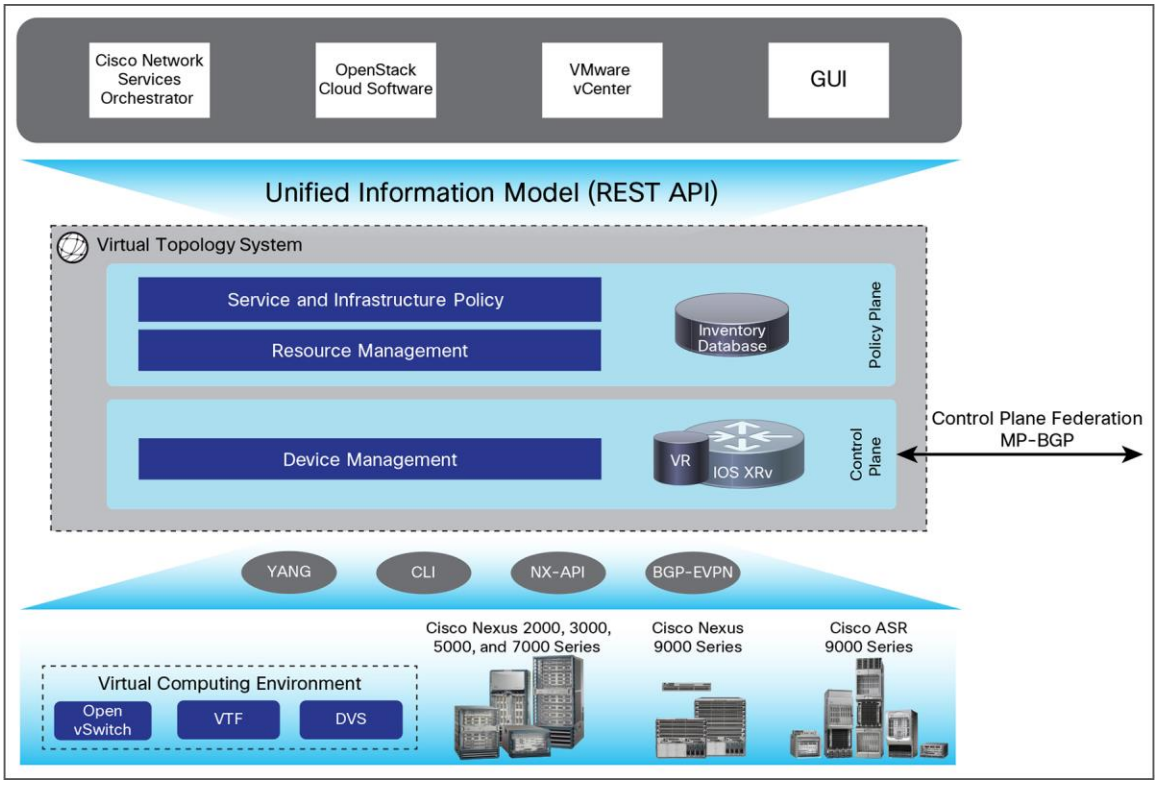
Cisco Virtual Topology System

Product Overview

The Cisco® Virtual Topology System (VTS) is an open, standards-based overlay management and provisioning system for data center networks. It automates fabric provisioning for both physical and virtual workloads.

The Virtual Topology System provides a network virtualization architecture and software-defined networking (SDN) framework that meets the requirements of today's multitenant data centers for cloud services. It delivers business agility by automating overlay provisioning on network infrastructure. It abstracts out the complexity involved in managing heterogeneous network environments, improving service delivery and reducing operating costs (Figure 1).

Figure 1. Cisco Virtual Topology System



Data centers are evolving from isolated resource islands into interconnected pools of virtualized resources. Virtualized functions and new on-demand service models are amplifying the need for robust overlays to achieve greater agility. Multitenancy, isolation, and service stitching—capabilities critical to capitalizing on virtualized resources—are basic requirements for any cloud architecture. The Virtual Topology System helps service providers and large enterprises capitalize on next-generation cloud architecture through automation and faster service delivery.

The system enables the creation of a highly scalable, open-standards multitenant data center solution. It automates complex network overlay provisioning and management tasks through integration with cloud orchestration systems such as OpenStack and VMware vCenter. The solution can be managed from the embedded GUI or entirely by a set of northbound representational state transfer (REST) APIs that can be consumed by orchestration and cloud management systems.

Main Benefits

Table 1 summarizes the main benefits of the Virtual Topology System.

Table 1. Cisco Virtual Topology System Benefits

Feature	Benefit
Scalable multitenant networks	• Helps ensure segmentation, isolation, and agility of cloud infrastructure
Fabric automation	• Supports faster, more agile network provisioning through a wide range of hardware and software endpoints
Programmability	• Provides an open, well-documented REST-based northbound API, which allows integration with an external orchestration or cloud management system • Offers extensive southbound integration through platform APIs (Cisco NX-API) or NETCONF YANG
Open, scalable, and standards based	• Provides a standards-based Border Gateway Protocol (BGP) Ethernet Virtual Private Network (EVPN) control plane for flexible workload placement and mobility without compromising performance • Provides standards-based Virtual Extensible LAN (VXLAN) encapsulation for flexible overlays
Investment protection	• Supports the entire Cisco Nexus® portfolio (Cisco Nexus 2000 Series Fabric Extenders and Cisco Nexus 5000, and 9000 Series Switches)
Deployment flexibility	• Supports hybrid overlays of physical and virtual VXLAN tunnel endpoints (VTEPs) for greater deployment flexibility

Platform Support

The Virtual Topology System extends a robust set of SDN capabilities to the entire Cisco Nexus portfolio by bringing automation and programmability to the Cisco Nexus 2000 Series Fabric Extenders and Cisco Nexus 3000, 5000, 7000, and 9000 Series Switches. Table 2 lists the platforms supported and their roles.

Table 2. Cisco Virtual Topology System Platform Support

Role	Platforms Supported
Top-of-rack (ToR) leaf switch (with or without Cisco Nexus 2000 Series Fabric Extenders)	• Cisco Nexus 9300TX and 9300PX platform switches and Cisco Nexus 9332PQ and 93128TX Switches • Cisco Nexus 9200 Platform Switches • Cisco Nexus 7000 Platform switches • Cisco Nexus 5600 platform switches • Cisco Nexus 9500 platform switches • Cisco Nexus 3100-V platform switches
Data center spine	• Cisco Nexus 9300PX platform switches • Cisco Nexus 9500 platform switches • Cisco Nexus 7000 Series Switches • Cisco Nexus 5000 Series Switches
Border leaf	• Cisco Nexus 9300TX and 9300PX platform switches • Cisco Nexus 9500 platform switches
Data center interconnect (DCI)	• Cisco ASR 9000 Series Aggregation Services Routers • Cisco Nexus 7000 Series Switches
Fabric extenders	• Cisco Nexus 2000 Series Fabric Extenders
Virtual machine manager (VMM)	• OpenStack Liberty, Newton • VMware vCenter 6.0 Server Enterprise Plus • VMware vCenter 6.5 Server Enterprise Plus
Hypervisor	• VMware ESXi 6.0, and 6.5 • Linux Kernel-based Virtual Machine (KVM)
Virtual forwarders	• Cisco Virtual Topology Forwarder (VTF)

Cisco Virtual Topology Forwarder

The Virtual Topology System includes a virtual forwarder known as the Virtual Topology Forwarder, or VTF. The forwarder is a lightweight, multitenant software data plane designed for high-performance packet processing on x86 servers. It uses Cisco Vector Packet Processing (VPP) technology and the Intel® Data Path Development Kit (DPDK) for high-performance Layer 2, Layer 3, and VXLAN packet forwarding. It allows the Virtual Topology System to terminate VXLAN tunnels on host servers by using the forwarder as a software VXLAN tunnel endpoint, or VTEP. The Virtual Topology System also supports hybrid overlays by stitching together physical and virtual endpoints into a single VXLAN segment.

System Requirements

The Virtual Topology System is distributed as an Open Virtualization Format (OVA) file. Tables 3 and 4 list the system requirements for the policy-plane and control-plane virtual machines. High-availability configurations need two separate server installations.

Table 3. Cisco Virtual Topology System Policy-Plane Requirements

	Virtual Topology System Policy-Plane Virtual Machine Requirements
Disk space	Minimum 64 GB required; 256 GB preferred
CPUs	8
Memory	Minimum 16 GB of RAM required
Computing host	Certified with Cisco UCS® C220 and C240 Rack Servers
Hypervisor	VMware ESXi 6.0 and 6.5 Linux KVM

Table 4. Cisco Virtual Topology System Control-Plane Requirements

	Virtual Topology System Control-Plane Virtual Machine Requirements
Disk space	Primary disk must be 80 GB; secondary disk of arbitrary size can be added
CPUs	14
Memory	Minimum 48 GB of RAM required
Computing host	Certified with Cisco UCS C220 and C240 Rack Servers
Hypervisor	VMware ESXi 6.0, and 6.5 Linux KVM

The Virtual Topology Forwarder is deployed as a virtual machine in ESXi environments and as a host process in KVM environments to deliver a high-performance software data plane on a host server. Table 5 lists the system requirements for the forwarder to be deployed as Virtual Machine.

Table 5. Cisco Virtual Topology Forwarder System (Virtual Machine) Requirements

	Virtual Topology Forwarder Virtual Machine Requirements
Disk space	Minimum 8 GB required
CPU cores	2
Memory	Minimum 16 GB of RAM required
Hypervisor support	VMware ESXi 6.0 and 6.5 UA and vSphere Linux KVM
Server network interface card (NIC) requirements	Intel DPDK-enabled NIC

Main Features

The Virtual Topology System provides an open approach to SDN in the data center. It extends a robust set of SDN capabilities to physical endpoints (Cisco Nexus 2000 Series Fabric Extenders and Cisco Nexus 3000, 5000, 7000, and 9000 Series Switches) and virtual endpoints (Virtual Topology Forwarder) to bring agility, programmability, and multitenancy to the data center fabric.

Table 6 summarizes the main features of the Virtual Topology System.

Table 6. Cisco Virtual Topology System Features

Feature	Description
Flexible, multitenant overlays	• Multitenancy at scale with Multiprotocol BGP (MP-BGP) EVPN control plane • Physical, virtual, and hybrid overlay support • Virtual machine mobility • System policy models to define administrative domains (multiple data center pods)
Security	• Policy-based filtering (source, destination, and Layer 4 ports) • Stateless access control list (ACL) provisioning on hardware and software VTEPs • Secure multitenancy at scale • Security policies automated to move as workloads are moved in the data center
Topology discovery	Automatic network and server host topology discovery through Link Layer Discovery Protocol (LLDP)
Ease of setup	• Guided Virtual Topology System setup using setup wizard • One-click installation of Virtual Topology Forwarder and host agent • One-click installation of virtual machine managers such as OpenStack and vCenter

Feature	Description
Supported protocols	• NX-API • BGP EVPN • NETCONF • Command-line interface (CLI)
Virtual forwarder	• Intel DPDK technology combined with Vector Packet Processing technology to deliver a high-performance software forwarder to support virtual overlays • Full-featured, high-performance software data plane with multihypervisor support • Multithreaded data plane
Control-plane federation	MP-BGP-based control-plane federation for greater scalability and deployment flexibility
Virtual Machine Manager (VMM) integration	• Plug-ins for OpenStack Liberty, Newton • Plug-ins for VMware vCenter 6.0 and 6.5 • Multi VMM support extending the L2/L3 overlay networks across workloads across multiple hypervisors
High availability	Support for active-standby high availability
Routing flexibility	Distributed anycast gateway provisioning on hardware and software VTEPs
DCI	VXLAN EVPN hand-off for DCI router provisioning
Web UI support	Firefox, Chrome
Overlay Service Extension Templates & Underlay Templates	• Extend Cisco VTS L3 and L2 Overlay services automated configurations with additional configurations in VTS GUI • Enhanced capabilities to add Underlay configuration using VTS GUI • Avoids need for out-of-band configuration in device for VTS provisioned configuration • VTS owns the configuration and is aware of the additional configurations Eliminates out-of-sync issues between VTS database and actual network device configurations

Warranty Information

For more information about the Virtual Topology System warranty, visit https://www.cisco.com/go/warranty.

Cisco and Partner Services

Cisco offers a wide range of services to help accelerate your success in deploying and optimizing Virtual Topology System solutions. The innovative Cisco Services offerings are delivered through a unique combination of people, processes, tools, and partners and are focused on helping you increase operation efficiency and improve your data center network. Cisco Advanced Services use an architecture-led approach to help you align your network infrastructure with your business goals and achieve long-term value. Cisco SMARTnet™ Service helps you resolve mission-critical problems with direct access at any time to Cisco network experts and award-winning resources. Spanning the entire network lifecycle, Cisco Services offerings help increase investment protection, optimize network operations, support migration operations, and strengthen your IT expertise. For more information, please visit https://www.cisco.com/go/services.

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For More Information

To learn more about the Cisco Virtual Topology System, visit https://www.cisco.com/go/vts.

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