Cisco Extensible Network Controller Topology-Independent Forwarding and Network Slicing Applications

Product Overview

As the number of enterprise business applications grows, network administrators have an increasingly difficult time meeting application-specific requirements using traditional approaches. Traditional approaches to routing based on application requirements have limitations. Some of the main limitations include the following:

- They cannot provide real-time visibility into the network path and statistics.
- They are complex to troubleshoot.
- They do not scale.
- Paths cannot change dynamically when network conditions change.

In addition, network administrators have to provide isolation among applications and users to meet the security requirements. With dynamic workload mobility across data centers, meeting application isolation needs requires networks that are programmable and agile. To meet the current application requirements and provide an improved user experience, the network has to become application aware.

Using the Cisco® Extensible Network Controller (XNC) and its Topology-Independent Forwarding (TIF) and Network Slicing applications, Cisco provides a software-defined networking (SDN) approach that addresses the challenges of the traditional approach and makes the network application aware.

Cisco XNC is built for extensibility using the Java OSGi Alliance framework. This framework provides the flexibility needed for Cisco and Cisco partners and customers to extend the functions of the controller based on business needs. Cisco XNC also provides robust northbound Representational State Transfer (REST) APIs for business applications to access and program policies. Two such solutions are the Cisco XNC TIF and Network Slicing applications.

Topology-Independent Forwarding Application

Cisco XNC with the TIF application provides the capability to set up the forwarding path for an application (Figure 1). TIF extends beyond the traditional routing concepts and can create a path across the entire network for a given property and criterion. Properties can be unconventional metrics such as link bandwidth, currency (dollar cost of a link), and link utilization and any other custom properties according to business needs. Network-aware applications can request that the forwarding path meeting certain criteria before sending traffic, thereby enhancing the application experience for the end users.

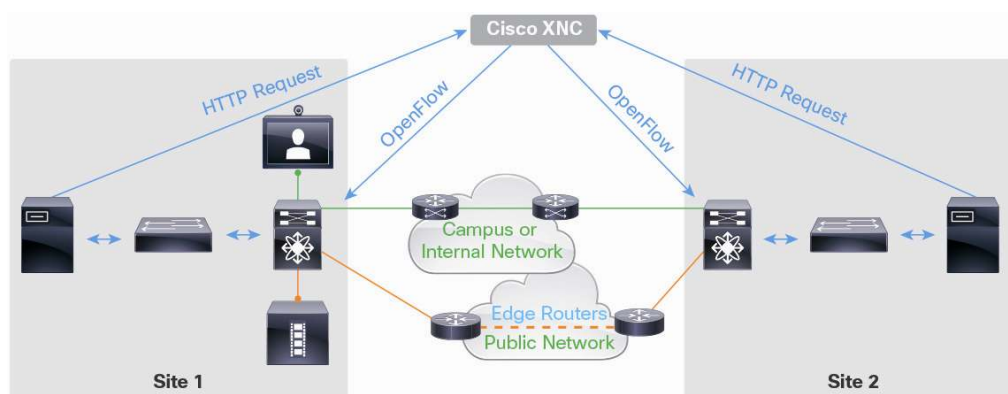**Figure 1.**   Cisco XNC Topology-Independent Forwarding Application

Table 1 summarizes the main features and benefits of the Cisco XNC TIF application.

Table 1.   Topology-Independent Forwarding Features and Benefits

Feature	Benefit
Application-aware network or network-aware application	• Cisco XNC with TIF provides a policy-based approach for matching and forwarding. • Application traffic can be matched based on Layer 3 or Layer 4 information. • The GUI and REST API provide support for creating and managing policies, which enables programmability.
Support for business-oriented metrics as criteria for forwarding application traffic	• A simple template-oriented approach enables use of custom metrics. • Customers can use business-oriented custom metrics such as the dollar cost value of a link as forwarding criteria and use that metric in the policy. • Values for these metrics can be populated through REST APIs, or fixed values can be assigned through the GUI.
Ability to set up path across the entire network	• On the basis of the matching criteria and metrics used, Cisco XNC and the TIF application can compute and configure the forwarding path across the entire network. • Cisco XNC keeps track of the network status and automatically reroutes application traffic as the network condition changes.
Provide adequate visibility for troubleshooting and analysis	• At any given time, using Cisco XNC, the network administrator can easily obtain complete application path information. • Cisco XNC provides statistics per policy level for easier troubleshooting.

Network Slicing Application

Slicing allows the network administrator to partition the network based on physical and logical criteria for multiple user communities. Slicing provides the logical separation required to manage the network traffic domains. A slice can be based on:

- Network devices (a network device can be shared by multiple slices)
- Network device interfaces (an interface can be shared by multiple slices)
- Flow specification (source and destination IP addresses, protocol, or source and destination TCP ports)

Two or more slices can share the same physical switch and interface, because each data flow is individually assigned to a slice based on the flow specification (Figure 2).

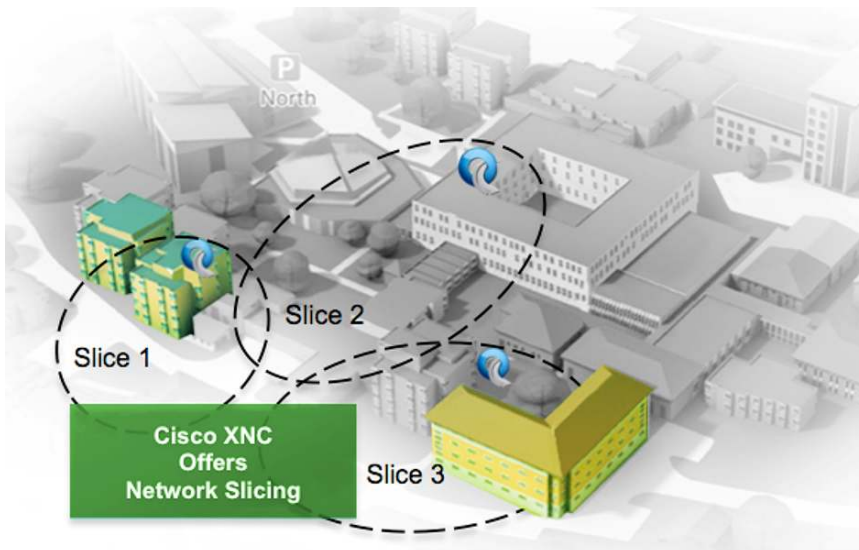**Figure 2.**   Cisco XNC Network Slicing Application

Table 2 summarizes the main features and benefits of the Cisco XNC Network Slicing application.

Table 2.   Network Slicing Features and Benefits

Feature	Benefit
Partitioning beyond VLANs and single pane of glass for management	• Allows the network administrator to create slices based on physical topology or at the Layer 4 protocol level using flow specification. • Provides complete visibility of the slice, including flow details. • Provides network slicing management through the Cisco XNC GUI.
Role-based access control (RBAC)	• Integrates application access with Cisco XNC RBAC. • Configures a user as the slice administrator. • Allows users to see only the slices with which they are associated.
Northbound interface support for network slicing	• Allows network slicing configurations to be managed through the northbound REST interface. • Applies authentication, authorization, and accounting (AAA) to all northbound interface functions.
Seamless integration with Cisco XNC TIF	• Network Slicing is integrated with TIF to provide the custom forwarding capabilities for each slice.
Associate specific VLAN to the flow spec	• Allows customers to attach VLAN Id to a specific flow enabling Q-in-Q VLAN tagging.
Program policies between hosts on the same IP subnet	• Topology Independent Forwarding avoids re-writing of the source/destination MAC addresses if the hosts are in the same IP Subnet. This enables customers to set up policies between hosts on the same subnet preventing flooding.

Licensing and Ordering Information

Table 3 presents ordering information for the Cisco XNC TIF and Network Slicing applications.

Table 3. Cisco XNC and TIF and Network Slicing Promotional Bundle

Part Number	Description
L-XNC-TNS-B-ST-K9	Starter Bundle that includes one instance of Cisco XNC and TIF and Network Slicing applications RTM 5 Top of Rack (1-2 RU) Nexus fixed switches
L-XNC-TNS-B-S-K9	Small size deployment Bundle that includes two instance of Cisco XNC for HA and TIF and Network Slicing applications RTM 10 Top of Rack (1-2 RU) Nexus fixed switches
L-XNC-TNS-B-M-K9	Medium size deployment Bundle that includes two instance of Cisco XNC for HA and TIF and Network Slicing applications RTM 25 Top of Rack (1-2 RU) Nexus fixed switches
L-XNC-TNS-B-L-K9	Large size deployment Bundle that includes two instance of Cisco XNC for HA and TIF and Network Slicing applications RTM 50 Top of Rack (1-2 RU) Nexus fixed switches

For More Information

For more information about Cisco XNC, visit http://www.cisco.com/go/xnc or contact your local account representative.