Cisco Dynamic Fabric Automation

Introduction

Cisco Dynamic Fabric Automation (DFA) configuration in this guide is organized based on the multi-tenancy segmentation that you use for various Cisco Nexus Series.

Multi-tenancy lite version supports:

- Cisco Nexus 5000 Series Switches
- Cisco Nexus 6000 Series Switches

Multi-tenancy full version supports:

- Cisco Nexus 7000 Series Switches

Overview of Cisco Dynamic Fabric Automation

Cisco Dynamic Fabric Automation (DFA) optimizes data centers through integration. The Cisco DFA architecture eliminates the need for overlay networks that can hinder traffic visibility and optimization and reduce scalability when physical server and virtual machine environments are integrated. This architecture enables zero-touch provisioning and greater orchestration, while delivering more predictable performance and latency for large cloud networks. The following building blocks are the foundation of Cisco DFA:

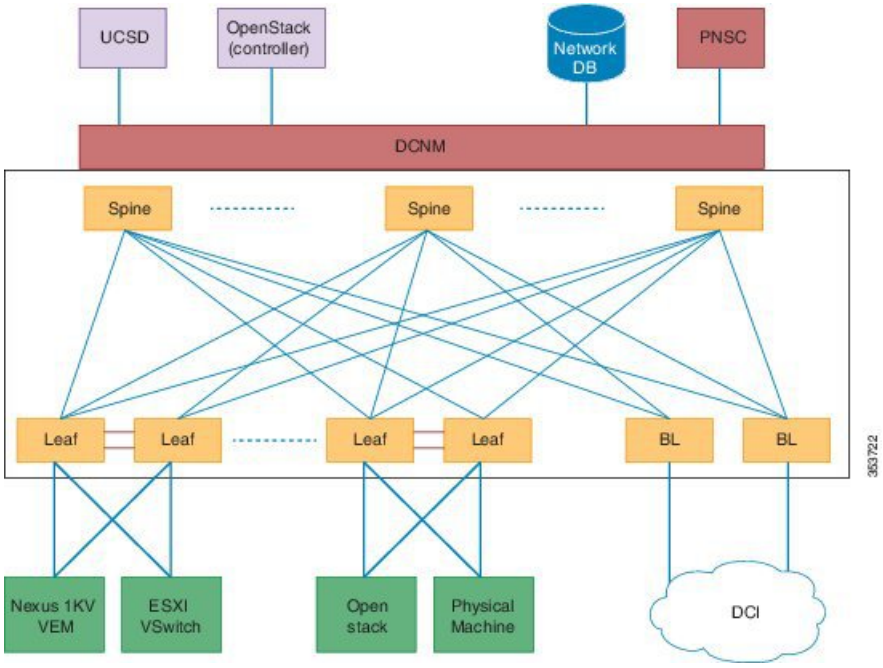
- Fabric Management — Simplifies workload visibility, optimizes troubleshooting, and automates fabric component configuration.
- Workload Automation — Integrates with automation and orchestration tools through northbound Application Programming Interfaces (APIs) and also provides control for provisioning fabric components by automatically applying templates that leverage southbound APIs and/or standard-based protocols. These automation mechanisms are also extensible to network services.
- Optimized Networking — Uses a simple distributed gateway mechanism to support any subnet, anywhere, concurrently. Existing redundancy models are also used to provide N+ redundancy across the entire fabric.

- Virtual Fabrics — Extends the boundaries of segmented environments to different routing and switching instances by using logical fabric isolation and segmentation within the fabric. All of these technologies can be combined to support hosting, cloud, and multi-tenancy environments.

Components in the Cisco DFA Network

The following figure depicts various components of Cisco Unified Fabric.

Figure 1: Components in the Cisco DFA Network



A leaf in a Cisco Unified Fabric is the node where virtual machines/physical machines are directly connected. A leaf is connected to all the spines in a Clos topology as shown in the figure above. The leaf manages VLAN allocation for physical and virtual machines wherever required. The leaf encapsulates tenant's traffic to the spine in a FabricPath encapsulation, either using segment ID or the VLAN based on the tenant traffic requirements. Cisco Unified Fabric leaf can also fetch network information via standard protocols like LDAP to automatically provision tenant networks.

A Border Leaf (BL) is a special purpose leaf typically required to reach the external world or provide connectivity for tenant networks that are spanning across a Cisco Unified Fabric. Any Cisco Nexus 5600 Platform Switches and Cisco Nexus 6000 and 7000 Series Switches can also be configured as a border leaf.

The spine nodes can load share the traffic between any leaf nodes and can also operate in a transit FabricPath mode essentially requiring no intervention in the spine configuration when a tenant is provisioned.

Cisco Prime Data Center Network Manager (DCNM) provides Power On Auto Provisioning (POAP), of the Cisco Unified Fabric nodes (spine, leaf and border leaf), cable-plan consistency, Unified Fabric Data Center Interconnect (DCI) automation and most importantly automated network provisioning with the help of northbound integration with both Virtual Machine Orchestrators and Services Orchestrators.

OpenStack DFA enabler seamlessly transforms and enables OpenStack compute nodes to be DFA capable. DFA enabler communicates network information to the Cisco Prime DCNM by invoking DCNM's rest APIs.

The compute nodes support Virtual Station Interface (VSI) Discovery and Configuration Protocol (VDP) to reliably pass the virtual machines network information to the leaf nodes.

Cisco Unified Computing System Director (UCSD) integrates perfectly with the Cisco Prime DCNM, making virtual machine network information available to the unified fabric leaf nodes. This clean and tighter integration provides for not only touchless automated tenant network provisioning but also a flexible choice of features that can be applied during the provisioning.

Cisco Prime Network Service Controller (PNSC) provides a way to orchestrate services for tenants in a touchless manner on the Cisco Unified Fabric. Cisco Prime DCNM network information is available within the PNSC to identify services required (edge firewall, load balancer) for a particular tenant network.

Cisco Nexus 1000V Series Switch compliments automated network provisioning of the tenant via the VSI discovery protocol (VDP) by reliably communicating virtual machine network information to the leaf via standards based implementation of 802.1QBG.