

Cisco IoT System

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Cisco IoT System Overview

The Internet of Everything (IoE) brings together people, process, data, and things to make networked connections more relevant and valuable than ever before. IoE turns information into actions that create new capabilities, richer experiences, and unprecedented economic opportunity for organizations. One of many trends that are combining to make the Internet of Everything possible is the Internet of Things (IoT) – bringing things that have never been connected before online. By connecting things to applications, IoT can increase operational efficiency and enable new services.

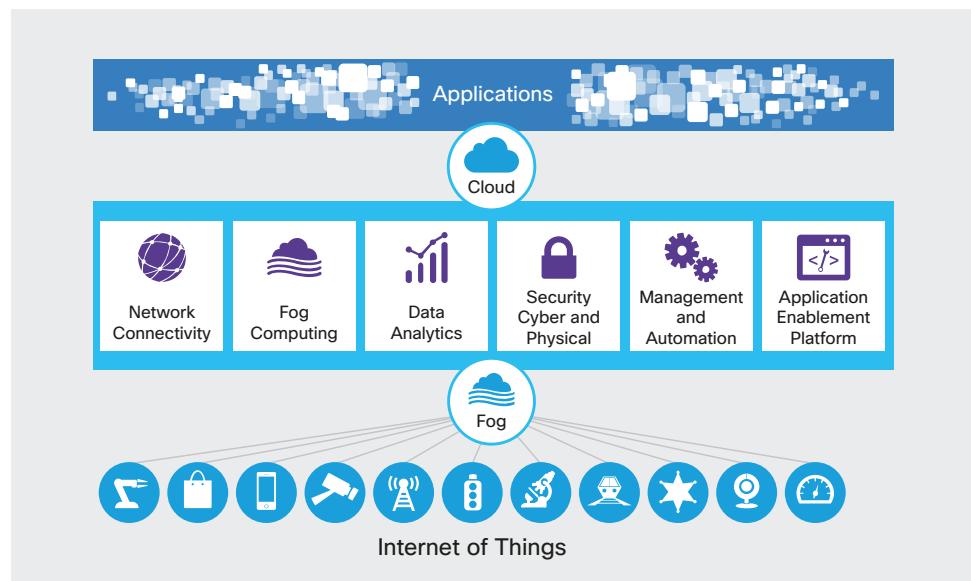
Cisco IoT System provides the technologies and software you need to deploy, accelerate, and innovate in the era of IoT. It is a comprehensive solution addressing challenges across several industries, including manufacturing, utilities, oil and gas, transportation, mining, and public sector.

Six pillars form the Cisco IoT System:

- Network connectivity
- Fog computing
- Data analytics
- Security (cyber and physical)
- Management and automation
- Application enablement platform

The following figure shows the six pillars that comprise the Cisco IoT System

Figure 1. Cisco IoT System



Network Connectivity

Cisco delivers a broad selection of reliable and scalable routing, switching, and wireless products in the IoT networking products portfolio – available in ruggedized and non-ruggedized form factors, as well as software-only solutions that can be integrated with third-party devices. The Cisco network connectivity portfolio spans from the cloud to the fog – from the data center to industrial networks as well as to the extreme edge.

Fog Computing

Cisco® fog computing extends cloud connectivity closer to the edge, bringing end devices, such as smart meters, industrial sensors, robotic machines, and others, into an integrated computing, networking, and storage system. By having this infrastructure closer to the connected things, the fog reduces latency and dramatically minimizes bandwidth requirements. With Cisco fog computing, you can efficiently analyze and manage data to grow your organization and accelerate IoT deployments.

Security (Cyber and Physical)

Cisco combines comprehensive physical- and cybersecurity solutions that address the full attack continuum – before, during, and after an attack. Our IoT security solutions include cloud-based threat protection, OT specific security appliances, network and perimeter security, data security, user- and group-based identity services, video analytics, and secure physical access. They support IT and industrial protocols and policies, so you can integrate security throughout your organization.

Data Analytics

The Cisco IoT analytics infrastructure comprises distributed network infrastructure components and IoT-specific APIs, which allows you to run organization-specific software analytics packages throughout your network architecture. Cisco provides the infrastructure and tools necessary for you to combine IoT analytics with business analytics.

How You Benefit:

- **Improve product quality and operational effectiveness** by easily connecting IT and operational technology. Use analytics and open APIs to control, monitor, analyze, and optimize performance.
- Mitigate risk in an increasing hostile threat environment with scalable, comprehensive cyber and physical security.
- **Create new revenue streams** by using pervasive IoT analytics to accelerate new service delivery and enhance product quality with data privacy.
- **Lower operating expenses** by using a common network to increase uptime, react quickly to changing market conditions, and reduce energy consumption.

Management and Automation

Cisco delivers a broad range of IoT management and automation capabilities throughout the extended network. You can customize Cisco management and automation products for specific industries to provide enhanced security and control and support for multiple siloed functions. You can also converge your operational technology and IT networks to create and enforce a consistent policy across your entire organization.

Application Enablement Platform

Cisco IoT System enables you to engage a broad ecosystem of technology partners with industry-specific expertise. The application enablement platform offers open APIs and application development environments on the rest of the Cisco IoT System for you, your partners and third parties to design, develop and deploy innovative solutions for your industry.

Cisco Services for IoT

In addition to Cisco IoT System, Cisco provides comprehensive consulting services for IoT. We help you plan, design, build, optimize, and manage your IoT solutions, and we have a successful worldwide track record of IoT implementations. Our leading networking expertise combined with our technology partners' expertise helps accelerate your organization's transformation and ensure IT and operational technology alignment. Cisco Services offers the following for your IoT deployments and the Cisco IoT System product portfolio:

- Cisco architectural roadmap
- Cisco micro-engagement and Cisco starter kits
- Cisco design and build service
- Cisco solution optimization service
- Cisco product support services

Network Connectivity

New IoT Requirements

As you deploy IoT, new and more vigorous demands are placed on your networks. Applications and services such as high-speed wireless, high-definition IP video services, and others require high-bandwidth connectivity. In addition, extremely low-latency applications, such as high-speed motion controls, demand high-speed connections. You also need a flexible and scalable network infrastructure to easily deploy your applications from the cloud all the way to the edge with fog computing and to serve the thousands of devices joining the network. And you must secure and manage your IoT network infrastructure.

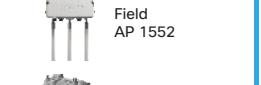
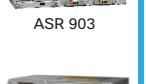
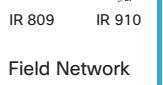
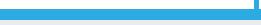
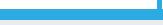
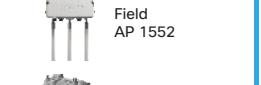
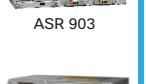
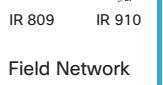
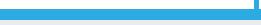
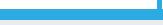
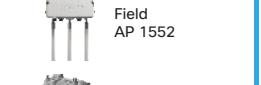
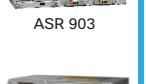
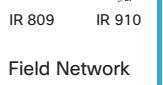
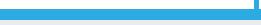
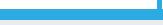
Cisco Advantage: Certified Network Products with Focus on Industrial Applications

Cisco is addressing these IoT network connectivity challenges by extending our proven expertise in IT networking to industrial operational-technology environments. We offer a broad portfolio of routing, switching, and wireless products in ruggedized and nonruggedized form factors. Cisco delivers the industry's most reliable, scalable, high-performance portfolio of IoT networking solutions, offering a broad selection of routing, switching, and wireless products. Our products meet the IoT needs of several industries, such as manufacturing, oil and gas, utilities, transportation, mining, public sector, among others. With breakthrough products, such as the industry's first industrial 40 Gigabit Ethernet switches, the Cisco Industrial Ethernet 4000 Series Switches, Cisco delivers a comprehensive network connectivity portfolio certified for various industries and geographies.

Network Connectivity Products

The following figure provides an overview of the Cisco IoT System network connectivity portfolio

Figure 2. Cisco IoT Network Connectivity Product Portfolio

| What Is It | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|--|---|---|---|--------------------------|----------|------------------|------------------|--------------|---|---|--|---|---|------|---------|---------------------------------------|------------------|----------|---|---|--|---|---|---------|---------|-----------------------------------|------------------|---|---|---|--|---|--|--------------------|------------------------|-------------------|---------------|--|--|--|--|--|
| Purpose Built Network Devices | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Portfolio Depth: Wired and Wireless, Routing and Switching | Customized for Industries | Cloud to Fog Comprehensive Portfolio | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cisco Portfolio | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <tbody> <tr> <td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>IE 2000, 3000 CGS2000</td><td>CGR 2000</td><td>Field AP 1552</td><td>CGR 1000 819H</td><td>ESS Switches</td></tr> <tr> <td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>IP67</td><td>IE 4000</td><td>Manufacturing WGB/AP (Rockwell)</td><td>IR 509 IR 829</td><td>5900 ESR</td></tr> <tr> <td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>IE 5000</td><td>ASR 903</td><td>Industrial AP IW 3700 802.11ac</td><td>IR 809 IR 910</td><td>5921 Software Router Embedded Networks</td></tr> <tr> <td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>Industrial Routing</td><td>Industrial Wireless</td><td>Mobile IP Gateway</td><td>Field Network</td><td></td></tr> </tbody> </table> |  |  |  |  |  | IE 2000, 3000 CGS2000 | CGR 2000 | Field AP 1552 | CGR 1000 819H | ESS Switches |  |  |  |  |  | IP67 | IE 4000 | Manufacturing WGB/AP (Rockwell) | IR 509 IR 829 | 5900 ESR |  |  |  |  |  | IE 5000 | ASR 903 | Industrial AP IW 3700 802.11ac | IR 809 IR 910 | 5921 Software Router Embedded Networks |  |  |  |  | | Industrial Routing | Industrial Wireless | Mobile IP Gateway | Field Network | | | | | |
|  |  |  |  |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IE 2000, 3000 CGS2000 | CGR 2000 | Field AP 1552 | CGR 1000 819H | ESS Switches | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  |  |  |  |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IP67 | IE 4000 | Manufacturing WGB/AP (Rockwell) | IR 509 IR 829 | 5900 ESR | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  |  |  |  |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IE 5000 | ASR 903 | Industrial AP IW 3700 802.11ac | IR 809 IR 910 | 5921 Software Router Embedded Networks | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  |  |  |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Industrial Routing | Industrial Wireless | Mobile IP Gateway | Field Network | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Benefits:

- Resilience at scale:** High availability facilitates networkwide resilience as you scale your networks with millions of new endpoints and applications.
- Integrated security:** Cisco network-as-a-sensor approach integrates cybersecurity throughout the network, maximizing security visibility and control.
- Converged networking:** Our broad portfolio of IoT networking solutions supports the disparate needs of IT and operational technology standards and protocols.

Industrial Switching

Cisco industrial switches are a range of compact, ruggedized switches that handle security, voice, and video traffic across industrial networks. They provide organizations in industries such as manufacturing, oil and gas, mining, transportation, and energy with highly secure access and industry-leading convergence using Cisco Resilient Ethernet Protocol (REP).

The Cisco industrial Ethernet switching portfolio includes the following product families:

- **Cisco Industrial Ethernet 2000 Series Switches:** A compact fixed switching platform. The 2000 Series Switches are available in two form factor options, one DIN rail mounting and one wall and/or pole mounting qualified for Ingress Protection 67 (**ie2000 IP67**). On the ie2000, different models provide between 6 and 20 Ethernet interfaces. On the ie2000 IP67, up to 24 Ethernet interfaces are supported. For electrical utilities specific applications, the **Cisco IE 2000U Switch** is available.
- **Cisco Industrial Ethernet 3000 Series Switches:** A multilayer switching modular platform. Composed by a main module and expansion modules, allowing scaling the configuration (up to 26 Ethernet interfaces) to grow with customer operational needs. A fixed 19-inch, one rack unit version is also available: the **Cisco Industrial Ethernet 3010 Series Switches**.
- **Cisco 2500 Series Connected Grid Switches:** A series of 19-inch, one rack unit fixed configuration switches designed for electrical utilities applications.
- **Cisco Industrial Ethernet 4000 Series Switches:** The industry's first DIN rail mounting 40 Gigabit Ethernet switch platform that offers high bandwidth and low-latency network connectivity. It is available in various models, up to 20 Gigabit Ethernet interfaces.
- **Cisco Industrial Ethernet 5000 Series Switches:** A 19-inch one rack unit, highly ruggedized full gigabit aggregation and/or backbone platform equipped with 24 Gigabit Ethernet ports plus 4 x 10 Gigabit or 4 x 1 Gigabit line interfaces, making it ideal for the aggregation and/or backbones in large-scale industrial networks.

Primary Features

- Design for industrial Ethernet applications, including extended environmental, shock and vibration, and surge ratings; a complete set of power input options; convection cooling; and DIN-rail, 19-inch rack or wall mounting
- Support for Power over Ethernet (PoE) and Power over Ethernet Plus (PoE+)
- Native support of industrial automation protocols (that is, Common Industrial Protocol [CIP]/Ethernet IP and PROFINETv2), allowing integration with industry-specific communication protocols and industrial automation management platforms
- High availability, guaranteed determinism, and reliable security using Cisco IOS® Software
- Designed and certified for many industrial and regional specific requirements and standards
- Standard 5-year hardware warranty on all models
- Easy and user-friendly deployment, setup, operation, and management

Hardware Models

The following figures show the hardware modules available:

Figure 3. Industrial Ethernet 2000 Series Switches



Figure 4. Industrial Ethernet 2000U Series Switches



Figure 5. Industrial Ethernet 2000 IP67 Series Switches



Figure 6. 2500 Series Connected Grid Switches



Figure 7. Industrial Ethernet 3000 Series Switches

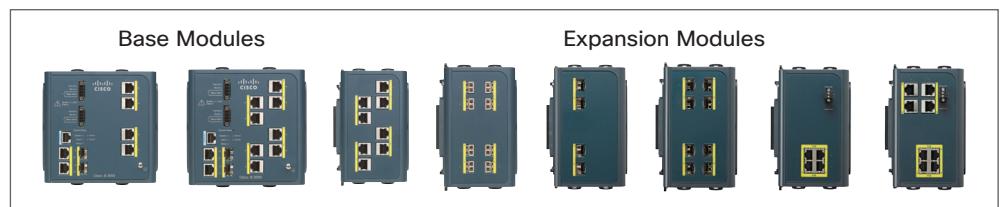


Figure 8. Industrial Ethernet 3010 Series Switches



Figure 9. Industrial Ethernet 4000 Series Switches



Figure 10. Industrial Ethernet 5000 Series Switches

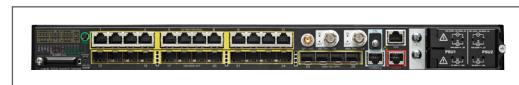


Table 1. Industrial Ethernet Switches Comparison Summary

| Product Family | IE2000 | IE2000U | IE2000 IP67 | CGS2520 | IE3000 | IE3010 | IE4000 | IE5000 |
|--|--|--|--|--|---|--|--|--|
| Number of Models | 25 | 7 | 5 | 2 | 2 Base + 6 Expansion | 2 | 12 | 2 |
| Total Ports | 20 | 20 | 24 | 26 | 24 | 26 | 20 | 28 |
| Copper Ports | 16 FE | 16 FE | 24 FE/16FE + 2GE | 24 FE | 24 FE | 24 FE | 16 FE/16 GE | 12 FE/GE |
| SFP Ports | 2 GE | 2 GE | - | 16 FE | 16 FE | 16 FE | 16 FE/GE | 12 FE/GE + 4 GE or 10GE |
| Combo Ports | 2 FE | 2 FE/GE | - | 2 GE | 2 GE | 2 GE | 4 GE | - |
| PoE/PoE+ | Yes | Yes | Yes | Yes | Yes | Yes | Yes (up to 8) | Yes (up to 12) |
| Mechanical form factor | DIN rail | DIN rail | Wall mountable | 19" | DIN rail | 19" | DIN rail | 19" |
| Ingress Protection Class | IP30 | IP30 | IP67 | IP30 | IP20 | IP30 | IP30 | IP30 |
| Max Dimensions H x W x D (inches and mm) | 5.1" x 5.0" x 5.26" (130mm x 127mm x 134mm) | 5.1" x 5.0" x 5.26" (130mm x 127mm x 134mm) | 9.5" x 14.76" x 3.2" (241.7mm x 374.8mm x 81.5mm) | 1.75" x 17.5" x 14.0" (44.5mm x 445mm x 356 mm) | 5.8" x 6.0" x 4.4" (147mm x 152mm x 112mm) | 1.75" x 17.5" x 14.0" (44.5mm x 445mm x 356 mm) | 6.12" x 6.12" x 5.09" (155.4mm x 155.4mm x 129.2mm) | 1.75" x 17.5" x 14.0" (44.5mm x 445mm x 356 mm) |
| Max Power Consumption (excluding PoE) | 30 W | 20 W | 22 W | 40.3 W | 15.7 W | 34.4 W | 42 W | 90 W |
| Max Weight | 4.35 lbs (1.97 kg) | 4.35 lbs (1.97 kg) | 8.86 lbs (4.02 kg) | 10 lbs (4.5 kg) | 4.4 lbs. (2.0 kg) | 10 lbs (4.5 kg) | 6.35 lbs (2.88 kg) | 13.7 lbs (6.2 kg) |
| HW Warranty Period | 5 years | 5 years | 5 years | 5 years | 5 years | 5 years | 5 years | 5 years |
| MTBF (Hours) - lowest model - | 374,052 | 660,730 | 374,052 | 660,730 | 329,451 | 543,540 | 519,190 | 247,590 |

Industrial Routing

The Cisco industrial routing portfolio includes a range of compact, ruggedized modular platforms on which industrial organizations can build a highly secure, reliable, and scalable communications infrastructure. These products are certified to meet harsh environmental standards. They support a variety of communications interfaces, such as Ethernet, Serial, Cellular, WiMAX, RF mesh, and others.

The Cisco industrial routing portfolio includes the following product families:

- **Cisco 1000 Series Connected Grid Routers:** Versatile communications platforms designed to meet the communication infrastructure needs of industrial verticals, allowing integration of multiple applications as well as workforce automation onto a single platform.
- **Cisco 2000 Series Connected Grid Routers:** Rugged routers optimized for use in the multitude of different communications networks in the energy and utility industries.
- **Cisco ASR 900 Aggregation Services Router:** A converged, full-featured, modular, small-footprint, fully redundant aggregation platform. It offers service flexibility and delivers Layer 2, IP, and Multiprotocol Label Switching (MPLS) transport for advanced Layer 2 VPN, Layer 3 VPN, and multicast services.
- **Cisco 500 Series WPAN Industrial Routers:** Compact routers that provide unlicensed 915 MHz industrial, WPAN communications enabling a diverse set of IoT applications.
- **Cisco 809 Industrial Integrated Services Router:** Very compact Cellular (3G and 4G LTE) Industrial Router for remote deployment in various industries enabling reliable, and secure remote asset management and machine-to-machine (M2M) solutions.
- **Cisco 819H Integrated Services Router:** A compact hardened form factor Cellular (3G and WLAN or 4G options available) Router that allow businesses to deploy secure wireless wide area network services and applications, like ATMs, wireless kiosks, digital signage, and more.
- **Cisco 829 Industrial Integrated Services Router:** A highly ruggedized compact Cellular (3G and 4G/LTE with GPS and dual SIM) and WiFi (2.4/5GHz) Industrial Router for scalable, reliable, and secure fleet management and remote asset monitoring solutions.
- **Cisco 910 Industrial Router:** Highly adaptable routers that easily integrate with third-party solutions to deliver smart-city applications, such as environmental monitoring, smart parking, smart metering, and more.

Primary Features

- Design for Industrial applications, including extended environmental, shock, vibration, and surge ratings; a complete set of power input options; convection cooling; and DIN-rail, 19-inch rack or wall mounting
- High availability, advanced quality of service (QoS), guaranteed determinism, and reliable security using Cisco IOS Software
- Diverse modular interfaces (Ethernet, T1/E1, 3G and 4G/LTE Cellular, Asynch/Synch, serial and others) to interface and backhaul for different existing infrastructures
- Advanced QoS capabilities to support mission-critical communications, such as substation communications or supervisory control and data acquisition (SCADA)
- Support for IEEE 1588v2, a precision-timing protocol with nanosecond-level precision for high-performance applications and compliance with IEC-61850-3 and IEEE 1613 for utility substation environments
- Easy and user-friendly deployment, setup, operation, and management

Hardware Models

Following figures show the hardware modules available:

Figure 11. Cisco 1000 Series Connected Grid Router



Figure 12. Cisco 2000 Series Connected Grid Router



Figure 13. Cisco 819H Integrated Service Router



Figure 14. Cisco 509 WPAN Industrial Router and Cisco 529 WPAN Range Extender



Figure 15. Cisco 910 Industrial Router



Figure 16. Cisco 809 Industrial Router



Figure 17. Cisco 829 Industrial Router



Figure 18. Cisco ASR 900 Aggregation Services Router



Table 2. Industrial Routers Comparison Summary

| | CGR 1120 | CGR 1240 | CGR 2000 | IR 509 | IR529 | ISR 819H | IR 809 | IR 829 | IR 910 | ASR902 ASR903 |
|----------------------|-------------------------|-------------------------|----------------|-----------|--------|-------------------------|-------------------------|-------------------------|--------------------------|----------------|
| Number of Models | 1 (*) | 1 (*) | 1 (*) | 1 | 3 | 16 | 4 | 5 | 2 | 1 (*) |
| O.S. | iOS M/T | iOS M/T | iOS M/T | TinyOS | TinyOS | iOS M/T | iOS M/T | iOS M/T | Linux | iOS M/T |
| IOX | Hypervisor + Linux | Hypervisor + Linux | No | No | No | Linux (4G model) | Hypervisor + Linux | Hypervisor + Linux | Linux | No |
| Raw Socket | Yes (TCP/ UDP) | Yes (TCP/ UDP) | Yes (TCP/ UDP) | Yes (TCP) | | Yes (TCP/ UDP) | Yes (TCP/ UDP) | Yes (TCP/ UDP) | No | Yes (TCP/ UDP) |
| Protocol Translation | T101-T104 DNP3- DNP3/IP | T101-T104 DNP3- DNP3/IP | No | No | No | T101-T104 DNP3- DNP3/IP | T101-T104 DNP3- DNP3/IP | T101-T104 DNP3- DNP3/IP | No | No |
| IP Grade | IP30 | IP67 | IP30 | IP41 | IP67 | IP41 | IP30 | IP54 | IP30 IP55 (w, enclosure) | IP30 |

| | CGR 1120 | CGR 1240 | CGR 2000 | IR 509 | IR529 | ISR 819H | IR 809 | IR 829 | IR 910 | ASR902 ASR903 |
|---|---|--|---|--|--|--|---|---|--|---|
| Ethernet ports (LAN/WAN) | 6 * FE RJ45 2 * GE RJ45/SFP | 4 * FE RJ45 2 * GE RJ45/SFP | 16 * FE RJ45 8 * FE SFP | 1 * FE RJ45 | No | 4 * FE RJ45 1 * GE RJ45 | 2 * FE RJ45 | 4 * GE RJ45 1 * GE SFP | 1 * GE RJ45/SFP | 8 x GE RJ45 (**) 8 x GE SFP (**) 2 x 10G SFP (**) |
| Serial ports (NAN) | 1 * RS232 1 * RS232/RS485 | 1 * RS232 1 * RS232/RS485 | 8 * RS232 | 1 * RS232 1 * RS232/RS485 | No | 1 * RS232 | 1 * RS232 1 * RS232/RS485 | 1 * RS232 1 * RS232/RS485 | 2 * RS232/RS485 | 14 x RS232 (**) |
| Cellular (WAN) | GPRS, 3G, 4G | GPRS, 3G, 4G | No | No | No | GPRS, 3G, 4G | GPRS, 3G, 4G | GPRS, 3G, 4G | GPRS, 3G | No |
| Wi-Fi (LAN/WAN) | Yes | Yes | No | No | No | Yes (not 4G model) | No | Yes | Yes (IR910W-K9) | No |
| WiMAX (WAN) | Yes | Yes | No | No | No | No | No | No | No | No |
| 802.15.4g/e (NAN) | Yes | Yes | Yes | Yes | Yes | No | No | No | No | No |
| 1901.2 PLC (NAN) | Yes | Yes | No | No | No | No | No | No | No | No |
| LTN (NAN) | No | No | No | No | No | No | No | No | Yes, Semtech LoRa | No |
| Operation Temperature | -40°C to +60°C (-40°F to 140°F) with type test to 85°C (185°F) for 16 hours | -40° to +70°C (-40°F to 158°F) with type test to 85°C (185°F) for 16 hours | -40° to +60°C (-40°F to 140°F) with type test to 85°C (185°F) for 100 hours | -40° to +70°C (-40°F to 158°F) with type test to 85°C (185°F) for 16 hours | -40° to +70°C (-40°F to 158°F) with type test to 85°C (185°F) for 16 hours | -25° to +60°C (-13° to 140°F) | -45° to +65°C (-49° to 149°F) | -40° to +60°C (-40° to 140°F) | -40° to +70°C (-40°F to 158°F) | -40° to 65°C (DC operation) -5° to 55°C (AC operation) |
| Max Dimensions H x W x D (inches and mm) | 11.3 x 9.7 x 8.5 in. 287 x 246 x 216 mm (***) | 3.5 x 9.0 x 7.8 in. 89 x 229 x 200 mm (*) | 3.5 x 17.25 x 15 in. 88.9 x 438.2 x 381 mm (***) | 1.125 x 4.0 x 5.0 in. 28.6 x 101.6 x 127 mm | 4.85 x 7.23 x 10.37 in. 123.2 x 183.7 x 263.4 mm (***) | 1.73 x 7.7 x 9.0 in 44 x 186 x 229 mm | 1.25 x 5 x 6.25 in 31.75 x 127 x 158.75 mm | 1.73 x 7.7 x 11 in 43.9 x 195.58 x 279.4 mm. | 5.1 x 6.2 x 5.38 in. 130 x 157 x 137 mm (*) | 5.22 x 17.44 x 9.22 in. 132.6 x 443 x 234.2 mm |
| Max Power Consumption (excluding PoE) | 40 W | 75 W | 60 W (****) | 6 W | 18 W | 25 W | 29W | 30W | 12 W | 400W (****) |
| Max Weight - heaviest model - | 8 lbs (3.6 kg) | 23 lbs (10.4 kg) | 25 lbs (11.4 kg) | 0.85 lbs (0.4 kg) | 8.48 lbs (3.85 kg) | 3.2 lb (1.5 kg) | 1 lb 11 oz. (0.77 kg) | 5 lbs (2.27 kg) | 5.07 lb (2.3 kg) | 34.17 lb (15.5 kg) |

(*) with various plug-in modules

(**) for each plug-in module

(***) without antennas

(****) Typical depending on configuration

Industrial Wireless

Cisco Outdoor and Industrial Wireless can be deployed in a variety of demanding environments. To help ensure an exceptional user experience on the wireless network, these access points provide a variety of capabilities, including:

- Cisco CleanAir® Technology for a self-healing, self-optimizing network that avoids RF interference
- Cisco ClientLink 2.0 and 3.0 to improve reliability and coverage for existing clients
- Band select to encourage 5 GHz client connections in mixed-client environments
- Cisco VideoStream which uses multicast encapsulated in unicast to improve multimedia applications

Whether you need a multilevel mesh network, flexible options such as fiber-based backhaul, or even deployment in hazardous locations, the Cisco industrial wireless portfolio provides a high-performance access point to meet your rugged outdoor requirements.

The Cisco industrial wireless portfolio includes the following product families:

- **Cisco Industrial Wireless 3700 Series Access Point:** Offers industrial-grade environmental qualifications while providing higher speeds for video and other bandwidth-intensive applications and extending support to a new generation of Wi-Fi clients that have integrated 802.11ac support.
- **Cisco Aironet 1530 Series Outdoor Access Points:** Offers a low-profile, attractive design that can withstand the most rugged outdoor conditions. Available with internal (Cisco Aironet 1530i Outdoor Access Point) and with external antennas (Cisco Aironet 1530e Access Point) options.
- **Cisco Aironet 1550 Series Outdoor Access Points:** A highly ruggedized access point qualified for Hazloc operations. Some models integrate an ISA100-compliant backbone router (Cisco Aironet 1552S Outdoor Access Point) and a WirelessHART gateway (Cisco Aironet 1552WU Outdoor Access Point), providing an easy-to-use solution for wireless sensor networks.
- **Cisco Aironet 1570 Series Outdoor Access Points:** A robust mobility experience for outdoor deployments, supporting IEEE 802.11ac, optimized roaming and cellular handoff, and Cisco High Density Experience.

Primary Features

- Rugged industrial design and an extended operational temperature range
- Carrier-grade outdoor Wi-Fi access point with dual-band (2.4 GHz 802.11n and 5 GHz 802.11ac) radios
- Industry's only 4x4 MIMO, three-spatial-stream outdoor access point
- Fast workgroup bridge roaming
- Up to 1.3 gigabits (5 GHz) WLAN RF data rates
- Various uplink options: Fiber and SFP, Gigabit Ethernet, cable modem and various power options (AC, DC, cable, PoE, PoE-Out, internal battery backup power)

Hardware Models

The following figures show the hardware models available:

Figure 19. Cisco Industrial Wireless 3700 Series Access Point:



Figure 20. Cisco Aironet 1530 Series Outdoor Access Point:



Figure 21. Cisco Aironet 1550 Series Outdoor Access Point:



Figure 22. Cisco Aironet 1570 Series Outdoor Access Point:



Table 3. Industrial Wireless: Main Features and Characteristics

| Feature | IW 3700 | Aironet 1530 | Aironet 1550 | Aironet 1570 |
|-------------------|--|---|---|--|
| Wireless Standard | 802.11a 802.11b 802.11g 802.11n 802.11ac | 802.11a 802.11g 802.11n | 802.11a 802.11b 802.11g 802.11n | 802.11a 802.11b 802.11g 802.11n 802.11ac |
| Radio type | 2.4 GHz (802.11b/g/n) 5 GHz (802.11a/n/ac) | 2.4 GHz (802.11b/g/n) 5 GHz (802.11a/n) | 2.4 GHz (802.11b/g/n) 5 GHz (802.11a/n) | 2.4 GHz 802.11b/g/n) 5 GHz (802.11a/n/ac) |
| Main Capabilities | 802.11n and Related: <ul style="list-style-type: none"> • 4x4 MIMO with 3 spatial streams • Maximal ratio combining (MRC) • 802.11n and 802.11a/g beamforming • 20- and 40-MHz channels • PHY data rates up to 450 Mbps (40 MHz with 5 GHz) • Packet aggregation: A-MPDU (Tx/Rx), A-MSDU (Tx/Rx) • 802.11 dynamic frequency selection • Cyclic shift diversity (CSD) support 802.11ac Related: <ul style="list-style-type: none"> • 4x4 MIMO with 3 spatial streams • MRC • 802.11ac beamforming • 20-, 40-, and 80-MHz channels • PHY data rates up to 1.3 Gbps (80 MHz with 5 GHz) • Packet aggregation: A-MPDU (Tx/Rx), A-MSDU (Tx/Rx) • 802.11 DFS • CSD supportDFS) • Cyclic shift diversity (CSD) support | 802.11n and Related <ul style="list-style-type: none"> • 1530l: 3x3 MIMO with 3 spatial streams (2.4 GHz) and 2x3 MIMO with 2 spatial streams (5 GHz) • 1530E: 2x2 MIMO with 2 spatial streams (2.4 GHz) and 2x2 MIMO with 2 spatial streams (5 GHz) • 20-MHz (2.4 and 5 GHz) and 40-MHz (5 GHz only) 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 DOCSIS and Euro-DOCSISRelated: <ul style="list-style-type: none"> • Eight (8) bonded channels on the downstream with total throughput in excess of 300 Mbps • Designed to meet DOCSIS 3.0 specifications as well as backward compatibility with existing DOCSIS 2.0, 1.1 and 1.0 networks • Enhanced packet processing technology to maximize performance • Downstream data rates in excess of 300 Mbps (without overhead) • Upstream data rates up to 100 Mbps (without overhead) Channel-bonded | 802.11n and Related <ul style="list-style-type: none"> • 2x3 multiple-input multiple-output (MIMO) with 2 spatial streams • 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 802.11ac Related: <ul style="list-style-type: none"> • 4x4 MIMO with 3 spatial streams • Maximal ratio combining (MRC) • 802.11ac Beamforming • 20- and 40-MHz channels • PHY data rates up to 450 Mbps (40 MHz with 5 GHz) • Packet aggregation: A-MPDU (Tx/Rx), A-MSDU (Tx/Rx) • 802.11 Dynamic Frequency Selection (DFS) • Cyclic Shift Diversity (CSD) support DOCSIS3.0, Euro-DOCSIS3.0 Related: <ul style="list-style-type: none"> • Twenty four (24) bonded channels on the downstream with total throughput of up to 912 and 1200 Mbps respectively • Eight (8) bonded channels on the upstream with total throughput of up to 216 Mbps • Designed to meet DOCSIS 3.0 specifications as well as backward compatibility with existing DOCSIS2.0 networks. • Enhanced packet processing technology to maximize performance. | |

| Feature | IW 3700 | Aironet 1530 | Aironet 1550 | Aironet 1570 |
|-----------------------|---|--|--|---|
| RF output power | Up to 23 dBm | Up to 27/29 dBm | Up to 27/28 dBm | Up to 30 dBm |
| Receiver Sensitivity: | <ul style="list-style-type: none"> • 802.11b (CCK): -101 dBm @ 1Mbps/-89 dBm @ 11Mbps • 802.11g (non HT20): -91 dBm @ 6Mbps/-79 dBm @ 54Mbps • 802.11a (non HT20): -93 dBm @ 6Mbps/-80 dBm @ 54Mbps • 802.11n (HT20): 2.4 GHz: -90 dBm/-75 dBm 5 GHz: -93 dBm /-77 dBm • 802.11n (HT40): 5 GHz: -90 dBm /-74 dBm • 802.11ac: non HT80: -86 dBm/-76 dBm VHT20: -94 dBm/-71 dBm VHT40: -91 dBm/-70 dBm VHT80: -86 dBm/-65 dBm | <p>1530I:</p> <ul style="list-style-type: none"> • 802.11b (CCK): -97 dBm @ 1Mbps/-90 dBm @ 11Mbps • 802.11g (non HT20): -95 dBm @ 6Mbps/-75 dBm @ 54Mbps • 802.11a (non HT20): -94 dBm @ 6Mbps/-74 dBm @ 54Mbps <p>530E:</p> <ul style="list-style-type: none"> • 802.11b (CCK): -96 dBm @ 1Mbps/-89 dBm @ 11Mbps • 802.11g (non HT20): -93 dBm @ 6Mbps/-73 dBm @ 54Mbps • 802.11a (non HT20): -92 dBm @ 6Mbps/-72 dBm @ 54Mbps <p>1530I:</p> <ul style="list-style-type: none"> • 802.11n (HT20): 2.4 GHz: -95 dBm/-69 dBm 5 GHz: -93 dBm/-70 dBm • 802.11n (HT40): 5 GHz: -91 dBm /-67 dBm <p>1530E:</p> <ul style="list-style-type: none"> • 802.11n (HT20): 2.4 GHz: -93 dBm/-69 dBm 5 GHz: -92 dBm/-68 dBm • 802.11n (HT40): 5 GHz: -89 dBm /-65 dBm | <ul style="list-style-type: none"> • 802.11b (CCK): -101 dBm @ 1Mbps/-89 dBm @ 11Mbps • 802.11g (non HT20): -93 dBm @ 6Mbps/-81 dBm @ 54Mbps • 802.11a (non HT20): -92 dBm @ 6Mbps/-80 dBm @ 54Mbps • 802.11n (HT20): 2.4 GHz: -93 dBm/-75 dBm 5 GHz: -92 dBm /-73 dBm • 802.11n (HT40): 5 GHz: -88 dBm /-70 dBm • 802.11ac: 5GHz VHT20: -92 dBm/-66 dBm 5GHz VHT40: -89 dBm/-64 dBm 5GHz VHT80: -85 dBm/-60 dBm | |
| Interfacing | <ul style="list-style-type: none"> • 10/100/1000BASE-T (M12 8P female connector with X-coding), PoE In (802.3af), PoE+ In (802.3at) • Management console port (RJ-45) with Reset button | <ul style="list-style-type: none"> • WAN port: 10/100/1000BASE-T Ethernet, (RJ-45) • LAN port: 10/100/1000BASE-T Ethernet (RJ-45) • Management console port (RJ-45) with Reset button | <ul style="list-style-type: none"> • WAN port: 10/100/1000BASE-T Ethernet, (RJ-45) • LAN port: 10/100/1000BASE-T Ethernet (RJ-45) • Fiber SFP (1552E/EU/H models) • Cable modem: NA-DOCSIS3.0/Euro-DOCSIS3.0/Japan-DOCSIS3.0 (8x4, 16x8, or 24x8) • Management console port (RJ-45) with Reset button | <ul style="list-style-type: none"> • WAN port: 10/100/1000BASE-T Ethernet, (RJ-45) • LAN port: 10/100/1000BASE-T Ethernet (RJ-45) • Cable modem: NA-DOCSIS3.0/Euro-DOCSIS3.0/Japan-DOCSIS3.0 (8x4, 16x8, or 24x8) • Management console port (RJ-45) with Reset button |

| Feature | IW 3700 | Aironet 1530 | Aironet 1550 | Aironet 1570 |
|---|--|--|---|--|
| Input power Requirements | <ul style="list-style-type: none"> 12V to 48V DC (-20% to +25%) (M12 4P male connector with A-coding per IEC 61076-2) PoE and PoE+ (RJ-45) | <ul style="list-style-type: none"> 24 to 57 VDC Power over Ethernet (PoE) (802.3at+ or Cisco Universal PoE [UPoE]) | <ul style="list-style-type: none"> 90-480 VAC, 50-60 Hz (1552E/EU models) 40-90 VAC, 50-60 Hz, Power over Cable 110-277 VAC, 50-60 Hz (1552I model) 100-240 VAC, 50-60 Hz (1552H model) 12 VDC (all models) PoE with power injector (1552E/EU/H models) | 1572EAC AC: <ul style="list-style-type: none"> 100-277 VAC, 50/60 Hz DC 10 to 16 VDC PoE-Input: <ul style="list-style-type: none"> - UPOE compliant PSE - Cisco AIR-PWRINJ1500-2: PoE-out: PoE+ (802.3at) 1572IC/1572EC <ul style="list-style-type: none"> PoC: 40-90 VAC, 50/60 Hz, quasi-square wave, Power over Cable (PoC) DC: 10 to 16 VDC PoE-out: PoE+ (802.3at), 1572EC only |
| DC power input | 10 to 60 VDC | 24 to 57 VDC | 12 VDC (nominal) | 10 to 16 VDC |
| Other powering options | PoE, PoE+ | PoE, UPoE | AC, PoE (1552E/EU/H) | AC, UPoE |
| PoE output | PoE | None | None | PoE+ (1572EC) |
| Mounting options | Wall, pole, DIN rail | Wall, pole | Wall, pole | Wall, pole |
| Mode of operation | Unified and autonomous | Unified and autonomous | Unified and autonomous | Unified and autonomous |
| Max Dimensions H x W x D (inches and mm) | 11.3 x 8.0 x 2.34 in. (287 x 203 x 59 mm) | 10 x 7 x 4 in. (254 x 170 x 100 mm) | 12.3 x 8.6 x 6.1 in. (31.2 x 22.9 x 16.3 cm) | 11.8 x 7.9 x 7.9 in. (30.0 x 20.1 x 20.1 cm) |
| Max Weight - heaviest model - | 6.7 lb (3.0 kg) | 5.5 lb (2.5 kg) | 17.6 lbs (8 kg) | 13.5 lbs. (6.1 kg) |
| Ingress Protection Class | IP67 | IP67 | IP67 | IP67 |
| Operating temperature | -40° to +158° Fbd° F (-40° to +70° C) without solar loading or wind cooling | -22° to 149° F (-30° to 65° C) ambient air with no solar loading | -40° to 131° F (-40 to 55° C) plus Solar Loading | -40° to 149° F (-40 to 65° C) ambient air with no solar loading |

Embedded Networks

Cisco Embedded Service Switch

Cisco Embedded Service switches are optimized for mobile and embedded networks that require switching capability in harsh environments. The primary product offering is the Cisco Embedded Service 2020 Series Switches product family. The flexible, compact form factor of the switch cards, complemented by Cisco IOS Software, provides highly secure data, voice, and video communications to stationary and mobile network nodes.

Primary Features

- Base card-only configuration (8 Fast Ethernet plus 2 Gigabit Ethernet ports) or an optional expansion card capable of providing 16 additional Fast Ethernet ports (board size conforms to the widely accepted PC104 form factor)
- Line rate and/or nonblocking application-specific integrated circuit (ASIC)-based architecture
- Resiliency includes flex links for fast recovery, Cisco Resilient Ethernet Protocol (REP) for fast convergence
- Advanced security features
- Manageability includes auto Cisco SmartPorts, Web Device Manager, Telnet, HTTPS access, and Simple Network Management Protocol (SNMP)

Hardware Models

Figure 23. Cisco Embedded Service 2020 Series Switches



Cisco Embedded Services Routers

The Cisco 5900 Series Embedded Services Routers provide highly secure data, voice, and video communications to stationary and mobile network nodes across wired and wireless links. They solve critical size, weight, and power challenges and can operate reliably in harsh environments. These routers are powered by Cisco IOS Software and feature Cisco Mobile Ready Net capabilities.

Cisco Embedded Services routers can be used to establish mobile networks in vehicles. They also extend resources more securely to workers in harsh environments such as public safety, exploration, transportation, and defense. The Cisco 5900 Series portfolio offers a range of form factors to address diverse requirements.

The Cisco Embedded Services Routers include:

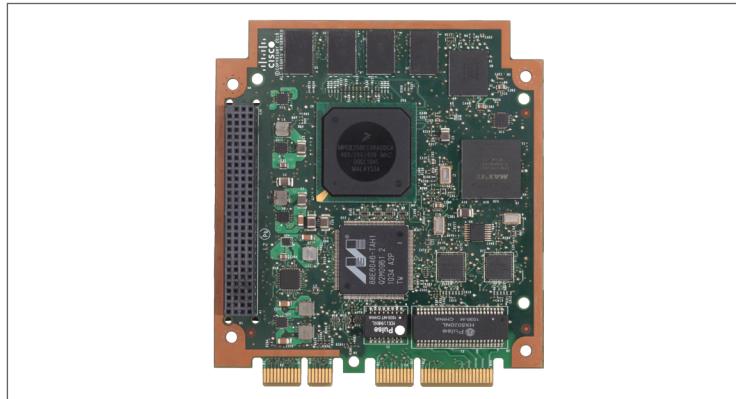
- **Cisco 5915 Embedded Services Router:** A PCI104-based card that provides two Fast Ethernet routed ports and three Fast Ethernet switched ports.
- **Cisco 5940 Embedded Services Router:** A CompactPCI (cPCI)-based card offering four Gigabit Ethernet routed ports.
- **Cisco 5921 Embedded Services Router:** A software router application designed for small, low powered Linux devices.

Primary Features

- Hardware-based and software-only options to support a variety of form factors based on proven Cisco IOS technologies
- Remote voice services with Cisco Unified Communications Manager Express and streaming multicast video support
- Cisco Mobile Ready Net capabilities such as Cisco Radio Aware Routing and Open Shortest Path First version 3 (OSPFv3) MANET extensions
- Advanced security features integration to protect against malicious attacks and unauthorized access
- Network optimization features that improve bandwidth utilization, including IP multiplexing, QoS, and Cisco Radio Aware Routing

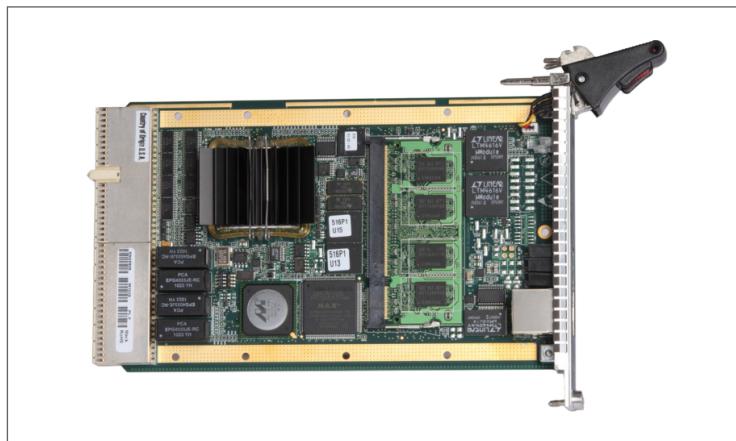
Hardware Models

Figure 24. Cisco 5915 Embedded Services Router



Cisco 5915 ESR Air-Cooled Model

Figure 25. Cisco 5940 Embedded Services Router



Cisco 5940 ESR Air-Cooled Model

Software Models

Figure 26. Cisco 5921 Embedded Services Router



Fog Computing

Benefits:

- **Unified infrastructure purpose-built for IoT:** IoT devices may be distributed over large geographical areas and harsh environments, such as roadways, railways, utility field substations, and vehicles. Cisco delivers a network of fog nodes with a unified platform and a wide range of ruggedized and nonruggedized form factors to collect, store, and analyze data as close to the source as possible, irrespective of where those devices are located.
- **Ability to manage data from the cloud to the fog:** Cisco enables organizations to efficiently manage the volume, variety, and velocity of IoT data, based on policy. You can apply rules to reduce, control, and standardize data produced by IoT things. Critical, time-sensitive IoT data is collected, stored, and analyzed at the network edge, while less time-sensitive data is sent to the cloud for long-term storage and historical analysis.
- **Redundancy and failover:** Cisco switches, routers, and UCS servers employ high-availability technology to facilitate networkwide resilience as organizations scale their networks with millions of new endpoints and applications, as well as the geographically dispersed switches, routers, and wireless access points that are required to support them.

New IoT Requirements

Cloud computing helps organizations take advantage of economies of scale to streamline operations, reduce costs, and increase the flexibility of application development and deployment. However, IoT is driving new requirements to control, monitor, and analyze billions of smart objects, as well as to process massive amounts of data and transform it into actionable business intelligence in real time. In the IoT era, the cloud model alone cannot meet the new requirements for low latency, reduced bandwidth, high reliability, and efficient and private data processing.

Cisco Advantage: Hardware and Software Purpose-Built for IoT

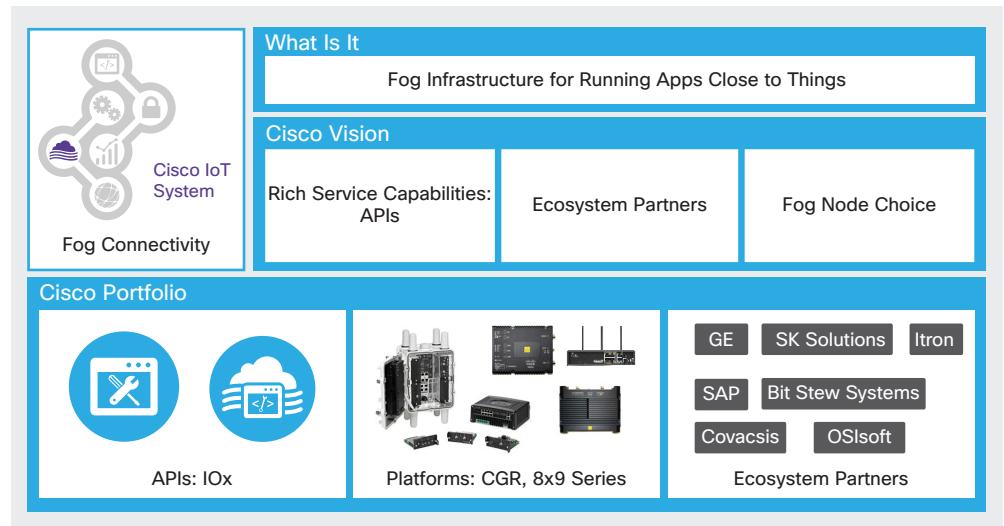
Cisco offers a combination of software and hardware that extends the cloud model closer to the things, which are located at the network edge. With open APIs, core application services, and an application development framework, IoT applications can be easily extended from the cloud to the fog. The Cisco fog-computing portfolio includes an array of edge network devices with integrated computing, networking, and storage to meet the needs of IoT industries such as manufacturing, oil and gas, utilities, transportation, mining, and public sector. By having this infrastructure closer to the things, the fog is able to eliminate latency and dramatically reduce bandwidth requirements. The Cisco fog enables data to be efficiently analyzed and managed – from the edge to the cloud – to help you grow your organization and accelerate IoT deployments.

The Cisco IoT System fog computing portfolio comprises:

- SDKs and open APIs:
 - IOx
 - Cisco Fog Data Services
- **16 Fog Computing Platforms Support IOx:**
 - Cisco 1120 Connected Grid Router
 - Cisco 1240 Connected Grid Router
 - Cisco 809 Industrial Router
 - Cisco 819 Integrated Services Router
 - Cisco 829 Industrial Router
 - Cisco 880 Series Integrated Services Routers
 - Cisco 890 Series Integrated Services Routers
- Other fog computing devices :
 - Cisco Connected Grid Routers
 - Cisco Integrated Services Routers
 - Cisco Aggregation Services Routers
 - Cisco Industrial Routers
- Application Management:
 - Cisco Fog Director

The following figure provides an overview of the Cisco IoT System fog computing portfolio

Figure 27. Cisco IoT System Fog Computing Portfolio



Security (Cyber and Physical)

New IoT Requirements

With converged IT and operational technology networks, the Internet of Things (IoT) significantly expands the breadth and depth of security challenges. The billions of new connected objects dramatically increases the number of potential attack vectors. The wide variety of objects increases the diversity of threats faced. More sensitive data flowing through devices with weak or no security, located in insecure places, increases the risk of a security breach. Because IT and operational technology environments are vastly different, the same security policies cannot be applied to both. This makes remediation more complicated and requires a different approach to security. All these challenges combined have a significant impact on your organization's ability to secure networks and data.

Cisco Advantage: Addressing the Full Attack Continuum

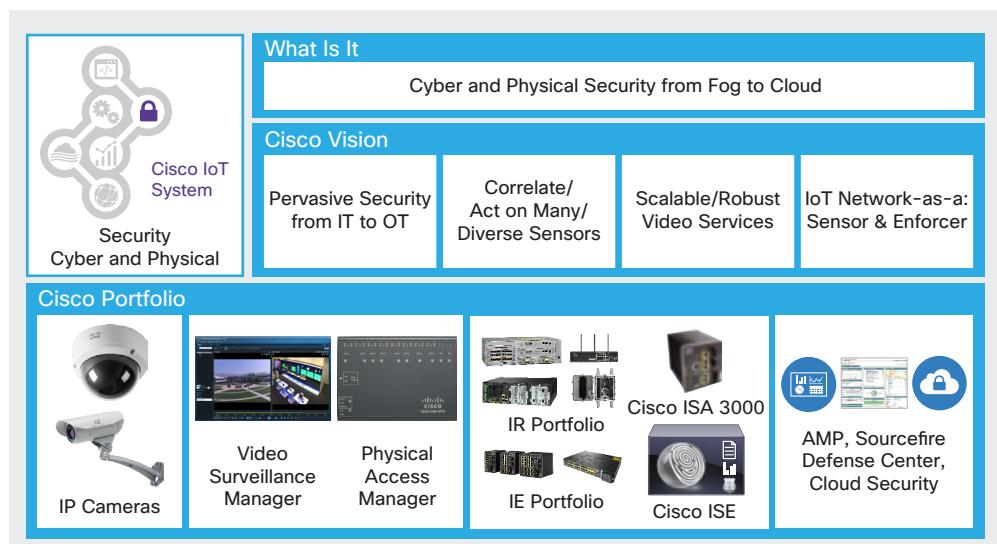
We are addressing these challenges by integrating comprehensive physical and cybersecurity solutions from the cloud to the fog that address the full attack continuum – before, during, and after an attack.

The following figure provides an overview of the Cisco IoT System security portfolio

Figure 28. Cisco IoT System Security Portfolio

Benefits:

- **Pervasive security solution:** Cisco delivers a pervasive security solution throughout the extended network. Cisco security products work together to produce robust, actionable security intelligence in real-time, increasing your overall security posture with little or no human intervention required.
- **Unique policies for IT and operational technology:** Recognizing that the practical application of security policies must be different for IT and operational-technology environments, Cisco security solutions are flexible to deliver differentiated policy enforcement across the extended network for organization-driven security policies and response.
- **Actionable security intelligence:** Developers can use Cisco IOx APIs to develop applications that use Cisco security solutions to produce comprehensive, actionable security intelligence across the extended network.



Cyber Security Portfolio

Cisco offers scalable, threat-centric cybersecurity solutions, enabling you to quickly and effectively discover, scope, contain, and remediate an attack to minimize damage. These cybersecurity solutions include:

- Cloud-based threat protection
 - Cisco Advanced Malware Protection (AMP)
- OT specific security
 - ISA 3000 Industrial Security Appliance
 - Fog Data Services
- Network and perimeter security
 - Cisco ASA Firewall with FirePOWER Services
 - Cisco FirePOWER™ Next-Generation Intrusion Prevention Service (NGIPS)
 - Cisco Talos Security Intelligence
- User- and group-based identity services
 - Cisco Identity Services Engine
 - Cisco TrustSec® solutions

The ISA-3000:

- Operates in harsh environments with a ruggedized design, while also fitting in with OT operational practices.
- Provides control and visibility across silos: traditional OT environments include silos of vendor-specific infrastructure with separate management systems. The ISA-3000 provides common security processes and network security management across IT and OT systems. This allows companies to leverage their existing IT security expertise while meeting OT specific needs for minimizing system downtime while demonstrating internal policy and regulatory compliance.
- Simplifies compliance: Increasing internal, industry, and government regulations place burdens on operators. The ISA-3000 helps deliver consistent policy enforcement and the segmentation needed to simplify compliance and reduce audit scope.
- Mitigates risk: As customers open up their OT environments to take advantage of IoT efficiencies, they cannot compromise system availability. The ISA-3000 leverages application awareness, understanding of OT protocols, and advanced industrial control system (ICS) threat detection to increase visibility across the IT and OT environments, enforce policy consistently, and reduce risks to system availability.

Key Features

The ISA-3000 incorporates the same security as Cisco ASA with FirePOWER Services software with four high-performance Ethernet data links in a DIN rail or rack mount form factor. It also provides access control, threat detection, and application visibility features for harsh environments.

Key features include:

- Resilience: endures temperatures from -40° to 60°C, vibration, shock, surge, and electrical noise
- Compliance: conforms to multi-industry specifications for industrial automation, ITS, and electrical substation environments
- Durability: lasts longer with fan less, convection-cooled design with no moving parts
- Ease of use: allows multi-device management across the network
- Authentication: provides user-specific access and control
- Threat detection: tracks over 25,000 rules to provide OT-specific protection
- Visibility and control: monitors DMZ infrastructure, IoT applications, and protocols
- High performance: provides remote access via VPN
- DMZ infrastructure: supports DMZ infrastructure with DHCP, DNS, AAA and IP routing services

Physical Security Products

Cisco physical security solutions provide broad network-centric capabilities in video surveillance, IP camera technology, electronic access control, and incident response. Cisco physical security solutions can be integrated with other Cisco and partner technologies to provide a unified interface that delivers situational awareness and rapid, informed decisions. Organizations can build cost-effective, modular, physical security solutions that are both best in class and interoperable.

The Cisco IoT system physical security portfolio includes the following product categories:

- Cisco Video Surveillance IP Cameras
- IoT Physical Security Analytics
- Cisco Video Surveillance Manager
- Cisco Physical Access Control

Cisco Video IP Cameras

Cisco Video Surveillance IP Cameras are feature-rich digital cameras that enable surveillance in a wide variety of environments. Available in standard and high definition, box and dome, wired and wireless, and stationery and pan-tilt-zoom (PTZ) versions, the cameras support MPEG-4 and H.264, and offer efficient network utilization while providing high-quality video:

- Cisco Video Surveillance 2500 Series IP Cameras: Standard-definition wireless box cameras
- Cisco Video Surveillance 2600 Series IP Cameras: Standard-definition box and dome cameras with motorized focus and zoom lens
- Cisco Video Surveillance 3000 Series IP Cameras: 1 megapixel (MP) dome cameras
- Cisco Video Surveillance 5000 Series IP Cameras: High-definition dome cameras with auto back focus and low-light operation
- Cisco Video Surveillance 7000 Series IP Cameras: 5 MP dome cameras

Table 4. Cisco Video IP cameras comparison table

| Camera Characteristics | CIVS-IPC-2830 | CIVS-IPC-2835 | CIVS-IPC-3050 | CIVS-IPC-3520 | CIVS-IPC-3535 | CIVS-IPC-6000P | CIVS-IPC-6020 |
|--|---|---|---|--|---|---|---|
| Profile |  |  |  |  |  |  |  |
| Description | Standard Definition, Outdoor PTZ (NTSC) | Standard Definition, Outdoor PTZ (PAL) | 360 Degree 5 MP, Integrated IR | 720p Indoor - flush, surface, and VR mounts | Outdoor, high-definition | 1080p P-Iris Box Camera | 1080p Indoor - flush, surface, and VR mounts |
| Image sensor | 1/4" SONY EXmor CCD Sensor, EX12E (NTSC) | 1/4" SONY EXmor CCD Sensor, EX12E (PAL) | 1/3" Progressive CMOS | 1/4" progressive scan CMOS | 1/3" progressive scan CMOS | 1/2.7" Progressive Scan CMOS | 1/2.7" Progressive Scan CMOS |
| Lens | f=3.7-44.4 mm | f=3.7-44.4 mm | fixed focal 4 mm | f=3-9 mm F 1.2 (wide) F 2.1 (tele) DC-Iris | f=3-9 mm DC-Iris | 3 - 8 mm P-Iris Lens | 3 - 9 mm |
| Field of View | H: 56.3 (W) ~ 4.6 (T)° | H: 56.3 (W) ~ 4.6 (T)° | 68° (horizontal) 50° (vertical) 90° (diagonal) | 66.09° ~ 25.03° (horizontal) 40.66° ~ 15.77° (vertical) 78.36° ~ 28.83° (diagonal) | 66.09° to 25.03° (horizontal) 40.66° to 15.77° (vertical) 78.36° to 28.83° (diagonal) | Dependent on lens selection | 37.5° ~ 103.7° (horizontal) 21.6° ~ 71.2° (vertical) 42.6° ~ 111.21° (diagonal) |
| Day and Night | Automatic/manual/scheduled | Automatic/manual/scheduled | Automatic/manual/scheduled | Automatic/manual/scheduled | Automatic/manual/scheduled | Automatic/manual/scheduled | Automatic/manual/scheduled |
| Video Compression | H.264 Motion JPEG | H.264 Motion JPEG | H.264 Motion JPEG | H.264 Motion JPEG | H.264 Motion JPEG | H.264 Motion JPEG | H.264 Motion JPEG |
| PoE | PoE+ High PoE | PoE+ High PoE | 802.3af compliant (Class 4) | 802.3af compliant (Class 3) | 802.3af compliant (Class 3) | 802.3af compliant (Class 3) | 802.3af compliant (Class 3) |
| External Power - D.C/A.C | 24V AC | 24V AC | 12V DC | 12V DC 24V AC | 12V DC 24V AC | 12V DC 24V AC | 12V DC 24V AC |
| Power Consumption (W) DC/AC/PoE | AC: 28W PoE+: 18W High PoE: 28W | AC: 28W PoE+: 18W High PoE: 28W | TBD | 3.6/5.1/5.28 | 3.6/5.1/5.28 | 4.7/6.3/6.1 | 4.7/6.3/6.2 |
| Env Certification (IP6x - Salt Spray/corrosion, IK10) | IP66 | IP66 | IP66 | Dependent on mounting option | IP67 IK10 | Dependent on mounting option | Dependent on mounting option |
| PTZ | Y | Y | N | N | N | N | N |
| | Pan speed: 0.05° ~ 450° / sec Tilt speed: 0.05° ~ 450° / sec | Pan speed: 0.05° ~ 450° / sec Tilt speed: 0.05° ~ 450° / sec | | | | | |

| Camera Characteristics | CIVS-IPC-6030 | CIVS-IPC-6400E | CIVS-IPC-6500PD | CIVS-IPC-6930 | CIVS-IPC-7030E | CIVS-IPC-7070 | CIVS-IPC-7530PD |
|---|---|---|---|---|--|---|--|
| Profile |  |  |  |  |  |  |  |
| Description | 1080p Outdoor Vandal Resistant IP Camera | 1080p outdoor, high-definition, integrated IR | 1080p outdoor, high-definition, integrated IR | 1080p Outdoor PTZ | Outdoor, high-definition | 720p Mobile Dome, Wide Dynamic Range | Outdoor, high-definition |
| Image sensor | 1/2.7" Progressive Scan CMOS | 1/2.7" Progressive Scan CMOS | 1/2.7" progressive scan CMOS | 1/2.8" SONY EXmor CMOS Sensor, EH6300 | 1/2.5" Progressive Scan CMOS | 1/2.5" progressive scan CMOS | 1/2.5" Progressive Scan CMOS |
| Lens | 3 - 9 mm | 3 - 9 mm DC-Iris | f=3.1-8 mm P-Iris | f=4.7-94.0 mm F 1.6 (wide) F 3.5 (tele) | DC-Iris | fixed focal 1.5 mm | DC-Iris |
| Field of View | 37.5° ~ 103.7° (horizontal) 21.6° ~ 71.2° (vertical) 42.6° ~ 111.21° (diagonal) | 37.5° to 95.98° (horizontal) 21.6° to 53.80° (vertical) 42.6° to 109.46° (diagonal) | Dependent on lens selection | H: 55.4 (W) ~ 2.9 (T)° | 35.45° to 88.90° (horizontal) 26.69° to 67.01° (vertical) 43.99° to 111.00° (diagonal) | 180° (horizontal) 180° (vertical) 180° (diagonal) | 35.45° to 88.90° (horizontal) 26.69° to 67.01° (vertical) 43.99° to 111.00° (diagonal) |
| Day and Night | Automatic/manual/scheduled | Automatic/manual/scheduled | Automatic/manual/scheduled | Automatic/manual/scheduled | Automatic/manual/scheduled | Automatic/manual/scheduled | Automatic/manual/scheduled |
| Video Compression | H.264 | H.264 | H.264 | H.264 | H.264 | H.264 | H.264 |
| | Motion JPEG | Motion JPEG | Motion JPEG | Motion JPEG | Motion JPEG | Motion JPEG | Motion JPEG |
| PoE | 802.3af compliant (Class 3) | 802.3af compliant (Class 3) | 802.3af compliant (Class 3) | PoE+ High PoE | 802.3af PoE class3 | 802.3af compliant (Class 3) | 802.3af |
| External Power - D.C/A.C | 12V DC 24V AC | 12V DC 24V AC | 12V DC 24V AC | 24V AC | 24V AC | 24V AC | 24V AC |
| Power Consumption (W) DC/AC/PoE | 9.5/13.1/12.72 | 9.6/12.5/12.2 | 9/10/10 | AC: 30W PoE+: 20W High PoE: 30W | AC: 13.9W PoE: 9.5W | TBD | AC: 27W PoE: 12.2W |
| Env Certification (IP6x - Salt Spray/corrosion, IK10) | IP66 IK10 | IP67 IK10 | Dependent on mounting option | IP66 | IP67 IK10 | IP66 | IP67 IK10 |
| PTZ | N | N | N | Y | N | N | N |
| | | | | Pan speed: 0.05° ~ 450° / sec Tilt speed: 0.05° ~ 450° /sec | | | |

| Camera Characteristics | CIVS-IPC-2830 | CIVS-IPC-2835 | CIVS-IPC-3050 | CIVS-IPC-3520 | CIVS-IPC-3535 | CIVS-IPC-6000P | CIVS-IPC-6020 |
|---------------------------------|---|---|---|---|---|---|---|
| Profile |  |  |  |  |  |  |  |
| Camera Adjustment Angle | Pan: Continuous 360° Tilt: 220° Zoom: 12x Optical | Pan: Continuous 360° Tilt: 220° Zoom: 12x Optical | | Pan range: 350° Tilt range: 80° Rotate range: 350° | Pan range: 350° Tilt range: 80° Rotate range: 350° | N/A | Pan: 350° Tilt: 80° Rotate: 350° |
| Remote, Auto Focus support | Auto focus | Auto focus | N | N | N | N | Y |
| Motorized Lens | Y | Y | N | N | N | N | Y |
| Digital I/O | Audio in x 1 Audio out x 1 DI x 4 DO x 2 | Audio in x 1 Audio out x 1 DI x 4 DO x 2 | Audio out x 1 DI x 1 DO x 1 | Audio in x 1 (Φ3.5 miniature jack) A/V out x 1 (Φ3.5 miniature jack) DI x 1 DO x 1 | <ul style="list-style-type: none"> 3.5-mm audio jack: Audio input for optional external microphone and audio output for optional external speaker supported through Y-cable adapter Two-way (full-and half-duplex), one-way, or audio off | Audio in x 1 Audio out x 1 Analog video out x 1 DI x 1 DO x 1 | Audio in x 1 (Φ3.5 miniature jack) A/V out x 1 (Φ3.5 miniature jack) DI x 1 DO x 1 |
| Local storage (S.D or Micro SD) | SD/SDHC | SD/SDHC | MicroSD | MicroSD/SDHC | MicroSD | SD/SDHC | MicroSD/SDHC |
| Operating Temp | AC24V: -40 ~ 55 °C PoE+: -5 ~ 55 °C High PoE: -40 ~ 55 °C | AC24V: -40 ~ 55 °C PoE+: -5 ~ 55 °C High PoE: -40 ~ 55 °C | AC24V: -40 ~ 55 °C PoE+: -5 ~ 55 °C High PoE: -40 ~ 55 °C | 32 to 122 °F (0 to 50 °C) | -40 to 122 °F (-40 to 50 °C) | 14 to 122°F (-10 to 50°C) Note: The temperature range can be extended if you use an outdoor enclosure. | 14 to 122°F (-10 to 50°C) |

| Camera Characteristics | CIVS-IPC-6030 | CIVS-IPC-6400E | CIVS-IPC-6500PD | CIVS-IPC-6930 | CIVS-IPC-7030E | CIVS-IPC-7070 | CIVS-IPC-7530PD |
|---------------------------------|---|---|---|---|---|---|---|
| Profile |  |  |  |  |  |  |  |
| Camera Adjustment Angle | Pan: 350° Tilt: 80° Rotate: 350° | N/A | N/A | Pan: Continuous 360° Tilt: 220° Zoom: 20x Optical | Pan range: 350° Tilt range: 80° Rotate range: 350° | | Pan: 350° Tilt: 80° Rotate: 350° |
| Remote, Auto Focus support | Y | Y | N | Auto focus | Y | N | Y |
| Motorized Lens | Y | Y | N | Y | N | N | Y |
| Digital I/O | Audio in x 1 (Φ3.5 miniature jack) A/V out x 1 (Φ3.5 miniature jack) DI x 1 DO x 1 | <ul style="list-style-type: none"> • 3.5-mm audio jack: Audio input for optional external microphone and audio output for optional external speaker supported through Y-cable adapter • Two-way (full-and half-duplex), one-way, or audio off | <ul style="list-style-type: none"> • 3.5-mm audio jack: Audio input for optional external microphone and audio output for optional external speaker supported through Y-cable adapter • Two-way (full-and half-duplex), one-way, or audio off | Audio in x 1 Audio out x 1 DI x 4 DO x 2 | <ul style="list-style-type: none"> • 3.5-mm audio jack: Audio input for optional external microphone and audio output for optional external speaker supported through Y-cable adapter • Two-way (full-and half-duplex), one-way, or audio off | Audio out x 1 DI x 1 DO x 1 | 3.5-mm audio jack: Audio input for optional external microphone and audio output for optional external speaker supported through Y-cable adapter Two-way (full-and half-duplex), one-way, or audio off DI x 1 DO x 1 RS485+ RS485- |
| Local storage (S.D or Micro SD) | MicroSD/SDHC | SD | SD | SD/SDHC | MicroSD | MicroSD | MicroSD |
| Operating Temp | -40 to 131°F (-40 to 55°C) | -4 to 122 °F (-40 to 50 °C) | 14 to 122°F (-10 to 50°C) Note: The temperature range can be extended if you use an outdoor enclosure. | AC24V: -40 ~ 55 °C PoE+: -5 ~ 55 °C High PoE: -40 ~ 55 °C | -25 to 50°C (-13 to 122°F) using PoE -40 to 50°C (-40 to 122°F) using AC | -25 to 50°C (-13 to 122°F) using PoE -40 to 50°C (-40 to 122°F) using AC | -25 to 50°C (-13 to 122°F) using PoE -40 to 50°C (-40 to 122°F) using AC |

IoT Physical Security Analytics

You can apply IoT physical security analytics for a variety of applications, including:

- Video behavioral detection: line crossing, wrong way, object taken, activity present, zone intrusion
- Audio detection: generates an alarm based on user-configured volume and duration thresholds
- Sensor aggregation: generates events based on inputs from groups of serial based sensors
- Audio message triggers: play pre-recorded audio file from an IP camera
- Metadata generation: generates analytics metadata for more efficient centralized processing
- Local video player: plays locally recorded video directly from an IP camera
- Video summarization: generates a set of thumbnails from locally recorded video

Cisco Video Surveillance Manager

Cisco Video Surveillance Manager offers you improved situational awareness by allowing you to manage centrally the deployment of millions of video surveillance cameras dispersed across hundreds of locations on a single console. It provides you the ability to:

- Scale rapidly to more than a million cameras in a federated system
- Deploy and easily manage Cisco camera applications and licenses
- Integrate systems flexibly with a software development kit (SDK)
- Optimize bandwidth and compute resources through dynamic proxy
- Integrate flexibly with network topologies and platforms ranging from virtual to nonvirtual, centralized to decentralized

Cisco Video Surveillance Manager comprises several components that combine to create a flexible, highly scalable system for the enterprise:

- Cisco Video Surveillance Operations Manager
- Cisco Video Surveillance Operations Manager Federator
- Cisco Video Surveillance Media Server
- Cisco Video Surveillance Safety and Security Desktop
- Cisco Video Surveillance Manager Express

Cisco Physical Access Control

Capable of managing one to several thousand doors, the Cisco Physical Access Control solution is scalable and flexible. You can combine modules to customize solutions and manage the entire system remotely. This solution easily integrates with Cisco Video Surveillance Manager and can use IP network services.

The Cisco Physical Access Gateway is the primary means for the Cisco Physical Access Control solution to connect door hardware, such as locks and readers, to your IP network. One gateway can control up to two doors. The Cisco Physical Access Gateway:

- Offers a distributed architecture to simplify installation of electronic access control
- Uses a Power over Ethernet (PoE) switch or external 12 to 24 Voltage Direct Current (VDC) source
- Powers badge readers, and locks and strikes with PoE
- Eases deployment through server discovery using network services
- Supports offline operation to allow doors to function if network connectivity is lost

Cisco Physical Access Manager is the management application for the Cisco Physical Access Control solution. Its easy-to-use interface lets you configure Cisco Physical Access Gateway and modules, monitor activity, enroll users, and integrate with IT applications and data stores. Cisco Physical Access Manager provides:

- Flexible options for enrolling users and assigning fine-grained credentials to tailor privileges to organizational roles
- Support for a comprehensive list of access control policies
- Simplified, data-driven integration with other IT systems, without requiring programming or custom development
- Flexible reporting capability that lets you generate template-based and custom reports
- Redundancy between two Cisco Physical Access module instances for failover support and reduced downtime
- Easy access to live or recorded video through integration with Cisco Video Surveillance Manager
- Cisco Physical Access Manager, which comes installed on hardware and is available as an appliance through a simple licensing model

Data Analytics

New IoT Requirements

IoT comprises billions of connected devices that are creating more than two exabytes of data every day. But to truly provide value, this data must be rapidly processed and transformed into actionable intelligence. In addition, different types of data need to be handled, stored, and processed differently, depending on the specific needs of each. This is driving requirements on the network infrastructure, as well as the need for enhanced hardware and software capabilities to efficiently manage the mass influx of data.

Cisco Advantage: Analytics from the Cloud to the Fog

The Cisco IoT analytics infrastructure comprises distributed network infrastructure components and IoT-specific APIs that enable you to run organization-specific software analytics packages throughout your network architecture from the cloud to the fog. Our infrastructure and tools also enable you to combine IoT analytics with business analytics. Cisco IOx APIs enable the [Cisco Connected Analytics portfolio](#) to run directly on Cisco fog nodes. In addition, these APIs make IoT data available to the Cisco Connected Analytics for IoE portfolio to improve operational efficiency and drive new business models.

The Cisco IoT System data analytics portfolio comprises:

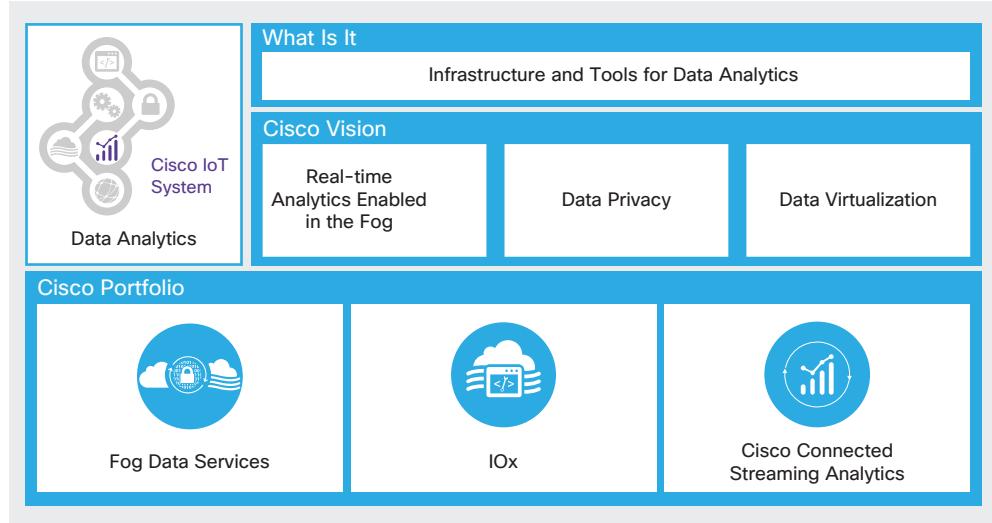
- SDKs and open APIs:
 - Cisco IOx
 - Cisco Fog Data Services
- [Cisco Connected real-time solutions](#)
- [Cisco Connected Analytics packages for optimized infrastructure](#)
- [Cisco Connected Analytics solutions for agile and pervasive data access](#)

Open APIs for IOx and Fog Data Services (formerly DMo) are available with Cisco DevNet. For additional details, please visit the Cisco DevNet sites here:

- <https://developer.cisco.com/site/devnet/home/index.gsp>
 - <https://developer.cisco.com/site/iox/>
 - <https://developer.cisco.com/site/data-in-motion/>

The following figure provides an overview of the Cisco IoT System data analytics portfolio

Figure 29. Cisco IoT System Data Analytics Portfolio



Management and Automation

New IoT Requirements

IoT greatly expands the size and diversity of the network to encompass the billions of smart objects that sense, monitor, control, and react. While networking these previously unconnected devices can deliver unparalleled levels of business and operational intelligence, it is essential to understand that operational environments comprise multiple disparate functional areas. Each of these areas also has distinctive requirements, including the need to track specific metrics. Operational technology systems can vary widely by industry, as well as by function in a given industry.

Cisco Advantage: Integrated Security, Increased Control, and Customizable Platforms

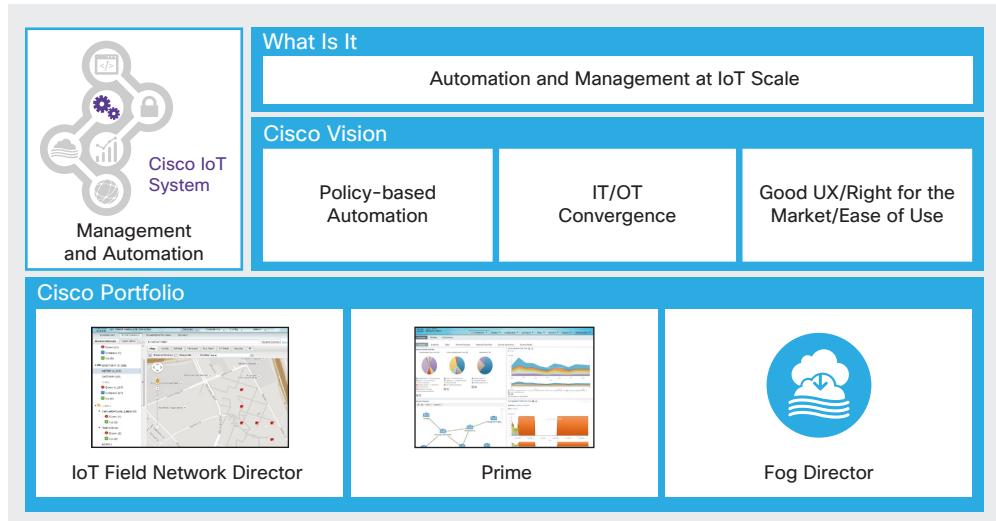
Cisco delivers a broad range of IoT management and automation capabilities that are supported throughout the extended network, from the cloud to the fog. Cisco management and automation solutions provide enhanced security and control, and support for multiple-siloed functions, and facilitate the convergence of operational technology data with the IT network.

The Cisco IoT System management and automation portfolio comprises:

- Management tools:
 - Cisco IoT Field Network Director (formerly Connected Grid Network Management System [CGNMS])
 - Cisco IoT Device Manager (formerly Connected Grid Device Manager [CGDM])
 - Cisco Fog Director (formerly Cisco Applications Manager as part of IOx)
 - Cisco Industrial Operations Kit (IOK)
 - Cisco Prime
 - Cisco Video Surveillance Manager
- SDKs and open APIs:
 - Cisco IOx

The following figure provides an overview of the Cisco IoT System management and automation portfolio

Figure 30. Cisco IoT System Management and Automation Portfolio



Application Enablement Platform

Benefits:

- Ability to run applications in the fog:** Cisco IOx (APIs) allows fog nodes to host applications so that the applications are close to the objects they need to monitor, control, analyze, and optimize. Cisco IOx is offered on multiple hardware devices that are customized for various industry needs.
- Elasticity with resilience:** The ruggedized Cisco UCS servers offer elastic computing, networking, and storage resources for applications to have a flexible and elastic footprint. These can be deployed in all industries to rapidly meet their custom requirements.
- PaaS offerings:** Cisco fog PaaS and IoT PaaS are planned to extend the cloud development model to the fog. The traditional cloud SaaS, PaaS, and IaaS model is now possible on fog nodes. You can now take advantage of pay-as-you-go consumption models for objects, machines, or products just as you can for your software products.
- Simplified management:** Cisco Fog Director can manage multiple instances of applications, update applications remotely, and allow applications from different development environments and in different languages to run on the same fog node.

New IoT Requirements

Digitization of objects and edge infrastructure are enabling organizations to control, monitor, analyze, and service smart objects through software and applications. Creating and deploying applications that run on mobile devices is quickly becoming the standard for interacting with smart objects. Organizations are also increasingly creating innovative product offerings for connected industrial objects. For example, machine-as-a-service (MaaS) and in general product-as-a-service (PRaaS) are new offerings that are changing the business models of both the makers of smart industrial products and the industries using these products. These applications are offered as software-as-a-service (SaaS) and follow the cloud models of SaaS running on platform-as-a-service (PaaS) over infrastructure-as-a-service (IaaS).

Cisco Advantage: Enabling Innovation Across a Broad Ecosystem of Technology Partners and Industries

The application enablement platform offers open APIs and application development environments for you, your partners, and third parties to design, develop, and deploy innovative solutions for a variety of industries. The Cisco vision is to provide IaaS and PaaS for IoT applications and SaaS offerings to run at the extreme edge.

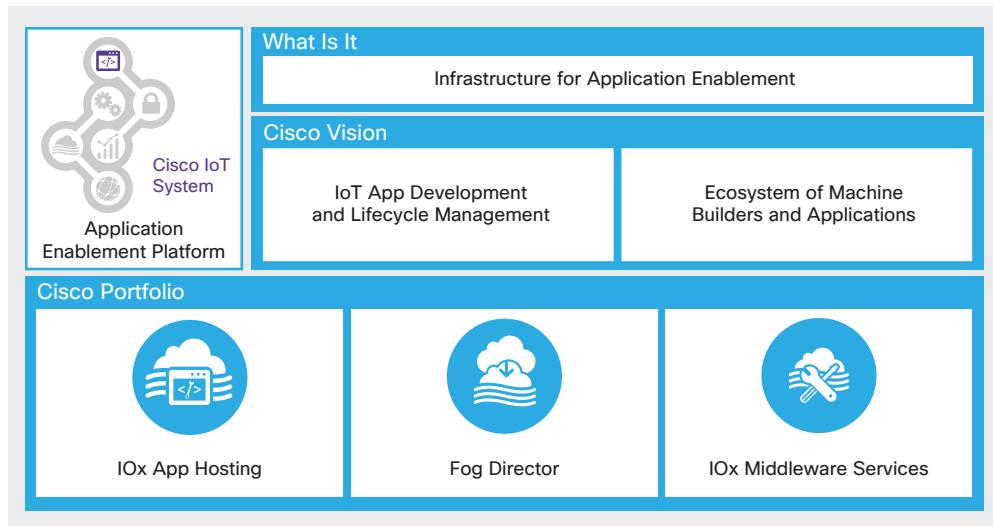
The Cisco IoT System application enablement platform portfolio contains Cisco IOx and the Cisco Fog Director. Cisco IOx and DSX enable object makers to develop APIs for their own products and create ecosystems around them to amplify the possibility of innovative applications. These APIs can then be used by your internal developers or other third parties to offer solutions. With IoT and its seemingly infinite possibilities for applications, such openness at multiple levels is crucial to fostering rapid innovation.

For additional details on these capabilities, visit the Cisco DevNet specific sites here:

- <https://developer.cisco.com/site/devnet/home/index.gsp>
- <https://developer.cisco.com/site/internet-of-things/>
- <https://developer.cisco.com/site/iox/>

The following figure provides an overview of the Cisco IoT System application enablement platform portfolio

Figure 31. Cisco IoT System Application Enablement Platform Portfolio



Use Cases

Manufacturing: Cisco Connected Factory Solutions

The Cisco Connected Factory solution is a portfolio of validated, proven architectures, capabilities, and market-leading technologies and services. By using the IoE, this solution is designed to help industrial companies:

- Rapidly and more securely integrate industrial automation and control with business systems
- Build one common, converged, rugged, plant-to-business network
- Improve operational costs and efficiency
- Find and fix problems faster to improve production uptime and equipment availability
- Improve security through control of network access by user and location with identity services

Cisco provides the breadth of plant infrastructure capabilities across networking, wireless, security, video, computing, and communications. The solution can flexibly support the current and future business needs of manufacturers. It meets the requirements of both business IT and operational technology in a highly secure, reliable, and integrated platform.

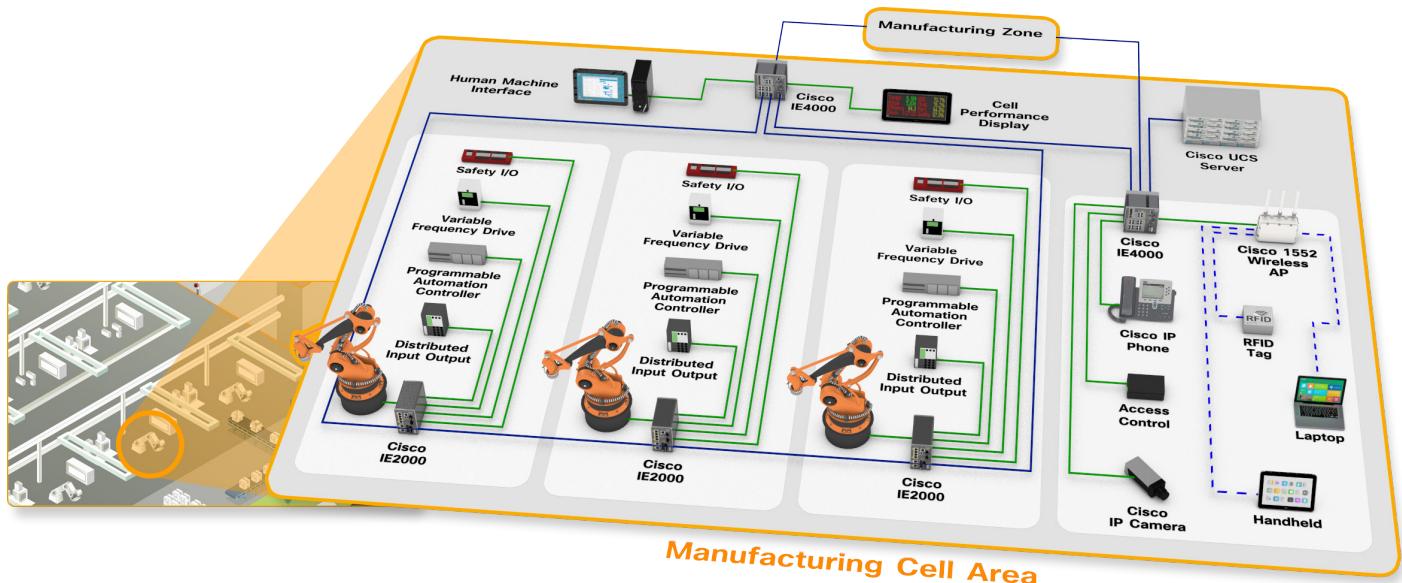
Cisco Solutions for Manufacturing include:

- [Connected Factory Automation](#)
- [Connected Factory Wireless](#)
- [Connected Factory Security](#)

For additional info and details: www.cisco.com/go/industrial

The following figure provides an illustration of a manufacturing cell area using Cisco IoT System products

Figure 32. Cisco Connected Factory: Manufacturing Cell Area Use Case



Cisco Connected Utilities Solutions

Cisco provides one of the industry's most comprehensive portfolios of infrastructure solutions to address top utility business priorities:

- Maintain reliability
- Address regulatory requirements
- Upgrade older infrastructure
- Anticipate an aging workforce
- Deploy a platform designed for grid security

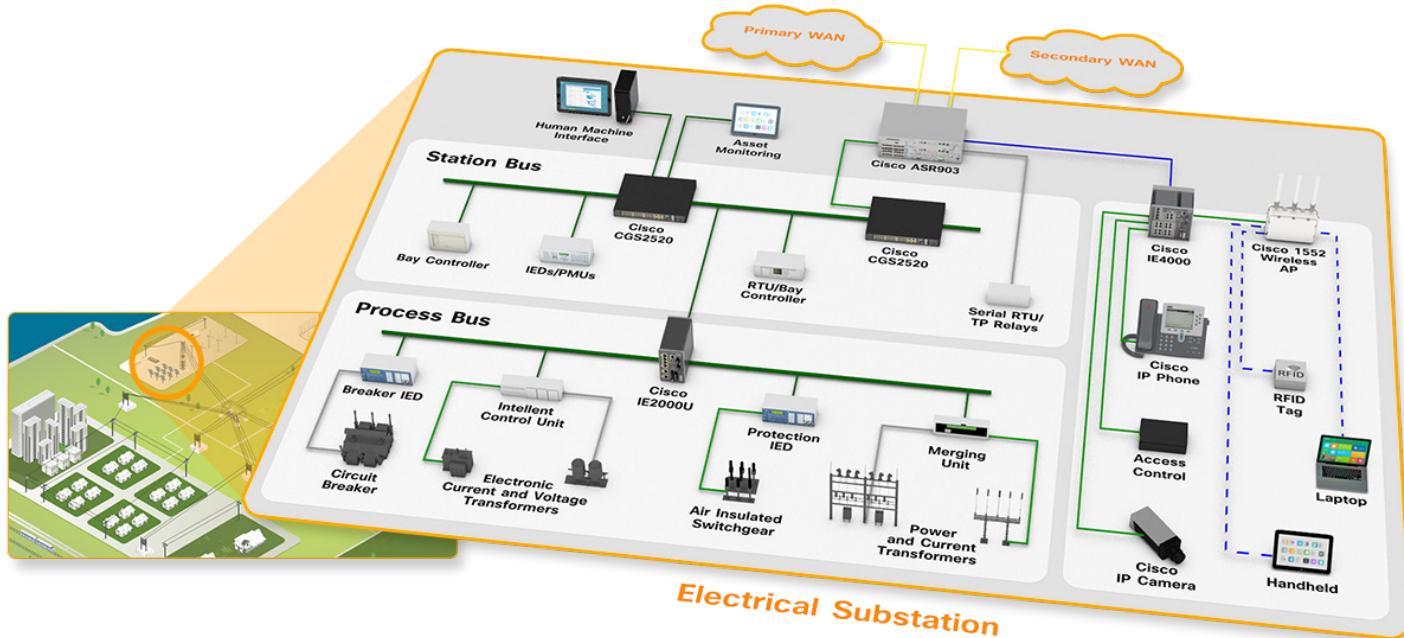
Cisco solutions for utilities include:

- Cisco Field Area Network Solution
- Connected Distribution Automation
- Cisco Connected Mobile Workforce Architecture
- Cisco Connected Substation Automation

For additional info and details: www.cisco.com/go/utilities

The following figure provides an illustration of an automated substation using Cisco IoT System products

Figure 33. Cisco Connected Substation: Substation Automation Use Case



Cisco Connected Transportation Solutions

Cisco brings a completely new approach to integrating information and communication technology with the transportation industry. Cisco transportation solutions are meeting new demands and requirements around traffic management, data analytics, telematics, vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I) and machine-to-machine (M2M) communications. Cisco solutions and architectures are built to help transportation companies and transit agencies create greater safety and mobility for both their workers and passengers while preparing for expansion and new opportunities for future growth. Utilizing the power of a secure IP network, transit operators gain a competitive advantage and help to ensure safety, operational efficiency, and improved productivity in their daily operations by providing seamless, secure access from any location.

Cisco Connected Transportation solutions can be applied for rail, roadways, mass transit, public safety, aviation, maritime, fleet management and connected vehicles.

Regardless of the mode of transit, the primary benefits that Cisco Connected Transportation solutions deliver include:

- Improve safety and security
- Converge networks to lower costs and simplify management
- Improve operational efficiencies and employee productivity
- Enable new business models and opportunities for generating additional revenue
- Reduce complexity with advanced services to help plan, build and manage networks and systems

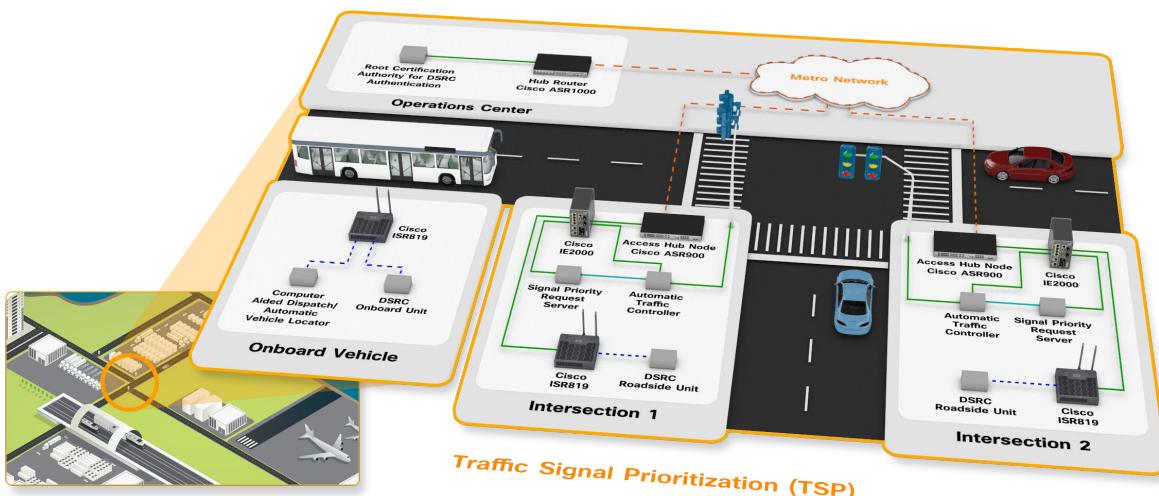
Cisco Solutions for Transportation include:

- [Cisco Connected Roadways](#)
- [Cisco Connected Trains](#)
- [Cisco Connected Stations](#)
- [Cisco Connected Trackside](#)

For additional info and details: www.cisco.com/go/transportation

The following figure provides an illustration of traffic signal prioritization using Cisco IoT System products

Figure 34. Cisco Connected Transportation: Traffic Signal Prioritization Use Case



Cisco IoT System Summary

Deploy, Accelerate, and Innovate

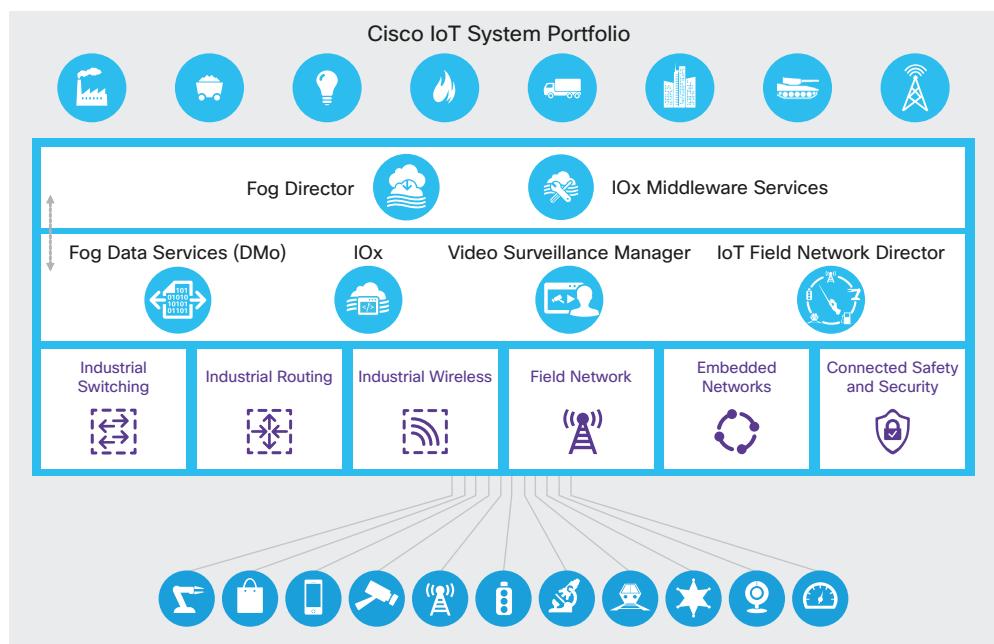
As IoT creates opportunity, it also increases complexity, producing vast amounts of data, and creating a maze of details to manage. To overcome those challenges and realize the true value of IoT, the Cisco IoT System enables you to:

- Bridge IT and operational technology, supporting your entire organization with a scalable network infrastructure
- Understand, act on, and protect the data you collect
- Secure your entire technology ecosystem – from cloud and fog networks, to the data being shared between servers and devices

The Cisco IoT System makes all that possible, bringing integration, analytics, and security to your IoT efforts. Figure 35 shows the product portfolio of the Cisco IoT System.

To find out how the Cisco IoT System can help you innovate faster, make smarter decisions, and strengthen security, visit www.cisco.com/go/iotsystem.

Figure 35. Cisco IoT System and Its Comprehensive Set of IoT Technologies



The Cisco IoT System enables industry specific solutions such as for manufacturing, oil and gas, utilities, transportation, public safety, and smart cities. Figure 36 shows the vertical specific solutions with the Cisco IoT System as a foundation.

Figure 36. Cisco IoT Industry Vertical Solutions

| Industries | Solutions | Use Cases |
|---------------|--|--|
| Manufacturing |  Connected Factory |  Factory Automation  Factory Wireless  Factory Security |
| Energy |  Connected Utilities  Connected Oil and Gas |  Substation Automation  Connected Pipelines*  FAN AMI  Secure Ops |
| Public Sector |  Smart and Connected City  Connected Transportation  Connected Public Safety |  City Wi-Fi  Connected Rail  Smart Meeting Space  Connected Roadway - Roadside |

Deploy, accelerate and innovate with Cisco IoT System.

www.cisco.com/go/iotsystem

Appendix

Network Connectivity

Table 5. Industrial Ethernet Switches: Main Common Features

| Layer 2 and Layer 3 | Security | Management | Quality of Service (QoS) |
|--|--|--|---|
| 802.1 Q VLAN trunking | 802.1 x | Auto Configuration | 2 Ingress and 4 Egress Queues |
| Auto MDIX | BPDU Filtering | Auto QoS | 802.1p Priority |
| Auto-negotiation on all ports | BPDU Guard | Auto Smartport | Auto QoS 1.5 |
| Configurable IGMP Leave Timer | Dynamic ARP Inspection | CLI-based management console | AutoQoS - VoIP |
| Dynamic Access Ports (Dynamic VLAN) | Generic Message Authent. for SSH Protocol | Digital Optical Monitor (DOM) support | AutoQoS - VoIP Enhancement |
| Dynamic ARP Inspection | HTTP(S) | Embedded Event Manager (EEM) | DSCP Mapping/Filtering |
| Dynamic MAC addressing | Ip device tracking (IPDT) | Express Setup via Device Manager | Egress Bandwidth Limiting/port shaping |
| Etherchannel | IP source guard | IP SLA responder | Egress Shaped Queues |
| FlexLink Mac Move Notification | Local RADIUS Server | LLDP | Global QoS (enable QoS) |
| FlexLink Multicast fast convergence failover | Loopguard | Macro Smartport | Hierarchical QOS |
| FlexLink/Back up Interface | MAC address notification | Mini USB console port | ingress policer |
| IGMP Filtering/Snooping Timer/Throttling/Querier | Multilevel Console Security | RS232 serial console port | Ingress Rate Limiting |
| IGMP v1, v2, v3 Snooping | Port Security | RSPAN session | Ingress/egress Shared Queues |
| Indirect IPV4 routing | Port Security for Voice VLANs | SNMP v1 v2 v3 | Ingress/Egress Strict Priority Queuing (Expedite) |
| Inter-VLAN routing (or IPv4 static routing) | Port Security MAC Aging | Software Alarm Relay | Packet Based Storm Control |
| Mini-jumbo/Jumbo frame | Private VLAN Edge (Protected Port) | SPAN session | Per VLAN Policy & Per Port Policer |
| MSTP | RADIUS Client | Web Device Manager | Shaped Round Robin (SRR) |
| MVR (Multicast VLAN Registration) | RADIUS Server Load Balancing | DHCP | Storm Control - Unicast, Multicast, Broadcast |
| Per Port Storm Control Unicast/Multicast | Secure Copy Protocol (SCP) | | Trust Boundary Configuration |
| Port duplex/speed | Secure Shell SSH 2 Server | DHCP Snooping | Weighted Tail Dop (WTD) |
| REP LSL Age-out timer/Edge no Neighbor | Secure Shell SSHv 1.5 | DHCP Option 82 data Insertion | Industrial Protocols |
| REP redundant ring | SPAN | DHCP Option 82 Pass Through | |
| RSTP | Spanning Tree Root Guard (STRG) | DHCP Option 82 - Configurable Remote ID and Circuit ID | Ethernet/IP |
| Static MAC addressing | SSL | DHCP Snooping Statistics and SYSLOG | Modbus TCP/IP |
| STP PortFast | SXP (Secure Group Acccss Exchange Protcol) | DHCP server port-based address allocation | PROFINET |
| SVI interface | TACACS+ | IPv6 | Network Address Translation (Layer2 NAT) |
| TrustSec: Auto Smart Port/Device Sensor/Device profiling | Trunk Port Security | | 1588 PTP, CIP sync |
| UDLD | TrustSec: Auto Smart Port (ASP) | IPv6 host addressing | Industrial automation Smartport (template) |
| Voice Vlan | TrustSec: Device Sensor, Device profiling | IPv6 MLD v1 and V2 snooping | Port based DHCP allocation |
| VTP v2, v3 | Unicast MAC Filtering | HTTP and HTTPS | Duplicate Address Detection |

Table 6. Industrial Ethernet Switches Power Supply Units: Main Specifications and Use Case Scenarios

| Product Number | Wattage | Rated Nominal Input Operating Range | Supported Input Voltage Operating Range | Power Output | PoE/ PoE+ Support | Use Case Scenario |
|--------------------|---------|--|---|--------------|-------------------|--|
| PWR-IE170W- PC-AC= | 170W | AC 100-240V/2.3A 50-60Hz or DC 125-250V/2.1A | AC 90-264V or DC 106-300V | 54VDC/3.15A | Yes | Maximum PoE/PoE+ port support in a AC or high DC environment1 |
| PWR-IE170W- PC-DC= | 170W | DC 12-54V/23A | DC 10.8-60V | 54VDC/3.15A | Yes | Maximum PoE/PoE+ port support in a DC environment1 |
| PWR-IE50W- AC= | 50W | AC 100-240V/1.25A 50-60Hz or DC 125-250V/1.25A | or DC 106-300V | 24VDC/2.1A | No | No PoE/PoE+ support needed in an AC or DC environment |
| PWR-IE50W- AC-IEC= | 50W | AC 100-240V/1.25A 50-60Hz | AC 90-264V | 24VDC/2.1A | No | No PoE/PoE+ support needed when IEC plug is desired |
| PWR-IE65W- PC-AC= | 65W | AC 100-240V/1.4A 50-60Hz or DC 125-250V/1.0A | AC 90-264V or DC 106-300V | 54VDC/1.2 A | Yes | Minimum (1~2 port) PoE support needed in an AC or high DC environment2 |
| PWR-IE65W- PC-DC= | 65W | DC 24-48VDC/4.5A | DC 18-60V | 54VDC/1.2 A | Yes | Minimum (1~2 port) PoE support needed in a DC environment2 |

Table 7. Industrial Ethernet Switches: Available Models (Product IDs)

| IE 2000 | Cisco Industrial Ethernet 2000 Series Switches |
|--------------------|--|
| IE-2000-4T-B | IE 4 10/100,2 FE, Base |
| IE-2000-4T-L | IE 4 10/100,2 FE, Lite |
| IE-2000-4TS-B | IE 4 10/100,2 FE SFP, Base |
| IE-2000-4TS-L | IE 4 10/100,2 FE SFP, Lite |
| IE-2000-4T-G-B | IE 4 10/100,2 Gig port, Base |
| IE-2000-4T-G-L | IE 4 10/100,2 Gig port, Lite |
| IE-2000-4TS-G-B | IE 4 10/100,2 SFP Gig port, Base |
| IE-2000-4TS-G-L | IE 4 10/100,2 SFP Gig port, Lite |
| IE-2000-4S-TS-G-B | IE 2000 with 4-port SFP, 2-port GE SFP uplinks, LAN Base ima |
| IE-2000-4S-TS-G-L | IE 2000 with 4-port SFP, 2-port GE SFP uplinks, LAN Lite ima |
| IE-2000-8TC-B | IE 8 10/100,2 FE SFP+2 T/SFP FE, Base |
| IE-2000-8TC-L | IE 8 10/100,2 FE SFP+2 T/SFP FE, Lite |
| IE-2000-8TC-G-B | IE 8 10/100,2 T/SFP, Base |
| IE-2000-8TC-G-L | IE 8 10/100,2 T/SFP, Lite |
| IE-2000-8TC-G-E | IE 8 10/100,2 T/SFP, Base with 1588 |
| IE-2000-8TC-G-N | IE 8 10/100,2 T/SFP, Base with 1588 & NAT |
| IE-2000-16TC-B | IE 16 10/100,2 FE SFP+2 T/SFP FE, Base |
| IE-2000-16TC-L | IE 16 10/100,2 FE SFP+2 T/SFP FE, Lite |
| IE-2000-16TC-G-E | IE 16 10/100,2 FE SFP+2 T/SFP, Base with 1588 |
| IE-2000-16TC-G-L | IE 16 10/100,2 FE SFP+2 T/SFP, Lite |
| IE-2000-16TC-G-N | IE 16 10/100,2 FE SFP+2 T/SFP, Base with 1588 & NAT |
| IE-2000-16TC-G-X | IE 16 10/100,2 FE SFP+2 T/SFP, Base with 1588, Conf. Coat |
| IE-2000-16PTC-G-E | IE 16 10/100,2 FE SFP+2 T/SFP, with 1588, NAT and PoE |
| IE-2000-16PTC-G-L | POE on LAN Lite base. GE uplinks |
| IE-2000-16PTC-G-NX | POE on LAN base with 1588, NAT and Conf. Coat. GE uplinks |

| IE 2000U | | Cisco Industrial Ethernet 2000U Series Switches |
|--------------------|--|---|
| IE-2000U-4S-G | | IE 2000U 4 SFP FE, 2 SFP GE ports |
| IE-2000U-4T-G | | IE 2000U 4 x 10/100, 2 x 10/100/1000 ports |
| IE-2000U-4TS-G | | IE 2000U 4 x 10/100, 2 SFP GE ports |
| IE-2000U-8TC-G | | IE 2000U 8 x 10/100, 2 T/SFP GE ports with 1588 |
| IE-2000U-16TC-G | | IE 2000U 16 x 10/100, 2 FE SFP, 2 T/SFP GE ports with 1588 |
| IE-2000U-16TC-GP | | IE 2000U 16 x 10/100, 2 T/SFP GE ports with 1588, PoE |
| IE-2000U-16TC-G-X | | IE 2000U 16 x 10/100, 2 FE SFP, 2 T/SFP GE ports with 1588, C |
| IE2000 IP67 | | Cisco Industrial Ethernet 2000 IP67 Series Switch |
| IE-2000-8T67-B | | IP67 IE 8 10/100 |
| IE-2000-8T67P-G-E | | IP67 IE 8 10/100 poe, 2 GE, with 1588 & NAT |
| IE-2000-16T67-B | | IP67 IE 16 10/100 |
| IE-2000-16T67P-G-E | | IP67 IE 8 10/100, 8 poe, 2 GE, with 1588 & NAT |
| IE-2000-24T67-B | | IP67 IE 24 10/100 |
| CGS 2520 | | Cisco 2520 Connected Grid Switch |
| CGS-2520-24TC | | Cisco CGS2520 front/rear cabling w/2GE, 24-10/100 copper |
| CGS-2520-16S-8PC | | Cisco CGS2520 front/rear cabling w/2GE, 16-SFP, 8-10/100 PoE |
| IE3000 | | Cisco Industrial Ethernet 3000 Series Switches |
| IE-3000-8TC-E | | IE 3000 Base Switch 8-Port 10/100 + 2 T/SFP w/ Layer 3 |
| IE-3000-4TC-E | | IE 3000 Base Switch 4-Port 10/100 + 2 T/SFP w/ Layer 3 |
| IE-3000-8TC | | IE 3000 Base Switch, 8 ports 10/100 + 2 T/SFP, LAN Base |
| IE-3000-4TC | | IE 3000 Base Switch, 4 ports 10/100 + 2 T/SFP, LAN Base |
| IEM-3000-8SM= | | IE 3000 Expansion module 8 port SFP |
| IEM-3000-8FM= | | IE 3000 Expansion Module, 8 100FX |
| IEM-3000-4PC-4TC= | | IE 3000 Expansion Module, 4 POE 10/100 4 non-POE 10/10 |
| IEM-3000-4SM= | | IE 3000 Expansion module 4 port SFP |
| IEM-3000-4PC= | | IE 3000 Expansion Module, 4 POE 10/100 |
| IEM-3000-8TM= | | IE 3000 Expansion Module, 8 10/100 |
| IE 3010 | | Cisco Industrial Ethernet 3010 Series Switches Layer 2/Layer 3 |
| IE-3010-16S-8PC | | Cisco IE 3010 Switch, 16 SFP, 8 PoE, 2 Combo GE uplinks |
| IE-3010-24TC | | Cisco IE 3010 Switch, 24 Port 10/100, 2 Combo GE uplinks |
| IE 4000 | | Cisco Industrial Ethernet 4000 Series Switches |
| IE-4000-4GC4GP4G-E | | IE 4000 4 x combo 1G with 4 x 1G PoE, 4 x 1G Combo, LAN Bas |
| IE-4000-4GS8GP4G-E | | IE 4000 4 x SFP 1G with 8 x 1G PoE, 4 x 1G Combo, LAN Base |
| IE-4000-4S8P4G-E | | IE 4000 4 x SFP 100M with 8 x PoE, 4 x 1G Combo, LAN Base |
| IE-4000-4T4P4G-E | | IE 4000 4 x RJ45 10/100M, 4 x PoE 10/100M, 4 x 1G Combo, LA |
| IE-4000-4TC4G-E | | IE 4000 4 x combo 10/100M, 4 x 1G Combo, LAN Base |
| IE-4000-8GS4G-E | | IE 4000 8 x SFP 1G, 4 x 1G Combo, LAN Base |
| IE-4000-8GT4G-E | | IE 4000 8 x RJ45 10/100/1000, 4 x 1G Combo, LAN Base |
| IE-4000-8GT8GP4G-E | | IE 4000 8 x RJ45 10/100/1000 with 8 x 1G PoE, 4 x 1G Combo, |
| IE-4000-8S4G-E | | IE 4000 8 x SFP 100M, 4 x 1G Combo, LAN Base |
| IE-4000-8T4G-E | | IE 4000 8 x RJ45 10/100M, 4 x 1G Combo, LAN Base |
| IE-4000-16GT4G-E | | IE 4000 16 x RJ45 10/100/1000M, 4 x 1G Combo, LAN Base |
| IE-4000-16T4G-E | | IE 4000 16 x RJ45 10/100/1000M, 4 x 1G Combo, LAN Base |
| IE 5000 | | Cisco Industrial Ethernet 5000 Series Switches |
| IE-5000-12S12P-10G | | IE5000 12x1G SFP+12x10/100/1000 + 4 1G/10G LAN BASE |
| IE-5000-16S12P | | IE5000 16x1G SFP and 12x10/100/1000 LAN BASE |

Table 8. Industrial Ethernet Switches: Main Certifications and Compliances

| Product Family | EMI | EMC | EN 50155 | FCC Part 15 | IEC 61850 | UL | Hazardous Location | Manufacturing | Oil and Gas | Mining (facilities) | Utilities | Traffic Control | Railways | Marine | Public Safety | RoHS | CE Declaration | Service Provider | Australia | China | EU | India | Korea | US |
|----------------|-----|-----|----------|-------------|-----------|----|--------------------|---------------|-------------|---------------------|-----------|-----------------|----------|--------|---------------|------|----------------|------------------|-----------|-------|-------|-------|-------|----|
| | | | | | | | | | | | | | | | | | | | | | | | | |
| IE 2000 | ✓ | ✓ | ✓ | ✓ | ✓(**) | ✓ | ✓(*) | ✓ | ✓ | ✓ | ✓(**) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓(**) | ✓ | ✓ | ✓ | ✓ |
| IE2000U | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓(*) | ✓ | ✓ | ✓ | ✓ | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| IE 2000 IP67 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CGS 2520 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓(***) | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| IE 3000 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓(*) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| IE 3010 | ✓ | ✓ | ✓ | ✓ | | | ✓ | | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| IE4000 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓(*) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓(**) | ✓ | ✓ | ✓ |
| IE 5000 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓(*) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

(*) : requires cabinet enclosure

(**) subset of PIDs in family

(***) : CUL

Table 9. Industrial Routers: Available Models and Options (Product IDs – Descriptions)

| Cisco Connected Grid Router (CGR) 1000 | |
|---|--|
| CGR1120/K9 | CGR 1120 w/ 2 module slots, 2 GE, 2 serial, 6 FE LAN, Wi-Fi, GPS |
| CGR1240/K9 | CGR1240 w/ 4 module slots, 2 GE, 2 serial, 4 FE LAN, Wi-Fi, GPS |
| Cellular Connected Grid Modules for Cisco CGR 1000 Series | |
| CGM-3G-EVDO-S= | Connected Grid Module - 3G Sprint EV-DO Rev A/0/1xRTT |
| CGM-3G-EVDO-V= | Connected Grid Module - 3G Verizon EV-DO Rev A/0/1xRTT |
| CGM-3G-HSPA-A= | Connected Grid Module - 3G AT&T HSPA+/UMTS/GSM/GPRS/EDGE |
| CGM-3G-HSPA-AB-G= | Connected Grid Module - 3G (All Bands) HSPA+/UMTS/GSM/EDGE |
| CGM-3G-HSPA-G= | Connected Grid Module - 3G (Global) HSPA+/UMTS/GSM/GPRS/EDGE |
| Cisco Connected Grid Router (CGR) 2000 | |
| CGR-2010-SEC/K9 | Cisco CGR2010 security bundle w/SEC license PAK |
| CGR-2010/K9 | Cisco CGR2010 w/2GE, 4 GRWIC slots, 256MB CF, 1GB DRAM, IPB |
| Cisco 2010 Connected Grid Router GRWIC Options | |
| GRWIC-1CE1T1-PRI= | 1 port channelized T1/E1 and PRI GRWIC (data only) |
| GRWIC-2CE1T1-PRI= | 2 port channelized T1/E1 and PRI GRWIC (data only) |
| GRWIC-2SHDSL= | Cisco Connected Grid G.SHDSL GRWIC |
| GRWIC-4G-LTE-A= | Cisco Connected Grid 2G/3G/4G Multimode LTE GRWIC for ATT |
| GRWIC-4G-LTE-G= | Cisco Connected Grid 2G/3G/4G Multimode LTE GRWIC - Global |
| GRWIC-4G-LTE-V= | Cisco Connected Grid 2G/3G/4G Multimode LTE GRWIC for VZW |
| GRWIC-4T= | 4-Port Serial GRWIC |
| GRWIC-8A/S-232= | 8-Port Async/Sync Serial GRWIC, EIA-232 |
| GRWIC-D-ES-2S-8PC= | EtherSwitch 8x 10/100T (4 PoE) ports + 2 100/1000 SFP |
| GRWIC-D-ES-6S= | EtherSwitch 4 100FX SFP ports + 2 100/1000 SFP |
| GRWIC-VA-DSL-A= | Cisco Connected Grid VDSL2 and ADSL2/ADSL2+ GRWIC - Annex A |
| GRWIC-VA-DSL-M= | Cisco Connected Grid VDSL2 and ADSL2/ADSL2+ GRWIC - Annex M |
| SGRWILK9-15002SE= | Cisco GRWIC ESM IP SERVICES WITH EXPRESS SETUP |
| SGRWISK9-12258EY= | Cisco GRWIC ESM IP SERVICES |
| SGRWISK9-15002SE= | Cisco GRWIC ESM IP SERVICES |

Cisco 819H 3G M2M GW Series Products

| | |
|----------------|--|
| C819H-K9 | C819 M2M Hardened Secure Router with Smart Serial |
| C819HG+7-K9 | C819 Secure Hardened M2M GW (non-US) 3.7G HSPA + R7, SMS/GPS |
| C819HG-4G-A-K9 | C819 Hardened 4G LTE M2M GW for ATT 700 MHz Band 17 |
| C819HG-4G-G-K9 | C819 Hardened 4G LTE for Global, 800/900/1800/2100/2600 MHz |
| C819HG-4G-V-K9 | C819 Hardened 4G LTE M2M GW for Verizon 700 MHz Band 13 |
| C819HG-S-K9 | C819 Secure Hardened Router, SPRINT EVDO Rev A w/ SMS/GPS |
| C819HG-U-K9 | C819 Secure Hardened M2M GW (non-US) 3.5G HSPA R6 w/ SMS/GPS |
| C819HG-V-K9 | C819 Secure Hardened Router, VERIZON EVDO Rev A w/ SMS/GPS |

Cisco 819H 3G M2M GW with WLAN Series Products

| | |
|------------------|--|
| C819HGW+7-A-A-K9 | C819 M2M Hardened 3.7G HSPA+ North America w/ Dual Radio FCC |
| C819HGW+7-E-K9 | C819 M2M Hardened 3.7G HSPA+ (non-US) w/ Dual Radio ETSI |
| C819HGW+7-N-K9 | C819 M2M Hardened 3.7G HSPA+ (non-US) w/ Dual Radio WiFi |
| C819HGW-S-A-K9 | C819 M2M Hardened for Sprint EV-DO Rev A w/ Dual Radio FCC |
| C819HGW-V-A-K9 | C819 M2M Hardened for Verizon EV-DO Rev A w/ Dual Radio FCC |
| C819HWD-A-K9 | C819 M2M Hardened with Dual Radio FCC WiFi |
| C819HWD-C-K9 | C819 M2M Hardened with Dual Radio China WiFi |
| C819HWD-E-K9 | C819 M2M Hardened with Dual Radio ETSI WiFi |

Cisco Industrial Router (IR) 509 and 529 WPAN

| | |
|-------------------|---|
| IR509UWP-915/K9 | IR509 915Mhz WPAN router w/ 2 serial,1 FE LAN |
| IR529UBWP-915D/K9 | IR529 915Mhz WPAN IP67 Range Ext. BBU Adv PS Dual antenna |
| IR529UBWP-915S/K9 | IR529 915Mhz WPAN IP67 Range Ext. BBU Adv PS Single antenna |
| IR529UWP-915D/K9 | IR529 915Mhz WPAN IP67 Range Ext. Adv PS Dual antenna |

Cisco Industrial Router (IR) 809

| | |
|------------------|--|
| IR809G-LTE-VZ-K9 | IR809 Hardened WAN 4G LTE secure platform multi-mode Verizon LTE/DoRa |
| IR809G-LTE-NA-K9 | IR809 Hardened WAN 4G LTE secure platform multi-mode ATT and Canada LTE/HSPA+ |
| IR809G-LTE-GA-K9 | IR809 Hardened WAN 4G LTE secure platform multi-mode Global (Europe) LTE/HSPA+ |
| IR809G-LTE-ST-K9 | IR809 Hardened WAN 4G LTE secure platform multi-mode Sprint LTE/DoRa |

Cisco Industrial Router (IR) 829

| | |
|--------------------|---|
| IR829GW-LTE-VZ-AK9 | IR829 Hardened WAN GE 4G LTE secure platform multi-mode Verizon LTE/DoRa with 802.11n, PoE, FCC compliant |
| IR829GW-LTE-NA-AK9 | IR829 Hardened WAN GE 4G LTE secure platform multi-mode ATT and Canada LTE/HSPA+ with 802.11n, PoE, FCC compliant |
| IR829GW-LTE-GA-EK9 | IR829 Hardened WAN GE 4G LTE secure platform multi-mode Global (Europe) LTE/HSPA+ with 802.11n, PoE, ETSI Compliant |
| IR829GW-LTE-GA-ZK9 | IR829 Hardened WAN GE 4G LTE secure platform multi-mode Global (Australia) LTE/HSPA+ with 802.11n, PoE, Australia Compliant |
| IR829GW-LTE-ST-AK9 | IR829 Hardened WAN GE 4G LTE secure platform multi-mode Sprint LTE/DoRa with 802.11n, PoE, FCC compliant |

Cisco Industrial Router (IR) 910

| | |
|----------------|--------------------------------------|
| ACC-IR910-H-M= | Cisco IR910 IP55 Enclosure |
| ACC-IR910-W-M= | Cisco IR910 Sensor Module Mount Kit |
| IR910G-NA-K9 | Cisco IR910 3G Sku for North America |

Cisco ASR 903 Systems

| | |
|-------------------|---|
| ASR-903 | ASR 903 Series Router Chassis |
| A903-FAN= | ASR 903 FAN Tray, Spare |
| A903-RCKMNT-19IN= | ASR 903 EIA /JIS 19in Rack Mount Kit, Spare |
| A903-RCKMNT-ETSI= | ETSI Rack mount Option for the Cisco ASR 903, Spare |

| Cisco ASR 900 Common Equipment | |
|--------------------------------------|---|
| A900-PWR550-A= | ASR 900 550W AC Power Supply, Spare |
| A900-PWR550-D-E= | ASR 900 550W Enhanced DC Power Supply, Spare |
| Cisco ASR 900 Route Switch Processor | |
| A900-RSP2A-128= | ASR 900 Route Switch Processor 2 - 128G, Base Scale, Spare |
| A900-RSP2A-64= | ASR 900 Route Switch Processor 2 - 64G, Base Scale, Spare |
| A903-RSP1A-55= | ASR 903 Route Switch Processor 1, Base Scale, Spare |
| A903-RSP1B-55= | ASR 903 Route Switch Processor 1, Large Scale, Spare |
| Cisco ASR 900 Interface Modules | |
| A900-IMA16D= | ASR 900 16 port T1/E1 Interface Module, Spare |
| A900-IMA1X= | ASR 900 1 port 10GE XFP Interface Module, Spare |
| A900-IMA2Z= | ASR 900 2 port 10GE SFP+/XFP Interface Module, Spare |
| A900-IMA4OS= | ASR 900 4 OC3/STM1 or 1 OC12/STM4 Interface Module, Spare |
| A900-IMA8S1Z= | ASR 900 Combo 8 port SFP GE and 1 port 10GE IM, Spare |
| A900-IMA8S= | ASR 900 8 port SFP Gigabit Ethernet Interface Module, Spare |
| A900-IMA8T1Z= | ASR 900 Combo 8 port 10/100/1000 and 1 port 10GE IM, Spare |
| A900-IMA8T= | ASR 900 8 port 10/100/1000 Ethernet Interface Module, Spare |
| A900-IMASER14A/S= | ASR 900 14 port Sync/Async Interface Module, Spare |

Table 10. Industrial Routers: Main Certifications and Compliances

| Product Family | EMI | EMC | EN 50 155 | FCC Part 15 | IEC 61850 | UL | Hazardous Location | Manufacturing | Oil and Gas | Mining (facilities) | Utilities | Traffic Control | Railways | Marine | Public Safety | RoHS | CE Declaration | Service Provider | Australia | China | EU | India | Korea | US | |
|----------------|-----|-----|-----------|-------------|-----------|--------|--------------------|---------------|-------------|---------------------|-----------|-----------------|----------|--------|---------------|------|----------------|------------------|-----------|-------|----|-------|-------|----|---|
| CGR 1000 | ✓ | ✓ | | ✓ | ✓ | ✓(***) | ✓(*) | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| CGR 2000 | ✓ | ✓ | | ✓ | ✓ | ✓(***) | ✓(*) | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| IR 509 | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓(*) | | | | ✓ | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | |
| ISR 819H | ✓ | ✓ | ✓ | ✓ | | ✓ | | ✓ | ✓ | ✓ | | | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| IR 809 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓(*) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | |
| IR 829 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓(*) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| IR 910 | ✓ | ✓ | | ✓ | | ✓ | | | | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| ASR 903 | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |

(*) : requires cabinet enclosure

(***) : CUL

Table 11. Industrial Wireless: Available Models and Options (Product IDs – Descriptions)

| Cisco Industrial Wireless IW3700 Series Access Points | |
|---|--|
| IW3702-2E-UXK9 | 2 antenna connectors on top and bottom for pole or wall mounting with direct attach antennas |
| IW3702-4E-UXK9 | 4 antenna connectors on one side for convenience in cabinet mount cabled scenarios |
| Cisco Aironet 1530 Series Outdoor Access Points | |
| AIR-CAP1532E-x-K9 | 802.11n Low-Profile Outdoor AP, External Ant., x Reg Dom. |
| AIR-CAP1532I-x-K9 | 802.11n Low-Profile Outdoor AP, Internal Ant., x Reg Dom. |
| Cisco Aironet 1550 Series Outdoor Access Point | |
| AIR-CAP1552C-x-K9 | 802.11N Outdoor Mesh Access Point, Cable Modem, Internal Antenna |
| AIR-CAP1552C-x-K9G | 802.11N Outdoor Mesh Access Point, Cable Modem, Internal Ant., w/ GPS |
| AIR-CAP1552CU-x-K9 | 802.11N Outdoor Mesh Access Point, Cable Modem, Single band Ext. Antenna |
| AIR-CAP1552CU-xK9G | 802.11N Outdoor Mesh Access Point, Cable Modem, Single band Ext. Ant., w/ GPS |
| AIR-CAP1552E-x-K9 | 802.11N Outdoor Mesh Access Point, Dual band Ext. Antenna |
| AIR-CAP1552E-x-K9G | 802.11N Outdoor Mesh Access Point, Dual band Ext. Ant., w/ GPS |
| AIR-CAP1552EU-x-K9 | 802.11N Outdoor Mesh Access Point, Single Band Ext. Antenna |
| AIR-CAP1552EU-xK9G | 802.11N Outdoor Mesh Access Point, Single Band Ext. Ant., w/ GPS |
| AIR-CAP1552H-x-K9 | 802.11N Outdoor Mesh Access Point, Hazardous Locations |
| AIR-CAP1552I-x-K9 | 802.11N Outdoor Mesh Access Point, Dual band, Internal Antenna |
| AIR-CAP1552SA-x-K9 | 802.11n Outdoor Access Point w/ISA100 Gateway, AC |
| AIR-CAP1552SD-x-K9 | 802.11n Outdoor Access Point w/ISA100 Gateway, DC |
| AIR-CAP1552WU-x-K10 | 802.11n Outdoor Access Point w/WiHartGateway, DC |
| Cisco Aironet 1570 Series Outdoor Access Point | |
| AIR-AP1572EAC-x-K9 | AP 1572EAC, E: External Antennas, AC: AC power |
| AIR-AP1572EC1-x-K9 | AP 1572EC1, E: External Antennas, C1: Cable Backhaul; NA-DOCSIS 42/88 MHz |
| AIR-AP1572EC2-x-K9 | AP 1572EC2, E: External Antennas, C2: Cable Backhaul; NA-DOCSIS 85/108 MHz |
| AIR-AP1572EC3-x-K9 | AP 1572EC3, E: External Antennas, C3: Cable Backhaul; Euro-DOCSIS 65/108 MHz |
| AIR-AP1572EC4-x-K9 | AP 1572EC4, E: External Antennas, C4: Cable Bachhaul; Japan-DOCSIS 65/108 MHz |
| AIR-AP1572IC1-x-K9 | AP 1572IC1, I: Internal Antennas, C1: Cable Backhaul; NA-DOCSIS 42/88 MHz |
| AIR-AP1572IC2-x-K9 | AP 1572IC2, I: Internal Antennas, C2: Cable Backhaul; NA-DOCSIS 85/108 MHz |
| AIR-AP1572IC3-x-K9 | AP 1572IC3, I: Internal Antennas, C3: Cable Backhaul; Euro-DOCSIS 65/108 MHz |
| AIR-AP1572IC4-x-K9 | AP 1572IC4, I: Internal Antennas, C4: Cable Bachhaul; Japan-DOCSIS 65/108 MHz |

Table 12. Industrial Wireless: Main Certifications and Compliances

| Product Family | EMI | EMC | EN 50155 | FCC Part 15 | UL 60950 | Hazardous Location | Manufacturing | Oil and Gas | Mining (facilities) | Utilities | Traffic Control | Railways | Public Safety | RoHS | CE Declaration | Service Provider | Australia | China | EU | India | Korea | US |
|----------------|-----|-----|----------|-------------|----------|--------------------|---------------|-------------|---------------------|-----------|-----------------|----------|---------------|------|----------------|------------------|-----------|-------|----|-------|-------|----|
| IW 3700 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Aironet 1530 | ✓ | ✓ | | ✓ | ✓ | | ✓ | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Aironet 1550 | ✓ | ✓ | | ✓ | ✓ | ✓(*) | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Aironet 1570 | ✓ | ✓ | | ✓ | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |

(*) subset of PIDs in family

Table 13. Embedded Networks: Available Models and Options (Product IDs – Descriptions)

| Cisco Embedded Service 2020 Series Switches | |
|---|--|
| ESS-2020-16TC-NCP | Embedded Service 2020 Switch, Expansion board, No cooling plate |
| ESS-2020-16TC-CON | Embedded Service 2020 Switch, Expansion board, Conduction cooled |
| ESS-2020-NCP | Embedded Service 2020 Switch, Main board, No cooling plate, LAN Lite software |
| ESS-2020-CON | Embedded Service 2020 Switch, Main board, Conduction cooled, LAN Lite software |
| ESS-2020-NCP-B | Embedded Service 2020 Switch, Main board, No cooling plate, LAN Base software |
| ESS-2020-CON-B | Embedded Service 2020 Switch, Main board, Conduction cooled, LAN Base software |
| Cisco 5915/Cisco 5940 Embedded Services Router Series | |
| CISCO5915RA-K9 | Cisco 5915 ESR - PC104, Rugged, Air-cooled |
| CISCO5915RC-K9 | Cisco 5915 ESR - PC104, Rugged, Conduction-cooled |
| CISCO5940RA-K9 | Cisco 5940 - cPCI, 3U, Rugged, Air-cooled/AES |
| CISCO5940RC-K9 | Cisco 5940 - cPCI, 3U, Rugged, Conduction-cooled/AES |
| CISCO5940-RTM | Cisco 5940 - cPCI, 3U, Rear Transition Module |
| Cisco 5921 Embedded Services Router | |
| CISCO5921-K9 | Cisco 5921 Embedded Services Router SW for x86 processor |

Security

Table 14. IP Cameras: Available Models and Options (Product IDs – Descriptions)

| Cisco IP Camera | |
|-----------------|--|
| CIVS-IPC-2830 | Cisco Video Surveillance SD Outdoor IP PTZ Camera, NTSC |
| CIVS-IPC-2835 | Cisco Video Surveillance SD Outdoor IP PTZ Camera, PAL |
| CIVS-IPC-3520 | Cisco Video Surveillance IP Dome Body, Indoor, 1MP DN, IO |
| CIVS-IPC-3535 | Cisco Video Surveillance IP Dome Body, Outdoor, 1.3MP DN, IO |
| CIVS-IPC-6000P | HD Box IP Camera, 1080P, P-Iris |
| CIVS-IPC-6020 | Cisco Video Surveillance IP Camera, Indoor HD Dome Body |
| CIVS-IPC-6030 | Cisco Video Surveillance IP Camera, Outdoor VR HD Dome Body |
| CIVS-IPC-6050 | Cisco Video Surveillance IP Camera, Outdoor, Ruggedized, M12 |
| CIVS-IPC-6400E | Cisco Video Surveillance IP Camera, HD Bullet Camera, VR, IR |
| CIVS-IPC-6500PD | HD Box IP Camera, 1080P, P-Iris, DSP |
| CIVS-IPC-6930 | Cisco Video Surveillance HD Outdoor IP PTZ Camera |
| CIVS-IPC-7030 | Cisco Video Surveillance 5MP IP Outdoor Dome Camera |
| CIVS-IPC-7030E | Cisco Video Surveillance 5MP IP Outdoor Dome Camera, IR |
| CIVS-IPC-7530PD | Cisco Video Surveillance 5MP IP Outdoor Dome Camera, DSP, IR |
| CIVS-IPC-7070 | Cisco Video Surveillance IP Camera 5MP IP 360° Outdoor Dome Camera |
| CIVS-IPC-3050 | Cisco Video Surveillance IP Dome Transportation |
| CIVS-SENC-4P | Video Encoder, 4-port, Standalone |
| CIVS-SENC-8P | Video Encoder, 8-port, Standalone |

Table 15. Video Surveillance Manager: Available Models and Options (Product IDs – Descriptions)

| Cisco Video Surveillance Manager | |
|----------------------------------|--|
| FL-CPS-MS-SW7 | License for One Media Server |
| FL-CPS-OM-SW7 | License for One Operations Manager |
| L-CPS-MS-SW7= | eDelivery License for One Media Server |
| L-CPS-OM-SW7= | eDelivery License for One Operations Manager |
| L-CPS-SASD-7= | eDelivery License for 1 Safety and Security Desktop with VSM7 |
| L-CPS-VSM7-1CAM= | eDelivery License for 1 Camera Connection with VSM7 |
| L-CPS-VSMS7-B-VM= | eDelivery License for one Media Server on B-Series |
| L-CPS-VSMS7-C-VM= | eDelivery License for one Media Server on C-Series |
| L-CPS-VSMS7-E-VM= | eDelivery License for one Media Server on E-Series |
| L-CPS-VSOM7-B-VM= | eDelivery License for one Operations Manager on B-Series |
| L-CPS-VSOM7-C-VM= | eDelivery License for one Operations Manager on C-Series |
| L-CPS-VSOM7-E-VM= | eDelivery License for one Operations Manager on E-Series |
| L-CPS-VSMX7= | eDelivery License for Video Surveillance Manager Express limited to 32 cameras |
| L-CPS-VSMX7-UPG= | eDelivery License to upgrade from VSM Express to VSM |
| L-CPS-VSM7-FD= | eDelivery License for base Federator, purchased for each Federator installed |
| L-CPS-FD-VSOM= | eDelivery License for one VSOM in Federator |
| L-CPS-FD-VSOM-X= | eDelivery License for one VSOM Express in Federator |

Table 16. Physical Access Manager: Available Models and Options (Product IDs – Descriptions)

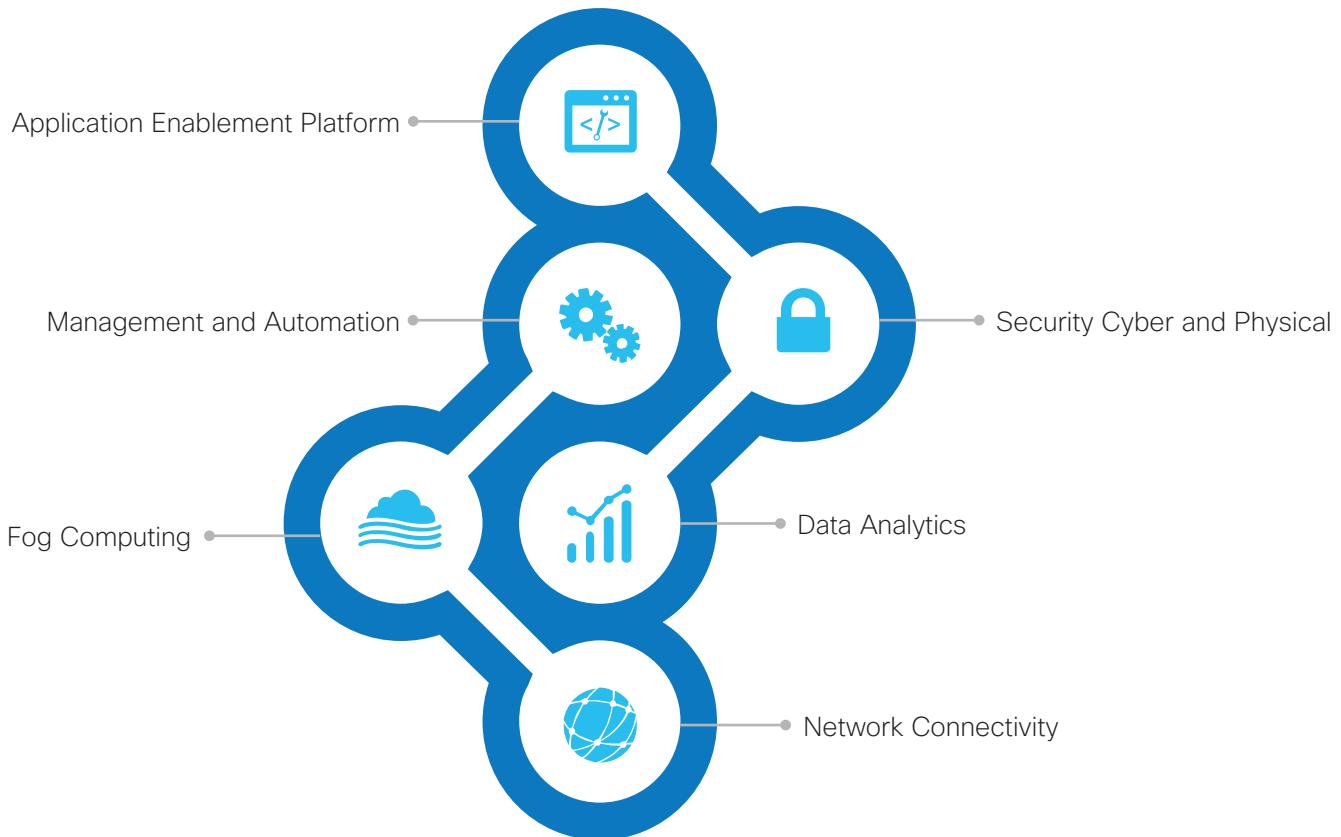
| Cisco Physical Access Manager | |
|-------------------------------|---|
| Hardware Appliance | |
| CPS-MSP-1RU-K9 | Cisco Multiservices Platform Server, 1-RU MSP assembly |
| CIVS-HDD-1000 | 1 TB SATA drive for CIVS-MSP |
| CIVS-CAB-16-CE | CIVS C16 power cable for Europe (CE) |
| CIVS-CAB-16-Cl | CIVS C16 power cable for Italy (Cl) |
| CIVS-CAB-16-CU | CIVS C16 power cable for UK (CU) |
| CIVS-CAB-16- AC | CIVS C16 power cable for North America (AC) |
| CIAC-PAME-M1X-K9 | Cisco Physical Access Manager Software |
| Virtual Appliance | |
| R-CIAC-PAME-VM-K9= | Downloadable OVF virtual appliance in the form of a single file with the extension .OVA |
| Spare PIDs | |
| Via Physical Delivery | |
| CIAC-PAME-BD= | Cisco Physical Access Manager Badge Designer and Enroller |
| CIAC-PAME-HA= | Cisco Physical Access Manager High-Availability License |
| CIAC-PAME-M64= | Cisco Physical Access Manager 64-Module Capacity Upgrade License |
| CIAC-PAME-M128= | Cisco Physical Access Manager 128-Module Capacity Upgrade License |
| CIAC-PAME-M512= | Cisco Physical Access Manager 512-Module Capacity Upgrade License |
| CIAC-PAME-M1024= | Cisco Physical Access Manager 1024-Module Capacity Upgrade License |
| CIAC-PAME-EDI= | Cisco Physical Access Manager Enterprise Data Integration License |
| CIAC-PAME-WSAPI= | Cisco Physical Access Manager Web Services API License |

Cisco Physical Access Manager

Via E-Delivery

| | |
|--------------------|--|
| L-CIAC-PAME-BD= | Cisco Physical Access Manager Badge Designer and Enroller |
| L-CIAC-PAME-HA= | Cisco Physical Access Manager High-Availability License |
| L-CIAC-PAME-M64= | Cisco Physical Access Manager 64-Module Capacity Upgrade License |
| L-CIAC-PAME-M128= | Cisco Physical Access Manager 128-Module Capacity Upgrade License |
| L-CIAC-PAME-M512= | Cisco Physical Access Manager 512-Module Capacity Upgrade License |
| L-CIAC-PAME-M1024= | Cisco Physical Access Manager 1024-Module Capacity Upgrade License |
| L-CIAC-PAME-EDI= | Cisco Physical Access Manager Enterprise Data Integration License |
| L-CIAC-PAM-WSAPI= | Cisco Physical Access Manager Web Services API License |

Cisco IoT System



For more information, visit: www.cisco.com/go/iotsystem.



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