Cisco Catalyst IR1101 Rugged Series Router

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The Cisco® Catalyst IR1101 Rugged Series Router or IR1101, is Cisco's most compact, FirstNet Ready™ industrial router. Designed in a highly modular form factor makes it an ideal solution for remote asset management across multiple industrial vertical markets.

The IR1101 has an integrated 9.6 to 60V DC power input and is designed to withstand hostile environments, including shock, vibration, dust, humidity and Electrostatic Discharge (ESD). The IR1101 also supports a wide temperature range: -40 to 60° C standard operation, -40 to 75° C in a forced air enclosure with 200 LFM of air, and type-tested at 85° C for 16 hours. This durability makes it ideal for harsh industrial and distributed IoT deployments such as transportation, oil and gas, distribution substations, industrial automation, and financial institutions.

Product highlights

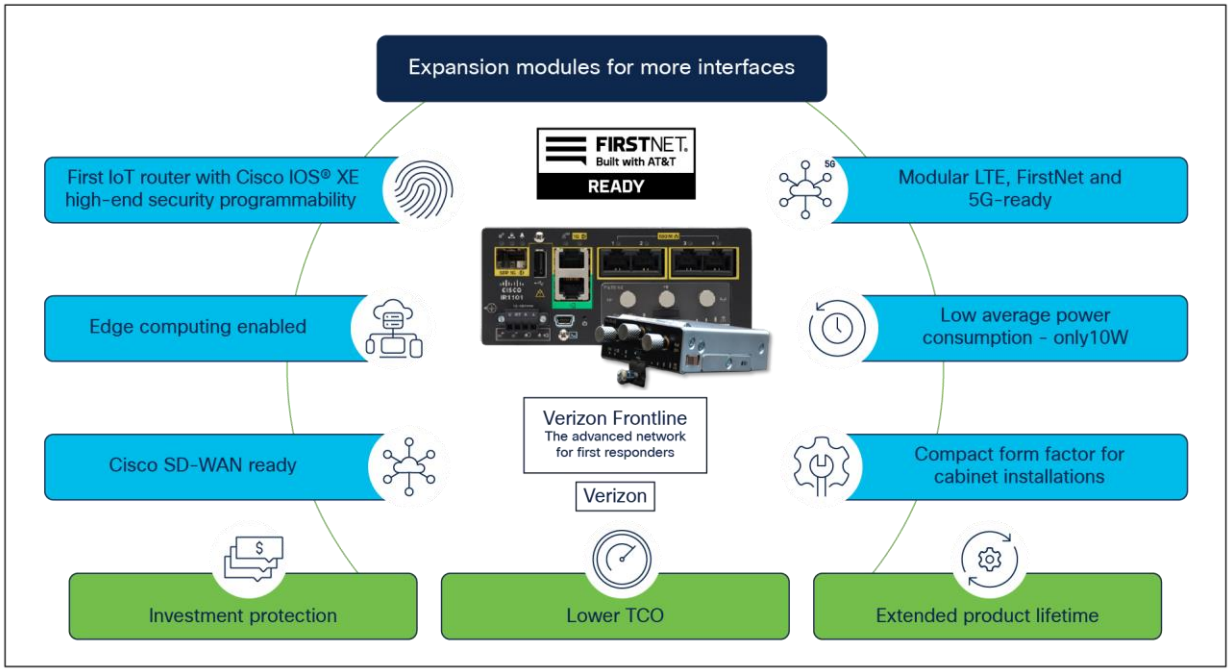


Figure 1.
Product highlights

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Figures 2, 3, and 4 offer visual views of product components and expansion modules.

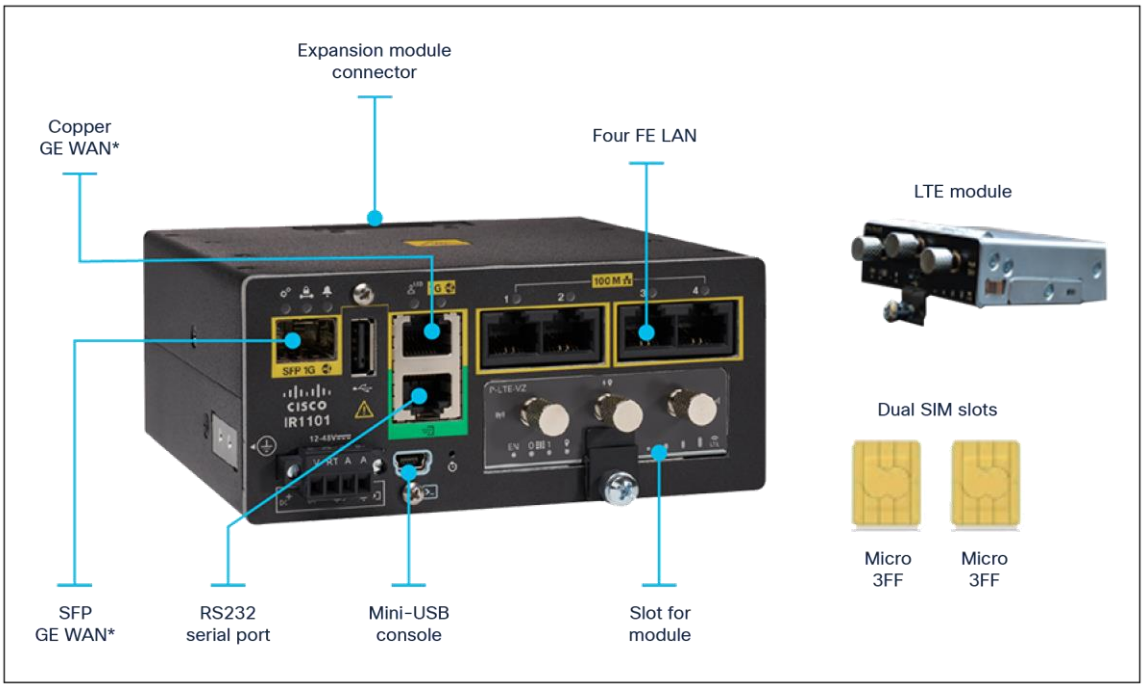


Figure 2.
Cisco IR1101 base platform front view

The IR1101 offers even more flexibility to add or upgrade WAN and storage components through an expansion module.

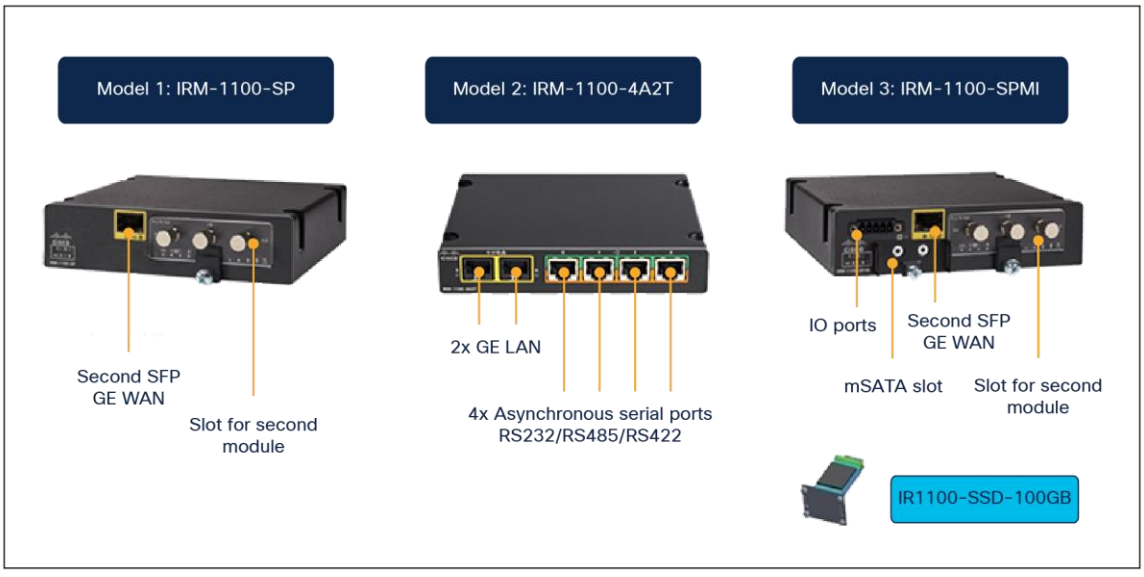


Figure 3.
Expansion Modules

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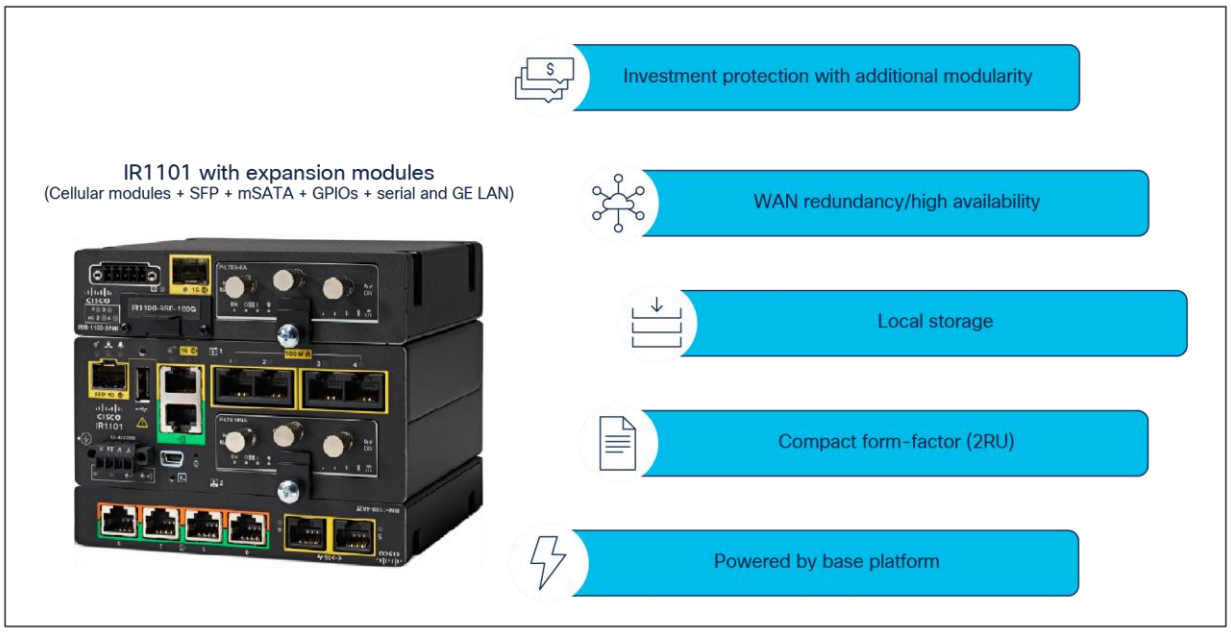


Figure 4.
IR1101 with expansion module offering more flexibility

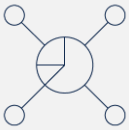
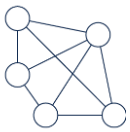
Product overview

The Cisco Catalyst IR1101 Rugged Series Router offers a broad range of features for the Internet of Things (IoT).

Table 1. Key features and benefits

Feature	Benefit
	Modularity and investment protection. A single form factor with multiple WAN (LTE, LTE-Advanced, SFP Ethernet) and storage options enable flexibility to add or upgrade modules as technologies evolve.
	Dual active LTE-capable With two LTE modules (LTE and LTE-Advanced with carrier aggregation), the IR1101 enables concurrent connectivity to two cellular networks for WAN redundancy, enhanced data throughputs, load balancing, and differentiated services, making it a highly reliable and high-performance platform.
	Cisco IOS XE Software. IOS XE is a highly secure, standards-based and flexible operating system for a new era of IoT deployment. It's an enterprise-class OS with advanced routing and security.
	Software Defined WAN (SDWAN) capable. For high WAN availability and simplicity for large-scale distributed networks.

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Feature	Benefit
	**Industrial security.** With Cisco Trust Anchor Technology ensuring authenticity of hardware and software, hardware-accelerated Next Generation Encryption and Quantum Computer Resistant algorithms, firewall and VPN services, and alerts and notifications enabling physical and cyber security, the IR1101 offers a multi-layer security for mission-critical deployments.
	**Edge computing.** Speed up awareness and response to events and conserve network bandwidth by analyzing the most time-sensitive data at the network edge, close to where it is generated. A highly secure, extensible environment for hosting applications ensures authenticity of applications. An optional mSATA SSD field-replaceable unit on the expansion module enables storage of application data for recording and analysis.
	**Supervisory Control and Data Acquisition (SCADA).** Supports migration of data from legacy control systems in an industrial environment to an IP-based network using DNP3 serial-to-DNP3/IP and IEC 60870 T101-to-T104 protocol translations.
	**Smart grid-compliant.** Designed for installation in harsh secondary substation environments. Complies with IEEE 1613 and IEC 61850-3 for distribution automation.
	**GPS.** Location-based services for tracking assets and protecting from theft and intrusion.
	**Ease of management.** On-premises and cloud-based network management solutions cater to businesses across multiple industry verticals. Tools such as Cisco DNA Center, Cisco IoT Operations Dashboard, Cisco IoT Field Network Director (FND), Cisco Plug and Play (PnP), and Cisco Prime® simplify deployment and offer the breadth of cross-network management and the depth of multi-layer visibility.
	**Multiple Packet Data Network (PDN).** Gain connectivity to different Access Point Names (APNs) for traffic segregation over a cellular link. 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.** Differentiated treatment of traffic with multiple simultaneous bearers as per 3GPP standards for an enhanced user experience. Multi-bearer QoS depends on the cellular carrier's ability to support the service in their network.
	**Network Segmentation.** Multi-VRF, VLAN, and VPN enable businesses to configure and maintain more than one instance of a routing and forwarding table within the same customer edge device, enabling dynamic changes in the network with a minimal maintenance window. Service providers can enable this feature to support two or more VPNs with IP addresses that overlap across the VPNs.

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Business benefits and application examples

Industrial customers are looking for real-time monitoring and control of industrial assets to help increase operation efficiency.

Utilities

Utilities are seeking the capability to monitor tens of thousands of miles of electric distribution lines or water infrastructure often located in harsh environments over cellular networks to provide remote assets monitoring and reliable and secure SCADA traffic backhauling. In many cases, these are power-constrained and space-constrained environments. Devices that enable this connectivity need to be highly reliable and able to be remotely monitored and configured. They also need to support traditional serial interfaces to interconnect with existing monitoring devices and fiber overlay for long-distance, intra-network connectivity. Needless to say, the device is expected to have a long lifetime to support such a massive scale of deployment.

Oil and gas

Oil and gas companies need to monitor pipeline infrastructure across wide geographic areas and remote locations using 3G and 4G cellular networks to collect data from remote terminal units and securely transport SCADA traffic to a Network Operations Center (NOC).

Transportation

Highways and transportation agencies require reliable, always-on communication between speed cameras, monitoring cameras, ticket terminals, and so on. Wireless devices to support such continuous communication need to support 3G and 4G networks to help ensure good, wide coverage; continuous operation in very harsh environments; compact form factor for deployment in roadside cabinets and ticketing machines; local decision-making for a rapid response time; and serial interfaces to existing traditional devices.

Additional features and benefits

Table 2. Additional features and benefits of the Cisco IR1101

Features	Benefits
IoT enablement	
Lightweight, compact, modular, and ruggedized form factor	Designed for tight installation inside cabinets. All the Input/Output (I/O) ports and connectors are located on the front panel for easy wiring inside cabinets.
No additional power supply for the expansion module	Easily add an expansion module without requiring an additional power input.
Raw socket transport and SCADA	The raw socket can be used to transport SCADA data from RTUs. This method is an alternative to the Block Serial Tunnel (BSTUN) protocol. The Cisco IR1101 also supports DNP3 serial-to-DNP3/IP and IEC 60870 T101-to-IEC 60870 T104 protocol translations, serving as a SCADA gateway.
Multiple mounting options	Floor or wall mounting and DIN rail mounting in horizontal or vertical orientations.
Increased performance to run concurrent services	The multi-core processor architecture allows businesses to take advantage of network-supported speeds.

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Features	Benefits
Multiple WAN and LAN connections	
Four fast Ethernet interfaces	• Allows multiple Ethernet devices (sensors, Remote Terminal Unit [RTU], PLCs) in an industrial environment to connect for visibility and management of assets • IEEE 802.1Q VLANs • Layer 3 support through VLAN interfaces • 4KV isolation for Electrostatic Discharge (ESD) protection
WAN diversity	• Multiple WAN links for high reliability: Gigabit Ethernet layer 3 SFP (copper and fiber) and 4G LTE provides WAN diversity and business continuity • Gigabit Ethernet WAN interface can be configured for layer 3 routing or layer 2 switching
Dual active LTE interfaces	Concurrent connectivity to two cellular networks for high reliability, load balancing, and differentiated services.
Serial interface	A RS-232 asynchronous serial interface (RJ45 DTE) can be used with raw socket, protocol translation, and connections to locate Remote Terminal Unit (RTU), sensors, and PLCs for SCADA transport and management.
Transparent roaming between wireless networks	
Dual Subscriber-Identity-Module (SIM) over cellular	Provides active and backup connectivity for high reliability over LTE and HSPA networks.
Cisco IOS® mobile IP	• Transparent roaming for mobile networks, enabling mission-critical applications to stay connected, even when moving between networks • The assigned IP addresses to the home network are maintained in private and public networks • Supports Proxy Mobile IP (PMIPv6) and Network Mobility (NEMO)
Cellular fallback	Multiple technologies (4G LTE, 3G, and 2G) are available to support connectivity to the best one available. 2G fallback is not supported in North America.
Software	
Cisco IOS XE	Designed to enable businesses to deploy services more quickly with lower TCO and complexity. • Openness and programmability: Standards-based programmable interfaces enable process and workflow automation. NETCONF, RESTCONF, IETF YANG, Python scripting, and custom libraries enable automation of event-based workflows • Secure: Multi-level, end-to-end security and trust are built in. The built-in Cisco Next Generation Encryption and Quantum Computing Resistant algorithms are expected to meet security and scalability requirements for the next two decades • Modular: Enables patching of software bug fixes and graceful insertion and removal of software modules for ease of maintenance • Common software stack: Reduces business and network complexity while managing an array of Cisco devices

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Table 3. Network management solutions

Operational phase	Application	Description
Device staging and configuration for a few routers	**Cisco WebUI**	A GUI-based device-management tool that simplifies provisioning of devices for a small-scale deployment through easy-to-use wizards.
Deploy, manage, monitor, and maintain IoT gateways and assets at scale	**Cisco IoT Field Network Director (FND) for hosting on premises** **Cisco IoT Operations Dashboard**	• Rapid scaling - zero-touch deployment and secure enrollment for tens of thousands of gateways • Enhanced security – role-based access and user audit trail and secure communications for data transport across networks, VPN tunnels, geo-fencing, alerts, and notifications for data and physical security • Increased reliability – reliable communications over cellular or Ethernet networks, lifecycle management, and 24/7 real-time monitoring and alerts
Extend your enterprise network to configure, monitor, and manage industrial assets	**Cisco Digital Network Architecture (Cisco DNA[1]) with APIC-EM** **Cisco Digital Network Architecture (Cisco DNA) with SDWAN**	• Cisco DNA offers a network infrastructure that is not only fully programmable and open to third-party innovation, but can also fully and seamlessly integrate the cloud as an infrastructure component • Simplifies and automates processes and workflow by bringing the notion of user-aware and application-aware policies into the foreground of network operations • With Cisco DNA, the network can provide continuous feedback to simplify and optimize network operations • Enables automation of network configuration and APIC-EM is a central part of Cisco Digital Network Architecture. It delivers software-defined networking to extend the enterprise network to harsh industrial and outdoor environments • Single management dashboard for configuration and management of WAN. • Cisco SD-WAN automates application flexibility over multiple connections, such as the Internet, MPLS, and wireless 4G LTE.
Manage devices over a cellular network	**Cisco IoT Control Center**	Cisco IoT Control Center minimizes the complexity and cost of managing connected devices on a cellular network by taking control with actionable insights. For instance, tracking and managing data usage overages can result in a significant reduction in operational expenses.

Table 4. Embedded management capabilities

Feature	Description
Cisco IOS Embedded Event Manager (EEM)	A distributed and customized approach to event detection and recovery. Provides the ability to monitor events and take corrective or any other desired action when the monitored events, such as a high or low threshold, occur.
Cisco IOS XE IP Service-Level Agreements (IP SLA)	Helps assure the performance of new, business-critical IP applications as well as IP services by actively monitoring and reliably reporting traffic statistics such as jitter, response time, packet loss, and connectivity.
Simple Network Management Protocol (SNMP), Syslog, NetFlow	Open-standards-based network monitoring and accounting tools, such as SNMP for 3G, 4G and, provide a common management platform for many different devices.
LTE network management and diagnostics	A dedicated diagnostic port on a cellular module enables logging of data during debugging sessions that can be analyzed by industry-standard tools such as Qualcomm CDMA Air Interface Tester (CAIT) and Spirent Universal Diagnostic Monitor (UDM).

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Product specifications

Table 5. Cisco IOS XE Software Features on the IR1101

Feature	Description
Cisco IOS Software requirements	• Cisco IOS XE Software: Universal Cisco IOS Software image • Cisco IOS XE Software Release 16.10.1 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) • Standard 802.1d Spanning Tree Protocol (STP) • Network Address Translation (NAT) • Dynamic Host Configuration Protocol (DHCP) server, relay, and client • Dynamic DNS (DDNS) • DNS proxy • DNS spoofing • Access Control Lists (ACLs) • IPv4 and IPv6 multicast • IP Service-Level Agreement (IP SLA) • Open Shortest Path First (OSPFv2 and OSPFv3) • Border Gateway Protocol (BGP) • Enhanced Interior Gateway Routing Protocol (EIGRP) • Virtual Route Forwarding (VRF) Lite • Next-Hop Resolution Protocol (NHRP) • Serial data encapsulation and relay • L2TPv3 over sub-interfaces and VLAN
Security features	**Secure connectivity** • Secure Sockets Layer (SSL) VPN for secure remote access • Hardware-accelerated encryption with minimal impact to system performance • Next Generation Encryption (NGE) and Quantum Computing Resistant (QCR) algorithms such as AES-256, SHA-384, and SHA-512 • Public-Key-Infrastructure (PKI) support • 20 IPsec tunnels • 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

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Feature	Description
	• Firewall stateful failover • VRF-aware firewall **Integrated Threat Control** • Control-Plane Policing (CoPP) • Flexible packet matching • Network foundation protection
QoS features	• Provides LTE QoS with support for up to 8 concurrent bearers on each cellular WAN interface for traffic classification and prioritization • Provides traffic precedence to delay-sensitive and mission-critical services • Facilitates low-latency routing of delay-sensitive industrial applications • Supported on all LAN and WAN interfaces, including cellular • 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 pre-classify and pre-fragmentation • Hierarchical QoS (HQoS)
High-availability features	• Dual active LTE backhaul with expansion module • Virtual Router Redundancy Protocol (VRRP) (RFC 2338) • Hot Standby Router Protocol (HSRP) • Dual SIM support on the LTE module for cellular failover
IPv6 features	• IPv6 addressing architecture • IPv6 unicast and multicast forwarding • IPv6 ACLs • IPv6 over cellular • IPv6 routing • IPv6 domain name resolution

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Software licensing

The IR1101 offers two software tiers – network Essential and Network Advantage. The Network Essential license offers the essential elements of routing and security necessary for typical IoT deployments. The Network Advantage license enables advanced features, including Multiprotocol Label Switching (MPLS) for a highly scalable and cost-effective solution; mobile IP for seamless migration between networks; and application-aware QoS policies for built-in intelligence.

A single Cisco IOS XE universal image encompassing all functions gets delivered with the product. Software feature licenses are pre-installed in the factory depending on the selection made at the time of purchase, thereby simplifying software delivery and decreasing operational costs of the deployment. Licenses can be upgraded after deployment by going through the Cisco Smart License activation process. For a more detailed overview on Cisco Licensing, go to cisco.com/go/licensingguide.

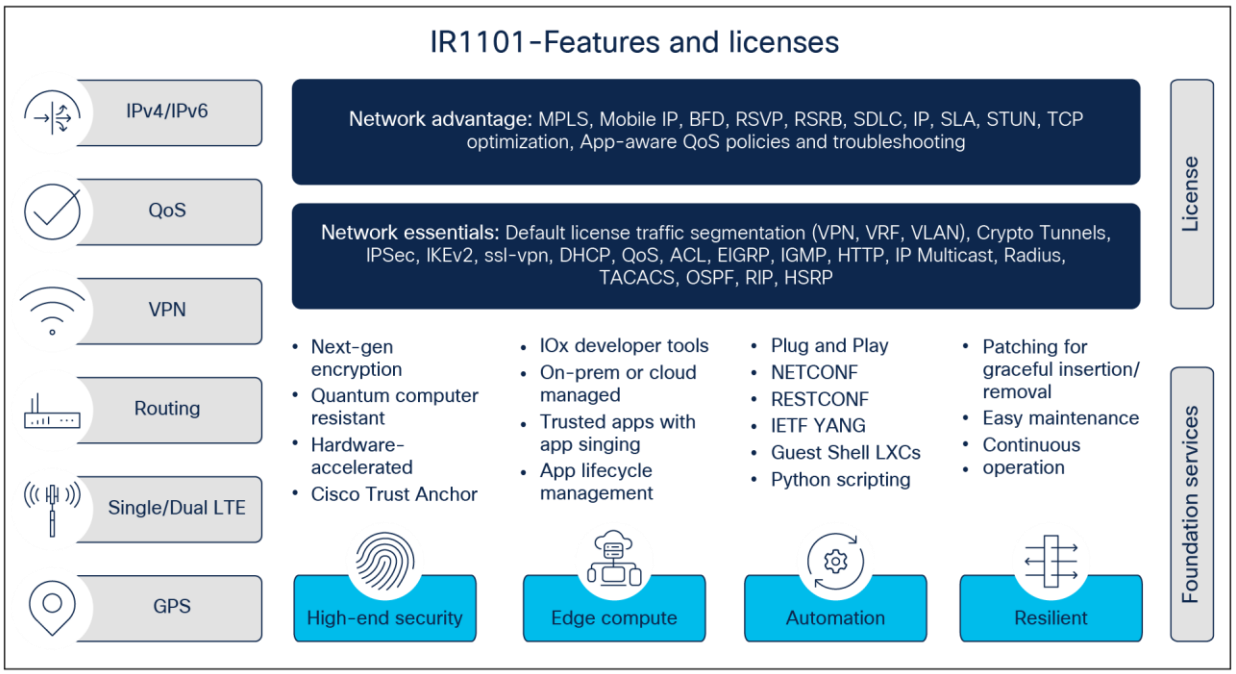


Figure 5.
Cisco IOS XE software features and benefits

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Table 6. System specifications for Cisco Catalyst IR1101 Rugged Series Router

Feature	Specification
Memory	
Default and maximum DRAM	4 GB
Default and maximum Flash memory	8 GB (physical) / 4 GB (usable)
Ingress protection rating	IP30
Physical characteristics	
Physical dimensions (H x W x D) **Chassis** **Expansion Module (IRM-1100-SP or IRM-1100-SPMI)** **Expansion Module (IRM-1100-4A2T)**	2.36 in. x 5.22 in. x 4.92 in. (60 x 132.5 x 124.9 mm) 1.3 in. x 5.2 in. x 4.9 in. (33 x 132 x 124 mm) 0.9 in. x 5.2 in. x 4.9 in. (23 x 132 x 124 mm)
Weight **Chassis** **Expansion Module** • IRM-1100-SPMI: • IRM-1100-SP: • IRM-1100-4A2T:	 2.25 lbs (1.02 kg) 1.65 lbs (0.75 kg) 1.45 lbs (0.66 kg) 0.94 lbs (0.43 kg)
Mounting options	Panel, wall, and din rail (vertical and horizontal) mount
Power specifications	Nominal voltage: +/-12V to +/-48V DC Minimum and maximum input voltage: 9.6-60V DC Maximum and minimum input current: 1.24A (9.6V DC) and 0.26A (60V DC)
Power consumption	At idle: 6.6W Typical: 9.8W Maximum: 12W Additional 10W (typical) with expansion module and 2nd cellular

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Feature	Specification
Interfaces on the base platform	
Console	Mini type-B USB
WAN interfaces	• Combo 10/100/1000 Gigabit Ethernet port (RJ45 and SFP) on the base platform • An additional 10/100/1000 Gigabit Ethernet SFP on the expansion module. Refer to Table 8 for supported SFPs • LTE: Modular with options for single and dual active LTE and LTE-Advanced
LAN interfaces	• Four 10/100BASE-T Fast Ethernet ports
Input and output	• ALARM input port
Interfaces on Serial and Ethernet Expansion Module	
Serial Interfaces	• 4 x Isolated asynchronous serial ports (RS232/RS485/RS422)(DCE)
Ethernet Interfaces	• 2 x GE RJ45 LAN ports
LEDs	• System OK • Link for Ethernet WAN ports • VPN • Tricolor user-configurable LED • ALARM
Serial interface	• Isolated RS-232 RJ45 DTE port • Support for asynchronous mode with speeds up to 115,200 baud
Serial protocols	SCADA, DNP3, T101-104, Raw Socket TCP, and UDP
Environmental characteristics	
Environmental operating temperature 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 Linear Feet per Minute (LFM) of air -40 to 167°F (-40 to 75°C) in a forced air enclosure with 200 LFM of air Type tested at 85°C for 16 hours
Operating altitude	40°C up to 13,800 ft (operating) per IEC 68-2-41
Non-operating shock and vibration	• 50-60G (3.76 m/s minimum) • 3-500Hz at 1.12 GRMS (BP at 10 and 100 Hz)
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

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Feature	Specification
Hazardous locations standards	• ANSI/ISA 12.12.01 (Class 1, Div 2 A-D) • CSA 213 (Class 1, Div 2 A-D) • IEC 60079-0 and -15 IECEx test report (Class I, Zone 2, gas groups IIC) • EN 60079-0 and -15 ATEX certification (Class I, Zone 2, gas groups IIC)
Industry standards	**Public Safety:** • FirstNet Ready™ • Verizon Frontline **Smart Grid:** • IEC 61850-3 • IEEE 1613 **Security:** • FIPS 140-2 • Common Criteria **Department of Defense** • DoDIN APL **IPv6** • USGv6
EMC emissions CLASS A	• 47 CFR Part 15 B • EN 55032:2015 • CISPR 32 Edition 2 • CNS13438: 2006 • EN 300 386 V1.6.1 • ICES-003 Issue 6: 2016 • KN 32: 2015 • TCVN 7189: 2009 • V-2/2015.04 • V-3/2015.04 • AS/NZ CISPR32
EMC immunity	• EN 61000-4-2, 3, 4, 5, 6, 8, 9, 16, 17, 18, and 29 • CISPR24: 2010 + A1: 2015 • EN 300 386 V1.6.1 • EN 55024: 2010 + A1: 2015 • EN 55035:2017 • KN35: 2015 • TCVN 7317:2003 • QCVN 18:2014

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Cellular modules

Table 7. LTE (3GPP Category 4) modules available with the IR1101

Region theaters	P-LTE-MNA	P-LTE-VZ	P-LTE-US	P-LTE-GB
LTE bands	LTE bands 2,4,5,12,13,14,17,66 FDD LTE 1700 MHz and 2100 Mhz (band 66 Ext AWS), 700 Mhz (band 17, 14, 13,12), 850 Mhz (band 5 CLR), 1700 MHz and 2100 MHz (band 4 AWS), 1900 Mhz (band 2)	LTE bands 4, 13 FDD LTE 700 MHz (band 13), 1700 MHz and 2100 MHz (band 4 AWS)	LTE bands 2, 4, 5, 12 FDD LTE 700 MHz (band 17), 700 MHz (band 12), 850 MHz (band 5 CLR), 1700 MHz and 2100 MHz (band 4 AWS)	LTE bands 1, 3, 7, 8, 20, 28 FDD LTE 700 MHz (band 28), 800 MHz (band 20), 900 MHz (band 8), 1800 MHz (band 3), 2100 MHz (band 1), and 2600 MHz (band 7)
Backward compatibility	UMTS, HSPA+ (band 2,4,5)	-	HSPA+ (band 2, 4, 5)	UMTS, HSPA+ (band 1, 8), EDGE, GSM, GPRS (900/1800)
Theoretical download and upload speeds[1]	150 and 50 Mbps	150 and 50 Mbps	150 and 50 Mbps	150 and 50 Mbps
United States	Multicarrier (AT&T and Verizon)	Verizon	AT&T	-
Europe	-	-	-	Yes
Band 14	Yes	-	-	-
FirstNet Ready™	Approved by AT&T FirstNet	-	-	-

Table 8. LTE (3GPP Category 4) modules available with the IR1101

Region theaters	P-LTE-IN	P-LTE-JN
LTE bands	LTE bands 1, 3, 5, 8, 40, 41* FDD LTE 2100 MHz (band 1), 1800MHz (band 3), 850MHz (band 5), 900MHz (band 8) TDD LTE 2300 MHz (band 40), 2500MHz (band 41). *B41 supported frequency range: (2535–2655 MHz)	LTE bands 1, 3, 8, 11, 18, 19, 21 FDD LTE 2100 MHz (band 1), 1800MHz (band 3), 900Mhz (band 8), 1500MHz (band 11), 850MHz (band 18 and band 19), 1500MHz (band 21)
Backward compatibility	HSPA+, UMTS (band 1, 8)	HSPA+, UMTS (band 1, 6, 19)

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Region theaters	P-LTE-IN	P-LTE-JN
Theoretical download and upload speeds[3]	150 and 50 Mbps	150 and 50 Mbps
India	Yes	-
Japan	-	Yes (NTT Docomo, KDDI, Softbank)

Table 9. LTE Advanced (3GPP Category 6) modules available with the IR1101

Region theaters	P-LTEA-EA	P-LTEA-LA
LTE bands	LTE bands 1-5, 7, 8, 12, 13, 20, 25, 26, 29, 30, and 41 FDD LTE 700 MHz (band 12), 700 MHz (band 29), 800 MHz (band 20), 850 MHz (band 5 CLR), 850 MHz (band 26 Low), 900 MHz (band 8), 1800 MHz (band 3), 1900 MHz (band 2), 1900 MHz (PCS band 25), 1700 MHz and 2100 MHz (band 4 AWS), 2100 MHz (band 1), 2300 MHz (band 30), or 2600 MHz (band 7) TDD LTE 2500 MHz (band 41) **Carrier aggregation band combinations:** 1+8; 2+(2,5,12,13,29); 3+(7,20); 4+(4,5,12,13,29); 7+(7,20); 12+30, 5+30, and 41+41	LTE bands 1, 3, 5, 7, 8, 18, 19, 21, 28, 38, 39, 40, and 41 FDD LTE 700 MHz (band 28), 850 MHz (band 5 CLR), 850 MHz (bands 18 and 19 Low), 900 MHz (band 8), 1500 MHz (band 21), 1800 MHz (band 3), 2100 MHz (band 1), or 2600 MHz (band 7) TDD LTE 1900 MHz (band 39), 2300 MHz (band 40), 2500 MHz (band 41), or 2600 MHz (band 38) **Carrier aggregation band combinations:** 1+(8,18,19,21); 3+(5,7,19,28); 7+(5,7,28); 19+21, 38+38, 39+39,40+40, and 41+41
Theoretical download and upload speeds[3]	300 and 50 Mbps	300 and 50 Mbps
United States	Verizon, AT&T	-
Europe	-	-
Canada	Yes	
Australia and New Zealand	-	Yes (Approved by Telstra)
Japan	-	Yes (NTT Docomo, KDDI, Softbank)
India, Singapore, Malaysia, Thailand		Yes
United Arab Emirates	Yes	

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Table 10. LTE Advanced Pro (3GPP Category 18) module available with the IR1101

Region theaters	P-LTEAP18-GL[1]
LTE bands	LTE bands 1-5, 7, 8, 12-14, 17, 18-20, 25, 26, 28-30, 32, 38-43, 46, 48, 66, and 71. FDD LTE 600 MHz (band 71), 700 MHz (bands 12, 13, 14, 17, 28, and 29), 800 MHz (band 20), 850 MHz (bands 5, 18, 19, and 26), 900 MHz (band 8), 1500 MHz (band 32), 1700 MHz (bands 4 and 66), 1800 MHz (band 3), 1900 MHz (bands 2 and 25), 2100 MHz (band 1), 2300 MHz (band 30), 2600 MHz (band 7). TDD LTE 1900 MHz (band 39), 2300 MHz (band 40), 2500 MHz (band 41), 2600 MHz (band 38), 3500 MHz (bands 42 and 48), 3700 MHz (band 43), 5200 MHz (band 46).
Theoretical download and upload speeds[2]	1.2 Gbps/200 Mbps
United States	**Multicarrier** (AT&T and Verizon)
Europe	Yes
Canada	Yes (Bell)
Australia	Yes
Japan	Yes
Band 14	Yes
FirstNet Ready™	Approved by AT&T FirstNet
Band 48 (CBRS)	Yes

Table 11. 5G Sub 6 GHZmodule available with the IR1101

Region theaters	P-5GS6-GL[9]
RF Bands	5G FR1 - n1, n2, n3, n5, n7, n8, n12, n20, n25, n28, n38, n40, n41, n48, n66, n71, n77, n78, n79 LTE bands 1-5, 7-8, 12-14, 17-20, 25, 26, 28-30, 32, 34, 38-43, 46(LAA), 48(CBRS), 66 and 71
Theoretical download and upload speeds	3.3 Gbps/400 Mbps
United States	Multicarrier (AT&T, Verizon[6], T-mobile[6])
Europe	Yes
Canada	Yes (Bell[7], Telus[7], Rogers[7])
APJC	Yes (Australia, New Zealand, Japan, Hong Kong, Indonesia, Singapore, India)
Japan	Yes (NTT Docomo, KDDI[6])

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Region theaters	P-5GS6-GL[9]
China	Yes
Australia	Telstra[7]
Band 14, Band 48 (CBRS)	Yes

450MHz LTE module

Extending connectivity to remote sites can be challenging, especially when connectivity requirements differ depending on location and use case. As organizations are automating and establishing remote operations, Cisco is expanding the capabilities of the Catalyst IR1100 Rugged Series Router (1101-A-K9 only) to meet the connectivity requirements of businesses wherever they operate. Network Advantage license is required.

Cellular communications in the 400-450MHz band, also called 450MHz LTE, have a longer wavelength, lower frequency and lower energy requirements compared to the traditional LTE and 5G. Due to the physical properties of the frequencies, it has benefits of covering a larger geographical area. It has been employed across several parts of Europe for connecting utility grids, maritime and other mission critical networks.

Cisco has partnered with Intelliport, a Hungary based technology provider in developing a module for the IR1101 to meet the market needs. The 450MHz LTE band provides high resiliency and deep indoor signal penetration to connect the Catalyst IR1101 anywhere onsite. Datasheet for the module is available here - https://www.intelliport.hu/dinamic/P-LTE-450%20datasheet%20v1dot0.pdf.

LoRaWAN modules

LoRa is an unlicensed RF physical layer modulation technology that offers long-distance wireless connectivity, excellent power efficiency, very high receiver sensitivity, robust spectrum spreading, and securely encrypted transmissions. LoRaWAN is a MAC (Media Access Control) protocol specification defined by the LoRa Alliance that complements the LoRa physical layer. It is supported by an established ecosystem of LoRaWAN compliant devices that are available from multiple vendors, and which can be certified for interoperability by the LoRa Alliance. The technology is used for a variety of use cases such as water and gas meters, asset trackers, parking sensors and environmental sensors.

Note: The LoRaWAN module, in combination with the IR1101, enables LoRaWAN gateway functionality (not endpoint functionality). The LoRaWAN module is compatible with IOS XE release 17.10 and later.

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Table 12. 900 and 800 MHz LoRaWAN modules available with the IR1101

Feature	Description		
ISM Band Support	• 900 MHz ISM band: subset of 902 – 928 MHz, depending on country/region • 800 MHz ISM band: subset of 863 – 870 MHz, depending on country/region • 8 uplink channels		
LoRa Technology	• Based on Semtech “Corecell” reference design		
LoRaWAN Specification	• LoRaWAN specification 1.0.x and 1.1 release compliant • US915, EU868, AU915, AS923-x, IN865 • Support for Class A, B (Roadmap for Common Packet Forwarder), and C endpoints		
Radio Spectrum Sniffer	• Online scanning of the interference noise on the RF channel		
LTE Coexistence	• 900 MHz Module: More than 40 dB rejection of LTE/NR Band 5/26 uplinks (814 – 849 MHz) • 800 MHz Module: More than 40 dB rejection of LTE/NR Band 20 (832 – 853 MHz) and Band 8 (884 – 915 MHz) uplinks		
Antenna Connectors	• RF Antenna Connector: One external SMA (f) connector • GPS Antenna Connector: One external SMA (f) connector		
Power Consumption	• Typical, radio in receive mode: 1.2 W • Maximum, transmitting at 27 dBm: 3.3 W		
Built-In GPS	• High-sensitivity GNSS module • GPS L1C/A, QZSS L1C/A, and GLONASS L1OF • Time pulse accuracy < 30 ns RMS, < 60 ns 99% of the time (clear sky) • NMEA 0183, Version 4.0		
LEDs	Power LED • Off: Device not powered on • Amber solid: Device power-up is in progress • Green solid: Power on		
	Status LED • Off: Device not fully configured • Red solid: Interface error or configuration error encountered • Green solid: Device fully configured; LoRa interface operational		
ACT²	Cisco Anti-Counterfeit Technology, 2nd Generation		
Receiver Sensitivity	Receiver sensitivity at 10% PER, 125 kHz bandwidth:		
	Spreading Factor	**Typical (dBm)**	**Maximum (dBm)**
	SF7	-124	-120
	SF8	-127	-123
	SF9	-130	-126
	SF10	-133	-129
	SF11	-136	-132

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Feature	Description		
	SF12	-139	-136
Tx Power (max)	27 dBm; **Note:** The maximum power will vary according to individual country regulations		

Cisco Small Form-Factor Pluggable (SFPs) modules

The IR1101 Ethernet SFP module provides connections to other devices. These field-replaceable transceiver modules provide the uplink interfaces. Local connectors provide the fiber-optic connection. RJ-45 connectors allow for copper connections.

Table 13. Supported Ethernet SFP modules

GE SFP	Distance	Fiber	Classification
GLC-SX-MM-RGD	220-550 m	MMF	Industrial (-40C to +85C)
GLC-LX-SM-RGD	550m / 10 km	MMF / SMF	Industrial (-40C to +85C)
GLC-ZX-SM-RGD	70 km	SMF	Industrial (-40C to +85C)
GLC-SX-MMD	220-550m	MMF	Extended (-5C to +85C)
GLC-LH-SMD	550m / 10 km	MMF/SMF	Extended (-5C to +85C)
GLC-ZX-SMD	70 km	SMF	Extended (-5C to +85C)
GLC-BX-U	10 km	SMF	Commercial (0C to +70C)
GLC-BX-D	10 km	SMF	Commercial (0C to +70C)
GLC-LH-MMD	550m / 10km	MMF/SMF	Extended (-5C to +85C)
GLC-EX-SMD	40 km	SMF	Extended (-5C to +85C)
GLC-FE-100FX-RGD	2 km	MMF	Industrial (-40C to +85C)
GLC-FE-100LX-RGD	10 km	SMF	Industrial (-40C to +85C)
GLC-FE-100FX	2 km	MMF	Commercial (0C to +70C)
GLC-FE-100LX	10 km	SMF	Commercial (0C to +70C)
GLC-FE-100EX	40 km	SMF	Commercial (0C to +70C)
GLC-FE-100ZX	80 km	SMF	Commercial (0C to +70C)
GLC-FE-100BX-U	10 km	SMF	Commercial (0C to +70C)
GLC-FE-100BX-D	10 km	SMF	Commercial (0C to +70C)
GLC-TE	100m	NA (RJ45)	Extended (-5C to +85C)

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Note: The IR1101 is designed to operate in the industrial temperature range (-40C to +85C internal component temperature range) and therefore, using a non-industrial or commercial-rated SFP modules could bring down the temperature profile of the system.

Ordering information

The IR1101 is a Smart License-enabled product. Cisco Smart Accounts and Virtual Accounts are required to order the product. For more information how to order the IR1101 and Cisco Smart Accounts, visit the Cisco Smart Account user guide.

Table 14. Ordering information for Cisco Catalyst IR1101 Rugged Router

Hardware	**Description**	
IR1101-K9	Cisco Catalyst IR1101 Rugged Series Router with SL-IR1101-NE software license	
IR1101-A-K9	Cisco Catalyst IR1101 Rugged Series Router with SL-IR1101-NA software license	
Management	**SKU**	**Description**
Cisco IoT Field Network Director (FND) for hosting on premises	IOTFND-SOFTWARE-K9 IOTFND-IR1100	FND Top Level Subscription IoT FND License for Managing IR1101 Router
Cisco IoT Operations Dashboard	IR1101-IOTOC	IR1101 and IoT Operations Dashboard bundle
Cisco Digital Network Architecture (Cisco DNA) with SDWAN for cloud or on premises hosting	IR1101-K9-DNA IR1101-A-K9-DNA	Cisco Catalyst IR1101 Rugged Series Router with Cisco DNA Essentials subscription for SDWAN Cisco Catalyst IR1101 Rugged Series Router with Cisco DNA Advantage subscription for SDWAN
Cisco Digital Network Architecture Central (Cisco DNAC) for on premises hosting	IR-DNA	Cisco IoT DNA-C Subscription License for IR1101
FirstNet Bundle	**Hardware PID**	**Cloud manager (subscription PID)**
IR1101	IR1101-A-K9 IR1101-K9	KIN-ESS-CLD-C KIN-ESS-CLD-C
FirstNet Ready™ LTE Module	**Description**	**RF band information**
P-LTE-MNA	3GPP Category 4 LTE supporting AT&T commercial, FirstNet™ and Verizon networks in the U.S	LTE bands: 2,4,5,12,13,14,17,66 FDD LTE 1700 MHz and 2100 Mhz (band 66 Ext AWS), 700 Mhz (band 17, 14, 13,12), 850 Mhz (band 5 CLR), 1700 MHz and 2100 MHz (band 4 AWS), 1900 Mhz (band 2) UMTS, HSPA+ bands: 2,4, 5
FND Ordering Guide: https://www.cisco.com/c/dam/en/us/products/collateral/se/internet-of-things/fnd-ordering-guide.pdf.		
Expansion Module	**Description**	
IRM-1100-SPMI	Expansion module for dual active LTE, local storage for applications, SFP and	

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Hardware	Description
	input/output ports
IRM-1100-SP	Expansion module for dual active LTE and SFP
IRM-1100-4A2T[8]	Serial and Ethernet Expansion Module for Asynchronous Serial and GE interfaces
Software license	**Description**
SL-IR1101-NE	Network Essentials for core routing and security features
SL-IR1101-NA	Network Advantage for advanced routing and app-based policy management
SL-IR1101-NE-NPE	Network Essentials tied for No Payload Encryption software
SL-IR1101-NA-NPE	Network Advantage for No Payload Encryption software
Cellular module	**Description**
P-5GS6-GL(=)	5G Sub 6 GHZ module for North America, Europe and Asia Pacific
P-LTEAP18-GL(=)	Category 18 LTE module for North America, Europe and Asia Pacific
P-LTEA-EA(=)	Category 6 LTE module for North America, Europe and Middle East
P-LTEA-LA(=)	Category 6 LTE module for Asia Pacific and Latin America
P-LTE-MNA(=)	Category 4 LTE module for AT&T, FirstNet™ Ready and Verizon, US
P-LTE-US(=)	Category 4 LTE module for AT&T, U.S
P-LTE-VZ(=)	Category 4 LTE module for Verizon, U.S
P-LTE-GB(=)	Category 4 LTE module for Europe
P-LTE-IN(=)	Category 4 LTE module for India
P-LTE-JN(=)	Category 4 LTE module for Japan
LoRaWAN modules	**Description**
P-LPWA-900	Cisco Interface Module for LoRaWAN operating on the frequency subset of 902 – 928 MHz ISM band, applicable to LoRaWAN regional profile for Americas, Asia, and Pacific
P-LPWA-800	Cisco Interface Module for LoRaWAN operating on the frequency subset of 863 – 870 MHz ISM band, applicable to LoRaWAN regional profile for Europe, Middle East, Africa, and India
Note: Network Advantage license required for use of LoRaWAN modules Refer to Cisco LoRaWAN Ordering Guide for deployment options	
Mounting	**Description**
IR1101-DINRAIL(=)	Din-rail clip for vertical or horizontal mounting

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Hardware	Description
IR1101-WALLMNT(=)	Wall-mount kit
IRM-1100-DINRAIL(=)	Din-rail kit for Expansion Module
Power supply	**Description**
PWR-IE50W-AC-L=	AC power adapter for 110/220V AC and 88-300V DC input (temperature profile: -40C to 60C)
PWR-IE50W-AC=	Expansion power module: Input AC 100-240V/1.25A or DC 125-250V/1A, Output DC 24V/2.1A, DIN-Rail Mount.
PWR-IE50W-AC-IEC=	Power Module supporting input AC 100-240V/1.25A 50-60Hz, Output DC 24V/2.1A, IEC Plug, DIN-Rail Mount
Antenna and lightening arrestors	**Description**
Refer to the Cisco Antenna and Options Guide **Note:** Antennas and other accessories are not included automatically with the IR1101.	

Warranty coverage and technical service options

The IR1101 comes 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 10 shows the available technical services.

Find more information about Cisco product warranties.

Learn more about Cisco Technical Services.

Table 15. Cisco technical services for the Cisco IR1101

Technical Services
Cisco SMARTnet Service • Global access to the Cisco TAC 24 hours daily • Unrestricted access to the extensive Cisco.com resources, communities, and tools • Next-Business-Day (NBD), 8 x 5 x 4, 24 x 7 x 4, and 24 x 7 x 2 advance hardware replacement and onsite parts replacement and installation available[4] • Ongoing operating system software updates within the licensed feature set[5] • Proactive diagnostics and real-time alerts on Cisco Smart Call Home-enabled devices

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Technical Services
Cisco Smart Foundation Service • NBD 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 the Cisco Smart Foundation portal • OS software bug fixes and patches

Cisco environmental sustainability

Information about Cisco's environmental sustainability policies and initiatives for our products, solutions, operations, and extended operations or supply chain is provided in the "Environment Sustainability" section of Cisco's Corporate Social Responsibility (CSR) Report.

Reference links to information about key environmental sustainability topics (mentioned in the "Environment Sustainability" section of the CSR Report) are provided in the following table:

Sustainability Topic	Reference
Information on product-material-content laws and regulations	Materials
Information on electronic waste laws and regulations, including products, batteries and packaging	WEEE Compliance

Reference links to product-specific environmental sustainability information that is mentioned in relevant sections of this data sheet are provided in the following table:

Sustainability Topic	Reference
Power	
Power specifications and consumption	Table 6: System Specifications for Cisco Catalyst IR1101 Rugged Series Router
Environmental Characteristics	
Operating temperature, industry standards, EMC emissions	Table 6: System Specifications for Cisco Catalyst IR1101 Rugged Series Router
Material	
Unit Weight	Table 6: System Specifications for Cisco Catalyst IR1101 Rugged Series Router

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For more information

For more information about the Cisco Catalyst IR1100 Rugged Series Routers visit https://www.cisco.com/go/IR1101 or contact your local Cisco account representative.

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Footnotes and Document history

[1] Throughput degradation may be observed at a high temperature.

[2] P-LTEAP18-GL can only be used in the main IR1101 chassis. It is not supported on the IR1101 expansion modules.

[2] P-LTEAP18-GL does not support GPS.

[2] P-LTEAP18-GL: Conforms to IEC 61850 reliability Class 1.

[2] P-LTEAP18-GL: Throughput degradation may be observed at high temperature. Uplink communication range may be temporarily reduced at the highest temperatures supported.

[4] Advance hardware replacement is available in various service-level combinations. For example, 8 x 5 x NBD indicates that shipment is initiated during the standard 8-hour business day, 5 days a week (the generally accepted business days within 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.

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

[6] Certification in progress. Approval expected in 1H CY22.

[7] Certification under planning.

[8] The ethernet ports of IRM-1100-4A2T will work only when the module is attached on the top side (expansion module) of IR1101.

[9] P-5GS6-GL can only be used in the main IR1101 chassis. It is not supported on the IR1101 expansion modules.

New or Revised Topic	Described in	Date
Added new certifications **Added new LTE Pluggables: P-LTEAP18-GL, P-LTE-IN and P-LTE-JN**	Table 6 Table 7 and Table 10	May, 2020
Added information on FirstNet approval	Product highlights, Table 6 Table 7 and Table 12	September, 2020
Added 5G pluggable and IRM-1100-4A2T expansion module	Table 6 and Table 11	Jan 2022

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