CCNA 200-301, Volume 2

Chapter 16 Introduction to Controller-Based Networking

Objectives

- Explain the role and function of network components
 - Endpoints
 - Servers
- Describe characteristics of network topology architectures
 - Spine-leaf
- Explain how automation impacts network management
- Compare traditional networks with controller-based networking
- Describe controller-based and software defined architectures (overlay, underlay, and fabric)
 - Separation of control plane and data plane
 - Northbound and southbound APIs

Data Plane Processing on Routers: Basics



Control and Data Planes of Routers-Conceptual



Management Plane for Configuration of Control and Data Plane



Key Internal Processing Points in a Typical Switch



Centralized Control Plane and a Distributed Data Plane



Java API: Java Application Communicates with Controller

Inside the Controller



Process Example of a GET Using a REST API



Architecture of NBI, Controller Internals, and SBI to Network Devices



Spine-Leaf Network Design



Endpoints Found on the Leaf Switches Only



Endpoint Groups (EPGs) and Policies



Architectural View of ACI with APIC Pushing Intent to Switch Control Plane



Controlling the ACI Data Center Network Using the APIC



APIC-EM Controller Model



Points of Comparison: OpenFlow, ACI, and APIC Enterprise

Criteria	OpenFlow	ACI	APIC Enterprise
Changes how the device control plane works versus traditional networking	Yes	Yes	No
Creates centralized point from which humans and automation control the network	Yes	Yes	Yes
Degree to which the architecture centralizes the control plane	Mostly	Partially	None
SBIs used	OpenFlow	OpFlex	CLI/SNMP
Controllers mentioned in this chapter	OpenDaylight	APIC	APIC-EM
Organization that is the primary definer/owner	ONF	Cisco	Cisco

Small Output from a Switch Command

SW1# show interfaces gigabit 0/1 switchport

Name: Gi0/1

Switchport: Enabled

Administrative Mode: dynamic auto

Operational Mode: static access

Administrative Trunking Encapsulation: dot1q

Operational Trunking Encapsulation: native

Negotiation of Trunking: On

Python Dictionary with Variables Set to Needed Values

>>> interface1

{ 'trunk-config': 'dynamic auto', 'trunk-status': 'static access' }

>>>