Cisco ESR6300 Embedded Series Router

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Product highlights

The Cisco® ESR6300 Embedded Series Router is a high-performance, ruggedized router designed for use in harsh environments, offering reliable operation in extreme temperatures and under shock and vibration conditions typical for mobile applications in rugged terrain. With onboard hardware encryption, the Cisco ESR6300 offloads encryption processing from the routing engine to provide highly secure yet scalable video, voice, and data services for mobile and embedded outdoor networks. The router offers high performance, six Gigabit Ethernet interfaces (two routed and four switched), and a rich Cisco IOS® XE Software feature set, providing investment protection for customers deploying bandwidth-intensive applications in mobile or embedded networks in heavy industrial, public safety, transportation, defense, and energy markets.

The Cisco ESR6300 is an embedded router module with a compact form factor of 3.0 by 3.775 in. (76.2 by 95.885 mm). This module may fit in an enclosure that was originally designed for PC/104 modules with some additional adaptation. The more compact design simplifies integration and enables the module to be used in a wide variety of embedded applications. The ESR6300 card is available with a custom-designed cooling plate, as well as without the cooling plate for systems integrators who want to design their own thermal solution. The card is designed as a replacement for the Cisco 5915 and 5940 Embedded Services Routers.

Cisco has an ecosystem of partners and systems integrators that embed Cisco ESR6300s into industry-standard, commercially available enclosures as well as custom enclosures tailored to the unique environments in which these routers are deployed. Figures 1 and 2 show the Cisco ESR6300 NCP (no cooling plate) and ESR6300 CON (conduction-cooled) models, respectively.



Figure 1.
Cisco ESR6300 NCP (no cooling plate)



Figure 2.
Cisco ESR6300 CON model (with cooling plate)

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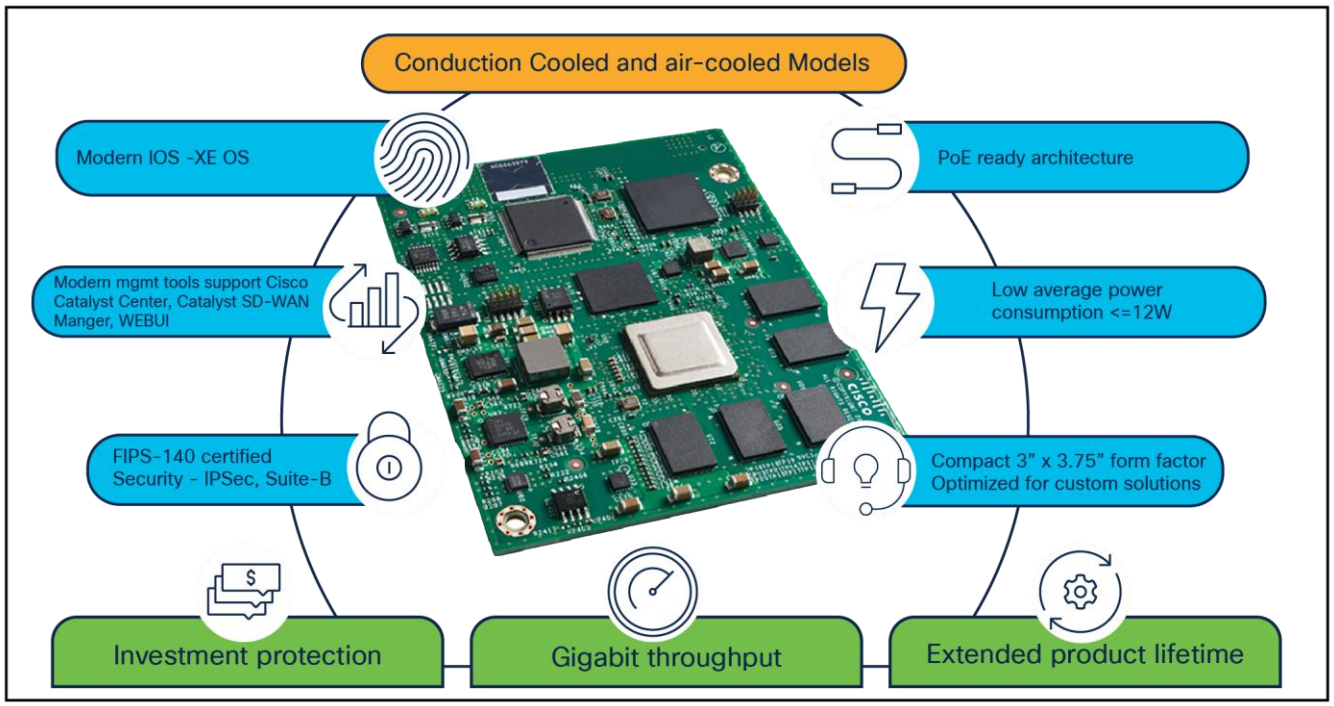


Figure 3.
ESR6300: The next-generation Gigabit Ethernet embedded router

Product overview

Table 1. Key features and benefits

Feature	Benefits
Gigabit Ethernet interface support	The Cisco ESR6300 provides 2 routed and 4 switched high-speed Gigabit Ethernet interfaces, enabling the router to serve as an aggregation point for on-demand network connectivity in mobile or fixed deployments.
Onboard hardware acceleration	The onboard hardware encryption module offloads packet encryption and decryption from the routing engine to increase router performance.
Cisco trustworthy technologies	The onboard Trust Anchor module (TAm), along with image signing, Secure Boot, and runtime defenses, helps ensure that the code running on the ESR6300 hardware platform is authentic, unmodified, and operating as intended.
Power over Ethernet-ready architecture	To enable PoE or PoE+, the third-party systems integrator has the option to add a PoE/PoE+ controller based on Cisco's specifications.
Flexible integration into solutions	The inclusive and compact design of the ESR6300 simplifies integration. • Non-conduction-cooled and conduction-cooled models are available to satisfy diverse operational environments. The router enables development of solutions that address size, weight, power, price, performance, and cooling requirements.

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Feature	Benefits
Security	Enterprise-grade Cisco IOS XE routing and switching security features help ensure highly secure voice, video, and data communication.
Cisco Unified Communications Manager Express support	This application supports up to 48 phones for remote IP telephony on vehicles or in outdoor locations. It provides primary or backup telephony services for command-and-control communications.
Throughput tiers	Various throughput licenses are available: • 50-Mbps (Default license) • 250-Mbps (Performance license) • Uncapped (Boost license)
Ease of management	On-premises and cloud-based network management solutions cater to businesses across multiple industries. Tools such as Catalyst SD WAN Manager simplify deployment and offer broad cross-network management and the depth of multilayer visibility.

Product specifications

Table 2. Hardware specifications

Feature	Specification
Memory	
Default and maximum DRAM	4-GB DDR4 memory capacity (32-bit plus 4-bit ECC)
Default and maximum flash memory	4-GB usable (pSLC mode) eMMC flash
Physical characteristics	
Physical dimensions (H x W)	3.0 x 3.775 in. (76.2 x 95.885 mm)
Power specifications	3.3V and 5V power inputs
Power consumption	At idle: 5W Typical: 7.5W Maximum: 12W
Interface support	
Console	• 1 Universal Asynchronous Receiver-Transmitter (UART) port, defaults to 9600 baud Options for external interface: • 1 USB 2.0 port (requires USB/UART bridge) • 1 EIA-232 serial console port (requires EIA-232/UART transceiver)
USB host	1 USB 3.0 host port Type A (requires USB connector and 5V VBUS power switch)
WAN Gigabit Ethernet	2 Layer 3 GE WAN ports (requires magnetics and connector)

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Feature	Specification
LAN Gigabit Ethernet	4 Layer 2 GE LAN ports (the module has an integrated Layer 2 switch that can be PoE/PoE+ enabled – requires magnetics, connector, and PoE controller)
Serial interface	• EIA-232 DTE serial port • Support for asynchronous mode and flow control with data rate up to 921,600 baud
Input and output	ALARM input port (requires isolated dry contact open/closed detection circuit)
LED signals	SYS: System (green/yellow) ALM: Alarm (red) VPN: Virtual private network (green) USB CONS: USB console (green) SSD: Solid state drive, mSATA (green) GE WAN: Link and activity (green) SFP WAN: Link and activity (yellow) GE LAN: Link and activity (green)
Environmental characteristics	
Industrial-grade board component temperature	–40° to 85°C (–40° to 185°F) component local ambient temperature specification
Operating temperature	–40° to 85°C (–40° to 185°F) for conduction-cooled SKUs as measured at the center top surface of the heat spreader plate Temperature range of a completed solution depends on the enclosure thermal design characteristics used by the systems integrator
Storage temperature	–40° to 85°C (–40° to 185°F)
Operating altitude	12,192 m (40,000 ft)
Nonoperating altitude	12,192 m (40,000 ft)
Nonoperating shock and vibration	MIL-STD-810, Method 514.4 IEC 68000-2-32 MIL-STD-810 F, Method 516.5, Procedure V Crash Hazard (All shock and vibration is dependent on the packaging.)
Standard safety certifications	Information Technology Equipment: UL/CSA 60950-1 UL Recognized Component UL/CSA 62368-1 UL Recognized Component CB report and certificate to IEC 60950-1 with all country deviations CB report and certificate to IEC 62368-1 with all country deviations
Industry standards	• IEC 61850-3 • IEEE 1613

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Feature	Specification
Government Certifications	• Please see https://www.cisco.com/c/en/us/solutions/industries/government/global-government-certifications.html
EMC emissions CLASS A	• 47 CFR, Part 15:2016 • CISPR32:2012:Ed:1 • CISPR32:2015:Ed:2 • CNS13438:2006 • EN300 386:2012:V1.6.1 • EN55032:2012 • EN55032:2015 • EN61850-3:2014 • ICES-300:2016:6 • IEC61850-3:2013 • KN32:2015 • QCVN 118:2018/BTTTT • VCCI-CISPR 32:2016
EMC immunity	• CISPR24:2010+A1:2015 • CISPR35:2016:Ed:1 • EN300 386:2012:V1.6.1 • EN55024:2010 • EN55024:2010:A1 • EN55035:2017 • EN61850-3:2014 • IEC61850-3:2013 • IEEE 1613.1:2013 • IEEE 1613:2009 • IEEE 1613a:2011 • KN35:2015 • TCVN 7317:2003

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Table 3. Software specifications

Feature	Description
Cisco IOS Software requirements	• Cisco IOS XE Software: Universal Cisco IOS Software image • Cisco IOS XE Software Release 17.1.1 or later
IPv4 and IPv6 services features	• Routing Information Protocol (RIP) v1 and v2 • 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 (OSPF) v2 and v3 • 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 • Layer 2 Tunneling Protocol (L2TP) v3 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 • Cisco Easy VPN Solution client and server • NAT transparency • Dynamic Multipoint VPN (DMVPN) • Tunnel-less Group Encrypted Transport VPN • FlexVPN • 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

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Feature	Description
	• 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 (CoPP) • Flexible packet matching • Network foundation protection
QoS features	• 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 • 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)
IPv6 features	• IPv6 addressing architecture • IPv6 unicast and multicast forwarding • IPv6 ACLs • IPv6 routing • IPv6 domain name resolution
Radio Aware Routing	• Dynamic Link Exchange Protocol (DLEP) - RFC 8175 • PPP over Ethernet (PPPoE) Extensions for Credit Flow and Link Metrics - RFC 5578

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Software licensing

The Cisco ESR6300 offers two software tiers – Network Essentials and Network Advantage. The Network Essentials 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, application-aware QoS policies for built-in intelligence, and Radio Aware Routing.

A single Cisco IOS XE universal image encompassing all functions is delivered with the product. Software feature licenses are preinstalled in the factory, depending on the selection made at the time of purchase, simplifying software delivery and decreasing the operational costs of the deployment. Licenses can be upgraded after deployment by going through the Cisco Smart License activation process.

Table 4. Software licensing

Software Tiers	Description
Network Essentials	• Authentication, Authorization, and Accounting (AAA), Address Resolution Protocol (ARP), ACLs, Cisco Configuration Professional, Cisco Discovery Protocol, Connectionless Network Service (CLNS), Cisco Networking Services, EIGRP, SNMP, MIB, raw sockets, Call Home, First-Hop Redundancy Protocol (FHRP), Hierarchical Queuing Framework (HQF), iEDGE, basic routing and multicast, NAT, Network Time Protocol (NTP), DHCP, Internet Control Message Protocol (ICMP), Internet Group Management Protocol (IGMP), basic OSPF and OSPFv3, QoS, RIP, HTTP, Hot Standby Router Protocol (HSRP), STP, VLAN, VRF, 802.1X • IPsec, crypto tunnels, FlexVPN, Internet Key Exchange (IKE) v2 • Cisco Unified Communications Manager Express
Network Advantage	• Includes Network Essentials plus: • MPLS, BFD, RSVP, RSRB, IP SLA, TCP optimization, App-aware QoS policies and troubleshooting, L2TPv3, Radio Aware Routing

Only key features are highlighted above.

***To order Cisco Catalyst Center or Catalyst SD-WAN Manager License for the ESR6300 use:**

For On-Prem Licenses use: L-IR-DNA-TIER-ADD

For Cloud Licenses use: IOT-IRDNA

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Ordering information

The ESR6300 is a Smart License–enabled product. Cisco Smart Accounts and Virtual Accounts are required to order the product. For a more detailed overview on Cisco Licensing, visit the Licensing Hub.

1. ESR6300 board selection: Choose ESR6300 CON (conduction-cooled models) or ESR6300 NCP (no cooling plate).
2. Mandatory purchase of one software tier/throughput license.

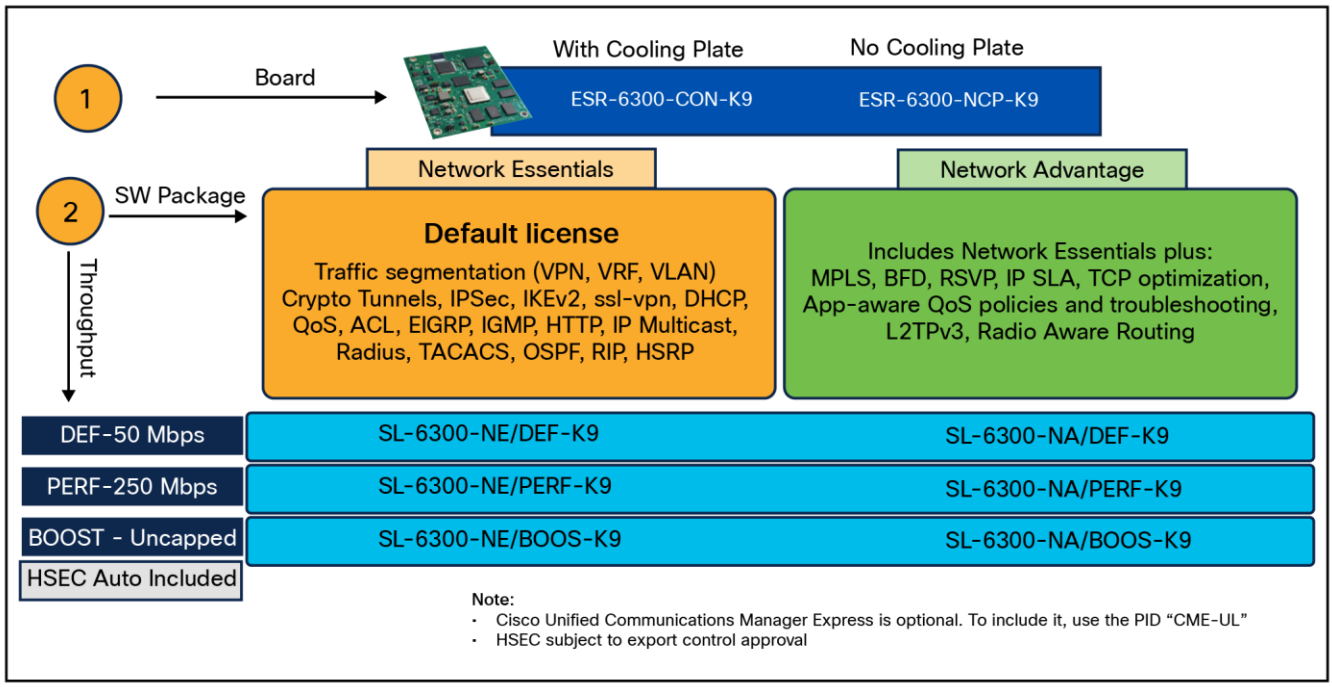


Figure 4.
ESR6300 licensing and ordering

- HSEC license is mandatory if the Boost license is selected, and is automatically included.
- Cisco Unified Communications Manager Express per-seat license is optional and is required if a customer wants to use Cisco Unified Communications Manager Express.
- Only key features under Network Essentials and Network Advantage are highlighted in Figure 4.

Table 5. ESR6300 router

Product name	Part number
Cisco ESR6300 Embedded Series Router Cards	
Cisco ESR6300 no cooling plate card with 2x Gigabit Ethernet routed ports and 4x Gigabit Ethernet switched ports	ESR-6300-NCP-K9
Cisco ESR6300 conduction cooled card with 2x Gigabit Ethernet routed ports and 4x Gigabit Ethernet switched ports	ESR-6300-CON-K9

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Table 6. Performance tiers and software packages

Throughput	Software tier	
	Network Essentials	**Network Advantage**
Default (50 Mbps)	SL-6300-NE/DEF-K9	SL-6300-NA/DEF-K9
Performance (250 Mbps)	SL-6300-NE/PERF-K9	SL-6300-NA/PERF-K9
Boost (Uncapped)	SL-6300-NE/BOOS-K9	SL-6300-NA/BOOS-K9

Table 7. Software option

Options	Part number
Cisco Unified Communications Manager Express – 1 seat	CME-UL

Table 8. Boost license requirement

HSEC license	Part number
High-security license, required with Boost license	L-63-HSEC-K9

Table 9. License Upgrade Matrix

FROM/TO	NE/50M	NE/250M	NE/UNC	NA/50M	NA/250M	NA/UNC
NE/50M		SL-6300-NE/DP-K9=	SL-6300-NE/DB-K9=	SL-6300-NA/DEF-K9=	SL-6300-NA/DP-K9=	SL-6300-NA/DB-K9=
NE/250M			SL-6300-NE/PB-K9=		SL-6300-NA/PER-K9=	SL-6300-NA/PB-K9=
NE/UNC						SL-6300-NAA/BOO-K9=
NA/50M					SL-6300-NAA/DP-K9=	SL-6300-NAA/DB-K9=
NA/250M						SL-6300-NAA/PB-K9=
NA/UNC						

NE=Network Essentials

NA=Network Advantage

UNC=Uncapped

How to Read:

Example: If you have NE/50M license for ESR6300 and want to upgrade it to NA/UNC, you need the “SL-6300-NA/DB-K9=” upgrade license PID.

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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

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For more information

For more information about the Cisco ESR6300 Embedded Services Router, visit https://www.cisco.com/go/esr6300 or contact your local Cisco account representative.

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Document history

New or revised topic	Described in	Date
Radio Aware Routing	Table 3 Software Specifications	March 7, 2024
Boost License throughput	Table 6 performance Tiers and software packages	March 7, 2024

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Printed in USA C78-742901-02 07/26

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