ANT-4G-DP-IN-TNC= (Spare)
Standalone active SMA GPS antenna with 17-ft (5 m)extender	GPS-ACT-ANTM-SMA GPS-ACT-ANTM-SMA= (Spare)
Single Unit Antenna Extension Base (10-ft, one cable)	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)
10-ft (3M) Ultra Low Loss LMR 400 Cable with TNC Connector	4G-CAB-LMR400-10 4G-CAB-LMR400-10= (Spare)
5-ft (3M) Ultra Low Loss LMR 400 Cable with TNC Connector	4G-CAB-LMR400-5 4G-CAB-LMR400-5= (Spare)
50-ft (15 m) Ultra Low Loss LMR 400 Cable TNC-N Connector	CAB-L400-50-TNC-N CAB-L400-50-TNC-N= (Spare)
20-ft (6 m) Ultra Low Loss LMR 400 Cable with TNC-N Connector	CAB-L400-20-TNC-N CAB-L400-20-TNC-N= (Spare)
20-ft (6m) Ultra Low Loss LMR 400 Cable with N Connectors	CAB-L400-20-N-N CAB-L400-20-N-N= (Spare)

Description	Part Number
10-ft (3M) Ultra Low Loss LMR 400 Cable RA-RP-TNC (m) to RP-TNC (f)	CAB-L400-10-R CAB-L400-10-R= (Spare)
20-ft (6 m) Ultra Low Loss LMR 400 Cable RA-N (m) to RP-TNC (f)	CAB-L400-20-N-R CAB-L400-20-N-R= (Spare)
Lightning Arrestor Kit: male to female	CGR-LA-NM-NF CGR-LA-NM-NF= (Spare)
Lightning Arrestor: TNC (female) to TNC (male)	4G-ACC-OUT-LA 4G-ACC-OUT-LA= (Spare)

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

Cisco Capital

Financing to Help You Achieve Your Objectives

Cisco Capital can help you acquire the technology you need to achieve your objectives and stay competitive. We can help you reduce CapEx. Accelerate your growth. Optimize your investment dollars and ROI. Cisco Capital financing gives you flexibility in acquiring hardware, software, services, and complementary third-party equipment. And there's just one predictable payment. Cisco Capital is available in more than 100 countries. Learn more.

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 replacement1 and onsite parts replacement and installation available ● Ongoing operating system software updates within the licensed feature set2 ● 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.

Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV Amsterdam,
The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at www.cisco.com/go/offices.

Printed in USA C78-734981-05 05/17