Q&A

Cisco Cloud Services Router 1000V with Cisco IOS XE Software Release 3.11

Q. What is the Cisco® Cloud Services Router 1000V?

A. The Cisco Cloud Services Router 1000V (CSR 1000V) is a router in virtual form factor. It contains selected features of the Cisco IOS® XE Operating System and can run on Cisco UCS® servers or servers from leading vendors that support VMware ESXi, Citrix XenServer, Red Hat KVM, or on the Amazon Web Services cloud.

Q. Where is the CSR 1000V deployed?

A. The CSR 1000V is intended for deployment in cloud data centers. It serves as a single-tenant router in a multitenant cloud. It is deployed at the edge of a tenant's network segment (or virtual private cloud [VPC]).

Q. What type of customer is the CSR 1000V intended for?

A. An enterprise can purchase and deploy the CSR 1000V in its VPC in an external provider-hosted cloud. The CSR 1000V enables the enterprise to transparently extend its WAN to its VPC in the external cloud.

A cloud service provider also can purchase the CSR 1000V and offer it as a per-tenant networking service. The CSR 1000V enables the service provider to offer end-to-end managed connectivity to its customers (tenants).

Q. What networking problems does the CSR 1000V address?

A. The multitenant, shared-infrastructure, shared-resource public cloud environment poses networking and security problems to enterprises:

- The enterprise does not own its cloud connectivity, so cannot extend its network configuration into the cloud. As a result, it has to support different IP addresses and management tools in its premises and in the cloud.
- The enterprise does not enjoy the same levels of privacy and security for its cloud deployment as it does in its premises, so it has to handle inconsistent VPN and security policies and limited connection reliability.
- The enterprise cannot directly connect its distributed sites to its cloud applications, instead having to redirect all network traffic through its data center, and it cannot prioritize and optimize its traffic. This situation causes a poor user experience for its cloud-deployed IT applications.

The cloud also presents networking challenges to cloud providers:

- The current cloud network switching (VLAN) architecture is limited in scale.
- The cloud provider 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).

Q. What are the typical uses of the Cisco CSR 1000V?

A. The typical cloud uses of the CSR 1000V include:

- Secure VPN gateway: The CSR 1000V offers route-based IPsec VPNs (DMVPN, EasyVPN, and FlexVPN), along with the Cisco IOS® Zone-Based Firewall and access control, enabling an enterprise to securely connect distributed sites directly to its cloud deployment.
- MPLS endpoint: The CSR 1000V can serve as an MPLS Customer Edge (CE) or Provider Edge (PE) router that enables a service provider to offer a customer end-to-end managed connectivity with performance guarantees. Also, by extending the MPLS WAN deeper into the cloud network, the service provider can increase network scale - more tenants and more networks per tenant.
- Network extension: The CSR 1000V offers features such as NAT and LISP that enable an enterprise to maintain addressing consistency across premise and cloud as it moves applications back and forth or bursts compute capacity into the cloud. The CSR 1000V's OTV and VPLS features enable an enterprise to extend VLAN segments from its data center into the cloud for server backup, disaster recovery and compute scale.
- Network control point: The CSR 1000V can redirect traffic to Cisco virtual WAAS appliances deployed in the cloud. It also offers integrated networking services such as the Cisco IOS® Zone-based Firewall, HSRP, QoS, and Application Visibility & Control (AVC) and Application Performance Monitoring. These features enable a cloud tenant to receive a comprehensive networking experience.

Q. What makes the CSR 1000V unique?

A. Built on the same proven Cisco IOS Software platform that is inside the Cisco Integrated Services Router (ISR) and Aggregation Services Router (ASR) product families, the CSR 1000V offers a rich set of features, including routing, VPN, firewall, NAT, QoS, application visibility, failover, and WAN optimization. These functions empower enterprises and cloud providers to build highly secure, optimized, scalable, and consistent hybrid networks. The CSR 1000V also offers the same Cisco IOS CLI and supports the same Cisco IOS Software management tools as the ISRs and ASRs, allowing for unified network management. The CSR 1000V is the only virtualized router that combines the networking quality demanded by enterprises with the flexibility benefits offered by virtualization.

Q. What virtualization platforms can the CSR 1000V run on?

A. The CSR 1000V supports the following virtualization platforms:

- VMware ESXi 5.1
- Citrix XenServer 6.1
- Red Hat KVM (Red Hat Enterprise Virtualization 3.1 and Red Hat Enterprise Linux 6.3)
- AWS Xen-powered virtualization platform

Q. Which servers can the CSR 1000V run on?

A. The CSR 1000V can run on Cisco UCS® servers or servers from leading vendors that support VMware ESXi, Citrix XenServer, or Red Hat KVM.

The server must support at least the following:

- Intel Nehalem or AMD Barcelona CPU with clock frequency 2.0 GHz
- Gigabit Ethernet interfaces

Q. What minimum resources does the CSR 1000V need from the underlying server?

A. The CSR 1000V requires the following from the virtualized server hardware:

- CPU: 1 to 4 virtual CPUs (depending on the throughput and feature set)
- Memory: 2.5 to 4 GB (depending on the throughput and feature set)
- Disk space: 8 GB
- Ethernet network interfaces: Three or more virtual network interface cards (vNICs), up to the maximum allowed by the hypervisor

Q. What Cisco IOS Software version runs in the CSR 1000V?

A. The CSR 1000V runs Cisco IOS XE Software Release 3.11, offering selected Cisco IOS XE Software features.

Q. What Cisco IOS Software features does the CSR 1000V support?

A. The CSR 1000V supports the following Cisco IOS XE Software features:

- **Routing:** BGP, OSPF, EIGRP, Policy-based Routing, IPv6, VRF-Lite, Multicast, LISP, GRE
- **Addressing:** DHCP, DNS, NAT, 802.1Q VLAN, EVC, VXLAN
- **VPN:** IPSec VPN, DMVPN, EasyVPN, FlexVPN
- **MPLS:** MPLS VPN, VRF, BFD
- **Security:** Cisco IOS® Zone-Based Firewall, ACL, AAA, RADIUS, TACACS+
- **High Availability:** HSRP, VRRP, GLBP
- **Traffic Redirection:** AppNav (to vWAAS), WCCP
- **Application Visibility, Performance Monitoring and Control:** QoS, AVC, IP SLA
- **Hybrid Cloud Connectivity:** LISP, OTV, VPLS, EoMPLS
- **Management:** CLI, SSH, NetFlow, SNMP, Embedded Event Manager, RESTful APIs

Q. How can I deploy the CSR 1000V?

A. You can download the CSR 1000V software from the following Cisco website in ISO, OVA, and BIN formats: http://software.cisco.com/download/release.html?mdfid=284364978&flowid=39582&softwareid=282046477&release=3.11.0S&relind=AVAILABLE&rellifecycle=ED&reltype=latest.

The software image comes with a free 60-day evaluation license, which you can deploy on a virtualized server using the hypervisor management tool (VMware vCenter, Citrix XenCenter, etc.). You can convert the CSR 1000V virtual machine (VM) into a template, from which you can create and customize other VMs, or you can clone multiple instances of the VM.

Note: The evaluation license enables full-feature set of the CSR 1000V and caps throughput at 50 Mbps. When the evaluation period ends, the router throughput drops to 2.5 Mbps.

Q. Does the CSR 1000V support virtual machine-level high availability?

A. It supports VMware high-availability features including vMotion and Disaster Recovery System (DRS).

Q. How can I purchase the CSR 1000V?

A. You can purchase the CSR 1000V directly from Cisco or from a partner. The CSR 1000V is licensed based on a combination of throughput and feature set, and you can purchase it for a term of 1 or 3 years, or perpetual.

The Cisco IOS XE Software Release 3.11 of the CSR 1000V offers six throughput options - 10 Mbps, 50 Mbps, 100 Mbps, 250 Mbps, 500 Mbps, and 1 Gbps. Upon activation of a particular option, the CSR 1000V limits its aggregate bidirectional throughput to that option.

The CSR 1000V comes in three technology packages or feature sets:

- Standard: Includes routing (BGP, EIGRP, OSPF, IPv6, ..), addressing (DHCP, NAT, and VLAN), basic security (ACL and AAA), high availability (HSRP, ..), and management (SSH, SNMP, NetFlow, ..) features
- Advanced: Includes Standard and Advanced security (Zone-Based Firewall, IPsec, and Route-Based VPNs: DMVPN, FlexVPN, ..) features
- Premium: Includes Advanced, MPLS (MPLS VPN and VRF), Application Experience (AppNav, AVC, IP SLA, …), and hybrid cloud connectivity (LISP, OTV, ..) features

After you purchase a license, you will receive a Product Activation Key (PAK). You must provide the PAK to a Cisco License Server along with a unique device identifier (which is generated when the CSR 1000V VM boots up) in order for the server to generate a license file for the CSR 1000V. You then must install and activate the license file in the CSR 1000V.

Q. What is the performance of the CSR 1000V?

A. The CSR 1000V is intended for single-tenant (VPC) networking use in a multitenant cloud, where the bandwidth expectations range from 10 Mbps to 1 Gbps.

The Cisco IOS XE Software Release 3.11 of the CSR 1000V supports up to 1 Gbps of throughput. The performance of the CSR 1000V is rate-limited based on the CSR 1000V license you purchase. Upon activation of the license, the CSR 1000V limits its aggregate bidirectional throughput to the throughput specified by the license. Future releases of the CSR 1000V will offer higher throughput licenses.

Q. What are the resource requirements per CSR 1000V license?

A. The Cisco IOS XE Software Release 3.9 of the CSR 1000V offered the following licenses:

- 10 Mbps: Standard, Advanced, and Premium packages - for 1-, 3-, and 5-year terms
- 25 Mbps: Standard, Advanced, and Premium packages - for 1-, 3-, and 5-year terms
- 50 Mbps: Standard, Advanced, and Premium packages - for 1-, 3-, and 5-year terms
- 100 Mbps: Standard only - for 1-, 3-, and 5-year terms
- 250 Mbps: Standard only - for 1-, 3-, and 5-year terms

The Cisco IOS XE Software Release 3.10 of the CSR 1000V has the following changes:

- 25 Mbps is not offered
- A 5-year term is not offered. Instead, perpetual is offered
- 100 Mbps: Advanced and Premium packages
- 250 Mbps: Advanced and Premium packages

- 500 Mbps: Standard package
- 1 Gbps: Standard package

The Cisco IOS XE Software Release 3.11 of the CSR 1000V has the following changes:

- 500 Mbps: Advanced and Premium packages
- 500 Mbps: Premium package with 8-GB RAM

Table 1 specifies the server resource requirements per license.

Table 1. Server Resource Requirements per License

Throughput	Technology Package		
	Standard	Advanced	Premium
10 Mbps	1 vCPU, 2.5-GB RAM	1 vCPU, 2.5-GB RAM	1 vCPU, 2.5-GB RAM
50 Mbps	1 vCPU, 2.5-GB RAM	1 vCPU, 2.5-GB RAM	1 vCPU, 2.5-GB RAM
100 Mbps	1 vCPU, 2.5-GB RAM	1 vCPU, 2.5-GB RAM	1 vCPU, 2.5-GB RAM
250 Mbps	1 vCPU, 2.5-GB RAM	1 vCPU, 2.5-GB RAM	1 vCPU, 2.5-GB RAM
500 Mbps	4 vCPU*, 4-GB RAM*	4 vCPU*, 4-GB RAM*	4 vCPU*, 4-/8-GB RAM* **
1 Gbps	4 vCPU*, 4 GB RAM*		

* Subject to change in future releases
** 8-GB licenses require 8-GB RAM

Q. How can I manage the CSR 1000V?

A. When the CSR 1000V is operational, you can provision its networking and security features using SSH or Telnet to access the Cisco IOS CLI. The CSR 1000V is also manageable by the Cisco Prime™ Infrastructure, the Cisco network management tool that manages Cisco IOS Software devices, including ISRs and ASRs. Starting with Cisco IOS XE Software Release 3.10 and forward, the CSR 1000V will offer RESTful APIs for selected Cisco IOS XE Software features, thus enabling service providers to automate CSR deployment and management through common orchestration tools or self-service portals. For monitoring and troubleshooting, the CSR 1000V supports SNMP, syslog, and IP SLAs.

Q. Can I deploy the CSR 1000V in the Amazon (AWS) or Microsoft (Azure) clouds?

A. Starting with Cisco IOS XE Software Release 3.11 and forward, the AMI version of the CSR 1000V is available on the AWS Marketplace catalog. Support for Hyper-V, a requirement for Microsoft Azure deployment, is targeted in an upcoming release.

Q. Is the CSR 1000V related to the Cisco Nexus® 1000V Series Switches?

A. No. The CSR 1000V can run on a VMware ESXi hypervisor that contains the Cisco Nexus 1000V or a standard virtual switch, such as a VMware vSwitch.

Q. Is the CSR 1000V similar to the Cisco ASR 1000 or Cisco ISR products?

A. The CSR 1000V is a Cisco IOS Software networking product like the Cisco ASR 1000 and ISR. Each product serves a specific purpose:

- The Cisco ASR 1000 is deployed primarily in data centers and campuses, the Cisco ISR is intended primarily for branch offices, and the CSR 1000V goes into VPCs. The three products are complementary to each other.

- The feature set of the CSR 1000V supports VPC networking needs. The CSR 1000V offers only selected Cisco IOS XE Software features based on the cloud uses of the product.
- The virtual form factor of the CSR 1000V makes it ideal for VPC deployments where flexibility and agility are highly desired. The Cisco ASRs and ISRs are ideally suited for data centers and branch offices where hardware-based performance and reliability are required to support demanding data, voice, and video networking services. Whereas the ISRs and ASRs are purpose-built networking devices with highly optimized performance, the Cisco CSR 1000V runs on general-purpose server hardware and shares resources with other applications running on the same hardware.

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