



# Cisco Cloud Services Router 1000v

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## Product Overview

### Cisco IOS XE Software

The Cisco® Cloud Services Router 1000v (CSR 1000v) is a virtual-form-factor router that delivers comprehensive WAN gateway and network services functions into virtual and cloud environments. Using familiar, industry-leading Cisco IOS® XE Software networking capabilities, the CSR 1000v enables enterprises to transparently extend their WANs into provider-hosted clouds. Similarly, cloud providers themselves can use it to offer enterprise-class networking services to their tenants or customers.

To save costs and become more agile, businesses small and large are increasingly virtualizing their data center infrastructures and applications. Many enterprises have started deploying IT applications in virtualized data centers that are built and managed by third-party service providers. These external data centers, known as provider-hosted clouds, allow enterprises to gain infrastructure and resources on demand and become even more operationally efficient.

However, the shared-infrastructure shared-resource cloud environment poses networking and security problems for enterprises:

- An enterprise does not own its cloud connectivity, so it cannot extend its network configuration into the cloud.
- It does not enjoy the same levels of privacy and security for its cloud deployment as it does for its premises.
- It cannot directly connect its distributed sites to its cloud applications, having to instead backhaul all network traffic through its data center because it lacks a network-aware endpoint in the cloud.

The cloud also presents networking challenges for cloud providers:

- The primary concern is the limitations of scaling the current network switching architecture.
- The cloud provider also lacks all the components of an end-to-end managed connectivity service offering to its customers, including Quality of Service (QoS), application visibility, and Service-Level Agreements (SLAs).

The Cisco CSR 1000v addresses these cloud-based networking and security constraints.

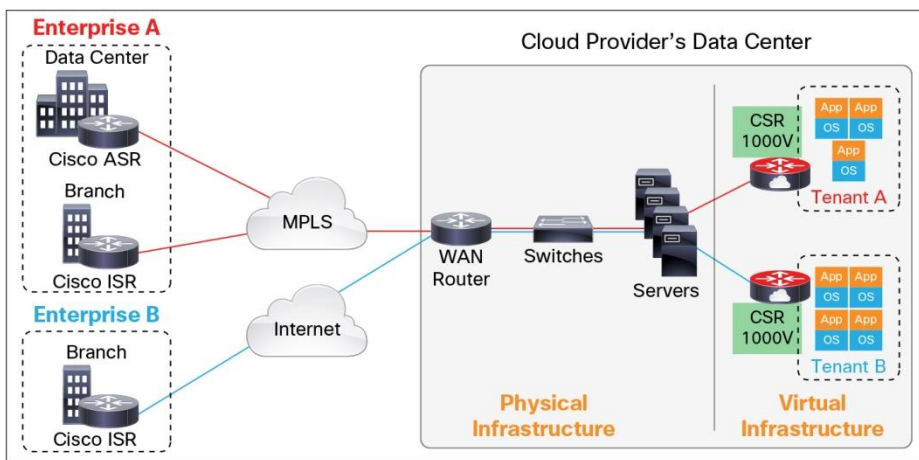
In addition to bringing enterprise-class networking services and security to public cloud environments, the Cisco CSR 1000v can be used as a building block for scalable network service offerings. The included Network-Function-Virtualization (NFV) components allow the CSR 1000v to fill roles traditionally reserved for hardware-based devices, including route reflection and broadband gateways. Virtualizing these complex functions allows service providers to consolidate numerous instances onto a single server, and to easily scale as new customers come on board or networks are expanded.

Built on the same proven Cisco IOS XE Software platform that powers the Cisco Integrated Services Router (ISR) and Aggregation Services Router (ASR) product families, it offers a rich set of features, including routing, VPN, firewall, Network Address Translation (NAT), QoS, application visibility, failover, and WAN optimization. Additional NFV uses such as virtual Route Reflector (vRR), virtual Broadband Network Gateway (vBNG), and virtual Intelligent Services Gateway (vISG) are also supported by the CSR 1000v platform. This broad suite of functions empowers enterprises and cloud providers to build highly secure, optimized, scalable, and consistent hybrid networks.

## Benefits

The Cisco CSR 1000v is a software router that an enterprise or a cloud provider can deploy as a virtual machine in a provider-hosted cloud or in its own virtual environment. It can run on Cisco Unified Computing System™ (Cisco UCS®) servers as well as on servers from leading vendors that support VMware ESXi, Citrix XenServer, Microsoft Hyper-V, Suse KVM, or Red Hat KVM virtualization, or on the Amazon EC2 cloud, Microsoft Azure cloud, or Google Cloud Platform. It contains Cisco IOS XE Software networking and security features.

A typical cloud provides IT infrastructure and resources to multiple customers or tenants. The Cisco CSR 1000v serves primarily as a router per tenant (Figure 1). That is, each tenant gets its own routing instance and hence its own VPN connections, firewall policies, QoS rules, access control, and so on. The router can, however, also be deployed as a multitenant router, using Virtual Route Forwarding (VRF) to maintain separate routing tables and feature configurations for each tenant it services.



**Figure 1.**  
Cisco CSR 1000v positioned as a WAN Gateway in a Multitenant Cloud

Several ways to use the Cisco CSR 1000v follow:

- Highly secure VPN gateway: The CSR 1000v offers route-based IP Security (IPsec) VPNs (Dynamic Multipoint VPN [DMVPN], Easy VPN, FlexVPN, and GetVPN), and in the future, Secure Sockets Layer (SSL) VPN, along with the Cisco IOS Zone-Based Firewall (ZBFW) and access control, meaning an enterprise can connect distributed sites directly to its cloud deployment (Table 1).

**Table 1.** Cisco CSR 1000v as a highly secure VPN gateway

Customer Problem	Features	Benefits of Cisco CSR 1000v
<ul style="list-style-type: none"> <li>An enterprise needs to securely connect its premises with its off-premises cloud: A typical large enterprise has a central headquarters, a few regional hubs, two or more data centers, and hundreds to thousands of branch-office sites. The network is either hub-and-spoke or fully meshed. By extending the data center to the cloud, the enterprise wants the cloud to act as another node in its network.</li> </ul>	<ul style="list-style-type: none"> <li>IPsec</li> <li>DMVPN</li> <li>Easy VPN</li> <li>FlexVPN</li> <li>GetVPN</li> <li>Border Gateway Protocol (BGP)</li> <li>Open Shortest Path First (OSPF)</li> <li>Enhanced Interior Gateway Routing Protocol (EIGRP)</li> <li>ZBFW</li> <li>Access Control List (ACL)</li> <li>Authentication, Authorization, and Accounting (AAA)</li> <li>NAT</li> <li>Dynamic Host Configuration Protocol (DHCP)</li> </ul>	<ul style="list-style-type: none"> <li>Ownership: An enterprise can deploy a CSR 1000v in the cloud, access its Command-Line Interface (CLI), and manage it using the Cisco Prime™ Infrastructure.</li> <li>Smooth connectivity and enterprise-class scalability: With its range of VPN and routing features, the CSR 1000v can fit into any enterprise network topology. An enterprise can directly and dynamically connect its distributed sites to its cloud deployment, avoiding the latency caused by the typical backhaul through the data center while overcoming the management complexity of point-to-point IPsec VPNs.</li> <li>Consistent WAN architecture: The Cisco IOS Software-based CSR 1000v complements the widely deployed Cisco ISRs and ASRs. Enterprises can now deploy a Cisco endpoint at every node in their network, allowing for consistent network configuration and security policies across their distributed hybrid networks.</li> <li>Visibility and cost savings vs. cloud VPN services: Many public cloud and virtual private cloud services provide VPN functions as a service. Typically, this service is offered as a black box with little visibility into failures and no ability to troubleshoot, and users must pay a monthly or per-tunnel fee. Using the CSR 1000v as the VPN termination point in the cloud allows for a familiar platform to monitor and troubleshoot problems, and avoids any additional VPN service fees.</li> </ul>

- Multiprotocol Label Switching (MPLS) WAN endpoint: The Cisco CSR 1000v can serve as an MPLS router, meaning a service provider can offer end-to-end managed connectivity (customer site to customer cloud deployment) with performance guarantees. Also, by extending the MPLS WAN deeper into the cloud network, the service provider can increase network scale, serving more tenants and more networks per tenant (Table 2).

**Table 2.** Cisco CSR 1000v as an MPLS WAN endpoint

Customer Problem	Features	Benefits of Cisco CSR 1000v
<ul style="list-style-type: none"> <li>A service provider needs to extend MPLS connectivity to its customers' cloud segments: Service providers that offer managed connectivity service to businesses want to help their customers connect with off-premises clouds. To provide end-to-end connectivity, the service providers want to extend their private MPLS WANs into the clouds right up to the edge of the customers' segments within the clouds.</li> </ul>	<ul style="list-style-type: none"> <li>MPLS VPN</li> <li>VRF</li> <li>BGP</li> <li>Generic Routing Encapsulation (GRE)</li> <li>QoS</li> <li>IP SLA</li> </ul>	<ul style="list-style-type: none"> <li>MPLS extension within a cloud: A service provider can manage the cloud connectivity of its customers and offer performance and reliability guarantees with the help of a dedicated CSR 1000v (serving as a customer-edge router) per customer.</li> <li>Intracloud scale: A typical cloud network is highly switched. A router hands off incoming traffic to a group of switches, which assign the traffic to customer VLANs. In this network architecture, the cloud provider cannot scale beyond 4096 VLANs per router, limiting the number of customers it can support. The CSR 1000v, serving as a customer-edge or provider-edge extension, can help overcome these scale limitations by creating routing overlays within the cloud, minimizing the providers' dependence on VLANs.</li> </ul>

- Layer 2 (virtual-machine migration) or Layer 3 extension (IP mobility) from premises to cloud: The Cisco CSR 1000v offers features such as NAT and Locator/ID Separation Protocol (LISP) that allow an enterprise to maintain addressing consistency across premises and cloud as it moves applications back and forth or bursts compute capacity into the cloud. The Overlay Transport Virtualization (OTV) and Virtual Private LAN Services (VPLS) features of the CSR 1000v allow an enterprise to extend VLAN segments from its data center into the cloud for server backup, disaster recovery, and compute scale (Table 3).

**Table 3.** Cisco CSR 1000v as a Layer 2 or Layer 3 extension

Customer Problem	Features	Benefits of Cisco CSR 1000v
<ul style="list-style-type: none"> <li>• An enterprise needs to maintain IP addressing consistency when moving an application from its data center into an off-premises cloud: An enterprise does not want to reconfigure its application when it moves the application back and forth between its data center and external cloud. Change in the address of the application affects connectivity with the user accessing the application.</li> </ul>	<ul style="list-style-type: none"> <li>• NAT</li> <li>• LISP</li> </ul>	<ul style="list-style-type: none"> <li>• IP mobility: The cloud-based CSR 1000v can serve as a LISP router, building a tunnel with a LISP-enabled router in the enterprise's data center so an application can be transported across the tunnel with a fixed identifier.</li> </ul>
<ul style="list-style-type: none"> <li>• An enterprise needs to replicate its virtual machines (for application servers, web servers, etc.) in an off-premises cloud: An enterprise wants to extend VLAN segments from its data center into an external cloud in order to migrate or back up virtual machines.</li> </ul>	<ul style="list-style-type: none"> <li>• OTV</li> </ul>	<ul style="list-style-type: none"> <li>• Virtual-machine migration: The cloud-based CSR 1000v can serve as an OTV router, building a bridge with an OTV-enabled router in the enterprise's data center so that a VLAN can be extended to the cloud.</li> </ul>

- Control point for networking services: The CSR 1000v can redirect traffic to Cisco Virtual Wide Area Application Services (vWAAS) appliances deployed in the cloud. The Application Visibility and Control (AVC) feature of the CSR 1000v offers end-to-end application visibility, performance monitoring, and control, allowing service providers to pinpoint application performance problems and offer performance SLAs that can be easily tracked (Table 4).

**Table 4.** Cisco CSR 1000v as a Traffic Control Point

Customer Problem	Features	Benefits of Cisco CSR 1000v
<ul style="list-style-type: none"> <li>• A cloud provider needs to offer enterprise-class networking services: The cloud provider wants to offer networking services that help ensure secure access and optimized, uninterrupted delivery of applications to its customers.</li> </ul>	<ul style="list-style-type: none"> <li>• AppNav (redirection)</li> <li>• ZBFW</li> <li>• NAT</li> <li>• DHCP</li> <li>• Hot Standby Router Protocol (HSRP)</li> <li>• AVC</li> </ul>	<ul style="list-style-type: none"> <li>• Rich set of networking services: The cloud provider can take full advantage of Cisco IOS Software security, application visibility, performance monitoring, and high-availability features to provide each tenant with a comprehensive networking experience.</li> </ul>

- Virtual Extensible LAN (VXLAN) gateway: The CSR 1000v can participate in a VXLAN network serving as a VXLAN Tunnel Endpoint (VTEP), and therefore as a termination point for VXLAN Network Identifiers (VNIs). For large data center and service provider networks, this feature allows for greatly increased scalability in the number of simultaneously operating isolated tenant networks. After a VNI is terminated by the CSR 1000v, its traffic can be Layer-3 routed or Layer-2 bridged to other VXLAN or non-VXLAN networks (Table 5).

**Table 5.** Cisco CSR 1000v as VXLAN Gateway

Customer Problem	Features	Benefits of Cisco CSR 1000v
<ul style="list-style-type: none"> <li>A service provider needs to support a very large number of tenants on a given infrastructure: Service providers, in particular those offering private cloud services, routinely create and manage many thousands of isolated networks for tenants. VLAN tagging has in the past been the typical technology used to isolate and extend a Layer-2 network from the physical network into a tenant’s private cloud. VLAN tagging imposed a limit of 4094 VLAN identifiers, limiting the utility of any given Layer-2 infrastructure.</li> </ul>	<ul style="list-style-type: none"> <li>VXLAN gateway</li> <li>VXLAN Multicast and Unicast modes</li> <li>VXLAN with VRF</li> </ul>	<ul style="list-style-type: none"> <li>Expanded scale for service provider networks: VXLAN supports millions of network identifiers, and allows service providers to deploy a greatly increased number of tenants on their existing infrastructure. The CSR 1000v can be deployed as a single-tenant VXLAN gateway, allowing tenants to enjoy their own dedicated VXLAN gateway node. It can also be deployed in a more cost-effective manner as a multitenant VXLAN gateway node, terminating VNIs for a large number of tenants with a single CSR 1000v instance.</li> </ul>

- Virtual route reflector: The CSR 1000v can be deployed as a vRR to simplify the routing adjacencies required in larger networks. Because route reflection is a process-intensive but not throughput-intensive application, many instances of route reflectors may be consolidated onto a single server running multiple CSR 1000v routers. This approach significantly reduces the physical footprint, power, cooling, and cabling overhead of maintaining numerous physical route-reflector systems.

An additional license is required to enable the 8 or 16 GB of system memory for route reflection on the CSR 1000v. When installed and operational, a CSR 1000v-based route reflector with 16 GB of memory can maintain 24 million IPv4 routes or 21 million IPv6 routes.

- Wireline or fixed wireless gateway: The CSR 1000v can be deployed as either a virtual Broadband Network Gateway (vBNG) or a virtual Intelligent Services Gateway (vISG).
  - vBNG allows service providers to deploy the CSR 1000v in virtual PPP Terminated Access (vPTA) or L2TP Network Server (vLNS) mode for fixed wireline deployments.
  - vISG can be deployed as a wireless access gateway for hospitality environments.
  - Deploying these networking functions virtually provides the same rich subscriber management functions that are currently offered by the Cisco ASR 1000 Aggregation Services Router, a hardware-based Cisco IOS XE platform. While maintaining the same level of functions, the CSR 1000v also allows network operators to consolidate their deployments of BNG or ISG service nodes. In some cases network operators may deploy a separate piece of hardware for each partner they need to enable with BNG or ISG functions. Deployments of these types can collapse BNG and ISG nodes into multiple CSR 1000v instances running on the same piece of server hardware.

## Cisco Software Defined WAN

Cisco SD-WAN is a set of intelligent software services that allow you to reliably and securely connect users, devices, branch office locations, and cloud deployments across a diverse set of WAN transport links. Cisco SD-WAN enabled routers like the CSR 1000v dynamically route traffic across the “best” link based on up-to-the-minute application and network conditions for great application experiences. You get tight control over application performance, bandwidth usage, data privacy, and availability of your WAN links.

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The CSR 1000v is optimized for the Cisco Software Defined WAN (Cisco SD-WAN). For enterprises this means that business critical applications run faster, with more reliability and reduced Operational Expenditure (OpEx). The SD-WAN achieves this by making all branches, Data Centers, and cloud deployments have the ability to monitor, control, move and report on streams of application data such as specific web (HTTP) traffic for example. The CSR 1000v has deep packet inspection capability and can accurately identify and control thousands of different applications including custom in-house enterprise applications.

The entire Cisco SD-WAN implementation on the CSR 1000v may be implemented by managing the end device either from the Cloud or On-Premise through ascending levels of throughput based licenses. All licenses that support Cisco SD-WAN are all enabled using subscription licenses. These subscription licenses enable all customers to seamlessly transition between On-Premise and Cloud management as needed. The license tiers are structured to support the growth in business needs through simple subscriptions that help simplify the journey to intent-based networking for the WAN.

The Cisco SD-WAN subscriptions are aligned across three subscription licenses of DNA Essentials, DNA Advantage and DNA Premier, each expanding functionally. DNA Essentials covers all types of connectivity and router life cycle management, support for Network & application visibility coupled with basic premise and transport security. DNA Advantage provides for Advanced WAN topologies, Application aware policies supported by enhanced network security. DNA Premier provides for Cloud connectivity with unlimited segmentation, advanced application optimization and Network Analytics, secured by advanced threat protection. For more information on Cisco SD-WAN please refer to <https://www.cisco.com/c/en/us/products/software/one-wan-subscription/index.html>.

The benefits are immense:

1. Extend your SD-WAN fabric to include your cloud deployments.
2. Business-critical applications no longer have to contend each other or with traffic that should be served on best effort basis.
3. The Enterprise network becomes more reliable because multiple paths can be used.
4. Costs are greatly reduced because dual MPLS links can be replaced with a mix of MPLS and Internet.
5. The time to bring up new remote sites is dramatically reduced because the SD-WAN supports rapidly deployed DSL and 3G/4G LTE connections as easily as MPLS.
6. Security is assured across these connections using a zero-touch secure VPN technology used by governments and finance organizations worldwide.

## The Cisco IOS XE Software advantage

The Cisco CSR 1000v contains the same operating system, Cisco IOS XE Software, that runs inside the Cisco ASR 1000 Series product line. Providing control- and data-plane separation, multicore forwarding, and a modular architecture that allows for smooth insertion of networking features, Cisco IOS XE Software is well-suited for dynamic cloud environments. Cisco IOS XE Software is based on the stable, robust, and feature-rich Cisco IOS Software that has powered Cisco ISRs and other hardware routers in demanding enterprise, service provider, and government networks for more than two decades.



The key benefits of Cisco IOS XE Software follow:

- Proven functions: Industry-leading Cisco IOS Software networking and security features
- Operational efficiency: Rapid integration into any Cisco IOS Software environment, such as branch office, WAN, data center, or cloud
- Consistent user experience: Same Cisco IOS Command-Line Interface (CLI) and management tools across all Cisco IOS Software platforms, including the Cisco ISR, Cisco ASR, and Cisco CSR 1000v

## Product Specifications

Table 6 lists the features the Cisco CSR 1000v offers in Cisco IOS XE Software.

**Table 6.** Cisco CSR 1000v features

Features	Description
<b>Cisco IOS XE Software version</b>	Cisco IOS XE Software (CSR Edition with selected Cisco IOS XE Software features) The software is available in ISO, BIN, OVA, and QCOW2 formats.
<b>Supported hypervisors</b>	<ul style="list-style-type: none"> <li>• VMware ESXi 6.5</li> <li>• Citrix XenServer 6.5</li> <li>• Red Hat KVM (Red Hat Enterprise Linux 7.5)</li> <li>• KVM on Ubuntu 14.04 LTS</li> <li>• KVM on Suse Linux 12-SP3</li> <li>• Microsoft Hyper-V for Windows Server 2016</li> </ul>
<b>Supported Public Clouds</b>	<ul style="list-style-type: none"> <li>• Amazon Web Services</li> <li>• Microsoft Azure</li> <li>• Google Cloud Platform</li> </ul>
<b>Supported I/O modes</b>	<p>The CSR 1000v supports several modes of communication between virtual network interface cards (vNICs) and the physical hardware:</p> <ul style="list-style-type: none"> <li>• Paravirtual</li> <li>• PCI pass-through</li> <li>• Single-root I/O virtualization (SR-IOV)</li> <li>• Cisco Virtual Machine Fabric Extender (VM-FEX)</li> <li>• Accelerated Networking (Azure)</li> <li>• Enhanced Networking (AWS)</li> </ul>
<b>Virtual-machine specifications</b>	<p>The CSR 1000v can run on Cisco UCS servers as well as servers from vendors that support VMware ESXi, Citrix XenServer, Suse Linux KVM, Red Hat KVM, Ubuntu KVM, Microsoft Hyper-V, or on the Amazon EC2 cloud, Microsoft Azure cloud, or Google Cloud Platform.</p> <p>The server must support at least the following:</p> <ul style="list-style-type: none"> <li>• Intel Nehalem or AMD Barcelona CPU with clock frequency 2.0 GHz</li> <li>• Gigabit Ethernet interfaces</li> </ul> <p>The CSR 1000v requires the following from the virtualized server hardware:</p> <ul style="list-style-type: none"> <li>• CPU: 1 to 8 virtual CPUs (depending on the throughput and feature set)</li> <li>• Memory: 4 GB to 16 GB (depending on the throughput and feature set)</li> <li>• Disk space: 8 GB</li> <li>• Network interfaces: Two or more vNICs, up to maximum allowed by hypervisor</li> <li>• If you run the CSR 1000v on Amazon Web Services (AWS), you can use encrypted EBS (Elastic Block Store) by following a process that creates a private Amazon Machine Image (AMI). For more information on this process, see "Deploying the Cisco CSR 1000v on Amazon Web Services" &gt; "Creating an AMI with Encrypted Elastic Block Storage" in the Cisco CSR 1000v Series Cloud Services Router Deployment Guide for Amazon Web Services <a href="https://www.cisco.com/c/en/us/td/docs/routers/csr1000/software/aws/b_csraws.html">https://www.cisco.com/c/en/us/td/docs/routers/csr1000/software/aws/b_csraws.html</a>.</li> </ul>

Features	Description
<b>Cisco IOS XE Software networking</b>	<ul style="list-style-type: none"> <li>• Routing: BGP, OSPF, EIGRP, Policy-Based Routing (PBR), IPv6, VRF-Lite, Multicast, LISP, GRE, and Connectionless Network Services (CLNS)</li> <li>• MPLS: MPLS VPN, VRF, and Bidirectional Forwarding Detection (BFD)</li> <li>• Addressing: DHCP, Domain Name System (DNS), NAT, 802.1Q VLAN, Ethernet Virtual Connection (EVC), and VXLAN</li> <li>• High availability: HSRP, Virtual Router Redundancy Protocol (VRRP), Gateway Load Balancing Protocol (GLBP), and box-to-box high-availability for ZBFW and NAT</li> <li>• Traffic redirection: AppNav (to Cisco Wide Area Application Services [Cisco WAAS]) and Web Cache Communication Protocol (WCCP)</li> <li>• Application visibility, performance monitoring, and control: QoS and AVC</li> <li>• Hybrid cloud connectivity: OTV, VPLS, and Ethernet over MPLS (EoMPLS)</li> <li>• NFV: vBNG, vISG, and vRR</li> </ul>
<b>Cisco IOS XE Software security</b>	<ul style="list-style-type: none"> <li>• VPN: IPsec VPN, DMVPN, Easy VPN, FlexVPN, and GetVPN</li> <li>• Firewall: ZBFW</li> <li>• Access control: ACL, AAA, RADIUS, and TACACS+</li> </ul>
<b>Management</b>	<ul style="list-style-type: none"> <li>• Virtual-machine creation and deployment: VMware vCenter and VMware vCloud Director</li> <li>• Provisioning and management: Cisco IOS XE CLI, Secure Shell (SSH) Protocol, Telnet, Cisco Prime Infrastructure, Cisco Prime Network Services Controller, and OpenStack Configdrive</li> <li>• Monitoring and troubleshooting: Simple Network Management Protocol (SNMP), Syslog, NetFlow, IP SLA, and Embedded Event Manager (EEM)</li> <li>• RESTful Application Programming Interfaces (APIs): License installation and Smart Licensing, interfaces and subinterfaces, routing protocols, IPsec and Easy VPN, firewall, ACL, NAT, configuration import and export, reports (CPU usage, interface statistics, routing table, VPN and firewall sessions, etc.), VRF, Network Time Protocol (NTP), DNS, DHCP, SNMP, TACACS, LISP, VXLAN, and HSRP</li> <li>• The Cisco IOS XE SD-WAN Software for CSR 1000v provides simplicity of management from the cloud with Cisco vManage</li> </ul>

## Ordering and Support

Beginning IOS XE version 16.10.1, Cisco SD-WAN support is provided for IOS image on the CSR 1000v. In addition, from IOS XE version 16.10.1 and later only subscription licenses are supported. The Cisco SD-WAN features are provisioned through a separate image, the IOS XE SD-WAN image. While the Universal IOS XE image provides for routing features, the IOS XE SD-WAN image provides support for OnPrem or Cloud based Software Defined WAN solutions. Unified Communications for IOS XE SD-WAN will be supported in upcoming releases. When ordering a CSR 1000v router, a customer may choose either the IOS XE or IOS XE SD-WAN image.

Both the IOS XE and IOS XE SD-WAN image of the Cisco CSR 1000v are licensed based on throughput, feature set, and term. With the IOS XE image, customers may opt for 1 or 3 year subscription based licensing. With IOS XE SD-WAN image, customers may order only subscription licensing.

The Cisco IOS XE Software of the CSR 1000v offers numerous throughput options: 10, 50, 100, 250, and 500 Mbps, and 1, 2.5, 5, and 10 Gbps. Upon activation of a particular option, the CSR 1000v limits its aggregate bidirectional throughput to that option. For Cisco SD-WAN please refer to the DNA ordering guide: [DNA Subscription Ordering Guide](#).

Term licenses may be purchased and used with Cisco CSR 1000v when deployed as a Bring-Your-Own-License (BYOL) instance on the Microsoft Azure cloud, Google Cloud Platform, and Amazon EC2 cloud. Hourly billing on the Amazon EC2 cloud is also available, and is published on the Cisco CSR 1000v page of the Amazon Web Services Marketplace.

The Cisco CSR 1000v comes in four technology packages or feature sets IP Base, Security, AppX, and AX (these are shown in detail in Table 7).

Subscription licensing with support for Cisco SD-WAN is offered using the three licenses of DNA Essentials, DNA Advantage and DNA Premier in-line with similar licenses that provide support on the IOS XE SD-WAN side. Please refer to DNA Ordering Guide at: [DNA Subscription Ordering Guide](#).

For the IOS XE SD-WAN image the following licenses are available:

- **DNA Essentials** covers all types of connectivity & router life cycle management, support for Network and application visibility coupled with basic premise and transport security
- **DNA Advantage** provides for advanced WAN topologies, application aware policies supported by enhanced network security
- **DNA Premier** provides for cloud connectivity with unlimited segmentation, advanced application optimization and Network Analytics, secured by advanced threat protection

For more information on Cisco SD-WAN licensing for CSR 1000v please refer to the [DNA Software Routing Subscription guide](#).

**Note:** Regardless of technology pack, 10Mbps and 50Mbps support up to 150 tunnels. Customer need to use 100Mbps or above throughput license to go beyond 150 tunnels.

**Table 7.** Cisco CSR 1000v packaging

Features	Description
<b>IP Base</b>	<ul style="list-style-type: none"> <li>• Basic networking: BGP, OSPF, EIGRP, Routing Information Protocol (RIP), Intermediate System-to-Intermediate System (IS-IS), IPv6, GRE, VRF-Lite, NTP, QoS, BFD, and CLNS</li> <li>• Multicast: Internet Group Management Protocol (IGMP) and Protocol Independent Multicast (PIM)</li> <li>• High availability: HSRP, VRRP, and GLBP</li> <li>• Addressing: 802.1Q VLAN, EVC, NAT, DHCP, and DNS</li> <li>• Basic security: ACL, AAA, RADIUS, and TACACS+</li> <li>• Management: Cisco IOS XE CLI, SSH, Flexible NetFlow, SNMP, EEM, and NETCONF</li> </ul>
<b>Security</b>	<ul style="list-style-type: none"> <li>• IPBase Plus</li> <li>• Advanced security: ZBFW, IPsec VPN, Easy VPN, DMVPN, FlexVPN, and GetVPN</li> <li>• Box-to-box high-availability for ZBFW and NAT</li> </ul>
<b>AppX</b>	<ul style="list-style-type: none"> <li>• IPBase Plus</li> <li>• Advanced networking: Layer 2 Tunneling Protocol Version 3 (L2TPv3), MPLS, VRF, and VXLAN</li> <li>• Application experience: WCCPV2, AppXNAV, Network-Based Application Recognition Version 2 (NBAR2), AVC, and IP SLA</li> <li>• Hybrid cloud connectivity: LISP, OTV, VPLS, and EoMPLS</li> <li>• Subscriber management: PTA, LNS, and ISG</li> </ul>
<b>AX</b>	<ul style="list-style-type: none"> <li>• All features</li> </ul>

Table 8 specifies the minimum server resource requirements per CSR 1000v license.

**Table 8.** Minimum server resource requirements per Cisco CSR 1000v instance

Throughput	Technology Package			
	IP Base	Security	AppX	AX
10 Mbps	1 vCPU/4 GB	1 vCPU/4 GB	1 vCPU/4 GB	1 vCPU/4 GB
50 Mbps	1 vCPU/4 GB	1 vCPU/4 GB	1 vCPU/4 GB	1 vCPU/4 GB
100 Mbps	1 vCPU/4 GB	1 vCPU/4 GB	1 vCPU/4 GB	1 vCPU/4 GB
250 Mbps	1 vCPU/4 GB	1 vCPU/4 GB	1 vCPU/4 GB	1 vCPU/4 GB
500 Mbps	1 vCPU/4 GB	1 vCPU/4 GB	1 vCPU/4 GB	1 vCPU/4 GB
1 Gbps	1 vCPU/4 GB	1 vCPU/4 GB	1 vCPU/4 GB	2 vCPU/4 GB
2.5 Gbps	1 vCPU/4 GB	2 vCPU/4 GB	4 vCPU/4 GB	4 vCPU/4 GB
5 Gbps	1 vCPU/4 GB	2 vCPU/4 GB	8 vCPU/4 GB	8 vCPU/4 GB
10 Gbps	2 vCPU/4 GB	Not supported	Not supported	Not supported

Table 9 specifies the Cisco CSR 1000v licenses compatible with the Amazon EC2 cloud, Microsoft Azure, and Google Cloud Platform for the Cisco IOS XE Software.

**Table 9.** Supported Cisco CSR 1000v Amazon EC2 licenses

Throughput	Technology Package			
	IP Base	Security	AppX	AX
10 Mbps	Supported	Supported	Supported	Supported
50 Mbps	Supported	Supported	Supported	Supported
100 Mbps	Supported	Supported	Supported	Supported
250 Mbps	Supported	Supported	Supported	Supported
500 Mbps	Supported	Supported	Supported	Supported
1 Gbps	Supported	Supported	Supported	Supported
2.5 Gbps	Supported	Supported	Supported	Supported
5 Gbps	Supported	Supported	Supported	Supported
10 Gbps	Supported	N/A	N/A	N/A

**Note:** Additional throughput levels will be available in future releases.

## IP Base

For the IP Base, Security, AppX, and AX Licenses software updates, 24-hour support from the Cisco Technical Assistance Center (TAC), and access to technical documentation and more on the Cisco.com support website can be purchased separately.

- The 1- and 3-year term licenses require purchase of corresponding 1- and 3-year Cisco Software Support (SWSS).

For more information, visit: <https://www.cisco.com/c/dam/en/us/products/collateral/cisco-software-support-data-sheet.pdf>.

## Cisco DNA Software Subscription

DNA Essentials, DNA Advantage, and DNA Premier licenses software updates, 24-hour support from the Cisco Technical Assistance Center (TAC), and access to technical documentation and more on the Cisco.com support website can be purchased separately.

For more information, visit: <https://www.cisco.com/c/dam/en/us/products/collateral/software/dna-software-routing-subscription.pdf>.

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### For more information

For more information about the Cisco Cloud Services Router 1000v, visit <https://www.cisco.com/go/cloudrouter>.

## Document History

New or revised topic	Described In	Date
Added Google Cloud Platform support. Added Cisco SD-WAN support.	Updated <a href="#">Page 10</a>	November 12, 2018

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