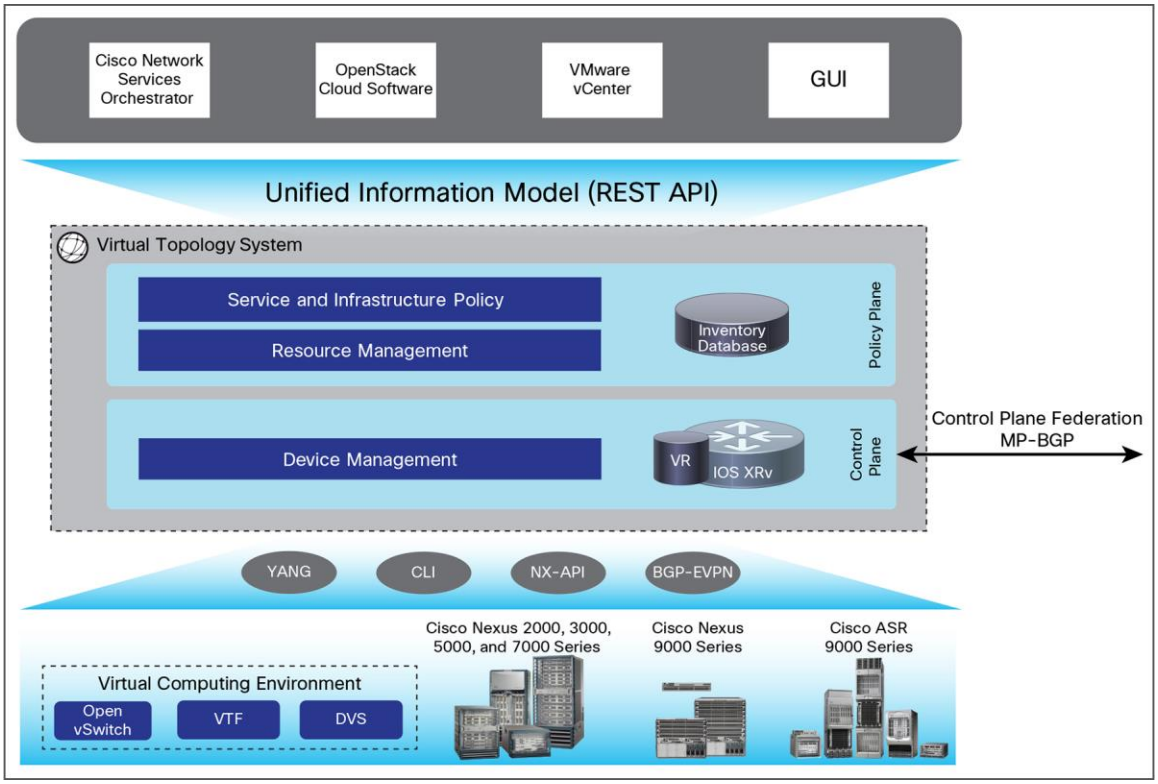
Cisco Virtual Topology System

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) and NETCONF 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
Multi-Fabric automation	• Supports faster, more agile network provisioning across multiple fabrics & fabric-types 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 & MPLS Segment Routing (an MPLS data-plane for source routing) for flexible overlays.
Investment protection	• Supports the entire Cisco Nexus® portfolio (Cisco Nexus 2000 Series Fabric Extenders and Cisco Nexus 5000, 7000 and 9000 Series Switches) & IOS-XR platforms like Cisco Network Convergence System 5500 & Cisco ASR 9000 series as well.
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 9300 Series Switches • Cisco Nexus 9200 Series Switches • Cisco Nexus 7x00 Series Switches • Cisco Nexus 5000 Series Switches • Cisco Nexus 9500 Series Switches • Cisco Nexus 3100-V Series Switches • Cisco Network Convergence System 5500 Series Routers
Data center spine	• Cisco Nexus 9300 Series Switches • Cisco Nexus 9500 Series Switches • Cisco Nexus 9200 Series Switches • Cisco Nexus 7x00 Series Switches • Cisco Nexus 5000 Series Switches • Cisco Network Convergence System 5500 Series Routers
Border leaf	• Cisco Nexus 9300 Series Switches • Cisco Nexus 9500 Series Switches • Cisco Nexus 7x00 Series Switches

Role	Platforms Supported
Data center interconnect (DCI)	• Cisco ASR 9000 Series Aggregation Services Routers • Cisco Nexus 7x00 Series Switches • Cisco Nexus 9500 Series Switches
Fabric extenders	• Cisco Nexus 2000 Series Fabric Extenders
Virtual machine manager (VMM)	• OpenStack Queens, 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) based on FD.io VPP

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 a virtual appliance. Tables 3 and 4 list the system requirements for the policy-plane and control-plane virtual machines. High-availability configurations need two separate virtual appliance 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 32 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 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. Starting 2.6.2 release, support for VTF deployment as a VM in ESXi environment is deprecated.

Table 5. Cisco Virtual Topology Forwarder System Requirements

	Virtual Topology Forwarder 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 Series Switches and Fabric Extenders) 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 • OpenStack Security groups Integration with virtual, SR-IOV and bare-metal ports • Security policies automated to move as workloads are moved in the data center • Support for AAA Authentication protocols like LDAP & TACACS.
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 Topology System Plugins for different virtual machine managers such as OpenStack and vCenter
Supported protocols	• NX-API • BGP EVPN • MPLS-SR • 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 multi-hypervisor support • Multithreaded data plane, Support for Intel, Cavium and Mellanox Interface cards
Control-plane federation	• MP-BGP-based control-plane federation for greater scalability and deployment flexibility
Virtual Machine Manager (VMM) integration	• Seamless integration of Virtual Topology System Software components within RedHat certified installation procedure for Openstack Platforms 10 (Newton) & 13 (Queens). • Plug-ins for OpenStack Queens, Newton • Plug-ins for VMware vCenter 6.0 and 6.5 • Multi VMM support extending the L2/L3 overlay networks to workloads across multiple VMMs (VMware and OpenStack). • Cisco NFVI VIM integration

Feature	Description
High availability	• Support for active-standby high availability
Routing flexibility	• Distributed anycast gateway provisioning on hardware and software VTEPs • Flexible static route at different levels, external, fabric and port and optional BFD • Easy provisioning of overlay routing for tenant BGP peering.
DCI	• VXLAN EVPN hand-off for DCI router provisioning
Web UI support	• Firefox • Chrome
Overlay Service Extension Templates, Underlay Templates, Device Objects	• Extend Cisco VTS L3 and L2 overlay services automated configurations with additional configurations • Enhanced capabilities to add Underlay configuration • Avoids need for out-of-band configuration in device • VTS owns the configuration and is aware of the additional configurations • Export of templates in JSON/XML data formats for offline edits and import into VTS • Full content search of underlay and overlay templates using Docker-solr. • Device Objects capability provides an easy and generic option for users to push any interface specific configurations to devices.
Infrastructure monitoring & Statistics	• Log aggregation to configured remote syslog servers • Monitoring of processes and resources across policy, control and data planes • Collection of resource metrics and routing statistics and export to external server via HTTP plugin
North Bound Integration	• REST API • NETCONF Driver for Cisco NSO integration
Overlay Port Extensions	• Enables BGP as a Service capability by allowing VNF peering with devices across the fabric.

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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