



Cisco NSO Essentials for Programmers and Network Architects

DURATION: 4 DAYS

COURSE CODE: NSO201

FORMAT: LECTURE/LAB

COURSE DESCRIPTION

Be able to install Cisco Network Services Orchestrator (NSO) and use it to manage devices and create services based on YANG templates with XPath.

This course provides a brief overview of the NSO solution, NETCONF, YANG, and XPath. After this overview, the course focuses on service creation, device and configuration management, NSO maintenance, NSO options and integrations, and basic NSO troubleshooting.

WHO SHOULD ATTEND

- System installers
- System integrators
- System administrators
- Network administrators
- Solution designers

PREREQUISITES

- Basic knowledge of the Cisco Command Line Interface (CLI) or the CLI of UNIX-like operating systems
- Basic knowledge of YANG data modeling
- Basic knowledge of Python programming
- Basic management of network components (routers, switches, etc.)

LEARNING OBJECTIVES

Explain the benefits and uses of Cisco Network Services Orchestrator (NSO)

Install NSO and describe how NSO uses NETCONF and the Device Manager component

Describe how YANG is used with NSO, create and deploy a service, and explain NSO FASTMAP

Design and manage services with YANG models

Perform NSO configuration and basic troubleshooting, and describe the following NSO features:

- Integration options
- Alarms and reporting
- Scalability and performance options
- Available function pack

COURSE OUTLINE

1. Introduction to Cisco NSO

- Meeting Challenges with Orchestration
- Challenges of Network Management
- Challenges of Network Orchestration
- NSO Features and Benefits that Meet Challenges
- Standardized Approach
- What Is NSO?
- Logical Architecture
- Components
- What Does NSO Do?
- Orchestration Use Cases
- How Does NSO Work?
- Introduction to NETCONF and YANG
- Packages
- Mapping Logic
- Network Element Drivers
- Resources and Training
- Resources
- Training

2. Get Started with Cisco NSO

- Installing Cisco NSO
- Setup Overview
- Cisco NSO Local Installation
- Installing NEDs
- Using NetSim
- NETCONF Overview
- Challenges of Network Management
- Introduction to NETCONF
- NETCONF Operation
- Device Manager
- Device Manager Overview
- Device Configuration Management
- Device Connection Management
- Templates and Groups
- Other Device Management Tools

3. Service Manager Essentials

- YANG Overview
- Introduction to YANG
- Other Representations of YANG
- Data Types
- XPath Overview
- Basic YANG Statements
- Can You Spot the Error?
- Using Services
- Package Architecture
- Creating a Service Package
- Sample Service Configuration
- Service Template
- YANG Service Model
- Deploying a Service
- Model -to-Model Mapping
- Mapping Introduction
- Mapping Logic
- FASTMAP
- Template Processing

4. Service Design and Cisco NSO Programmability

- Service Design
- Service Design Overview
- Top-Down Approach
- Bottom-Up Approach
- Device Configuration
- Service Model
- Service Management
- Service Management Tasks
- Service Lifecycle Management Guidelines
- NSO Programmability Introduction
- NSO Programmability Overview
- Python Service Skeleton
- Creating a Service YANG Model
- Creating a Service Template
- Template Processing with Python

COURSE OUTLINE (CONTINUED)

5. Cisco NSO Flexibility

System Configuration and Troubleshooting

System Configuration

System Troubleshooting

Integration

- Integration Options
- NETCONF Server
- Web Integration
- SNMP Agent
- Alarm Management and Reporting
- Alarm Management
- Reporting
- Scalability and Performance
- High Availability
- High-Availability Cluster Communications
- Clustering
- Layered Service Architecture
- Addressing Performance Limitations
- Components and Function Packs
- Function Packs
- NFV Orchestration
- Reactive FastMap

LABS

1: Installing Cisco NSO

2: Using Device Manager

3: Creating a Loopback Template Service

4: Creating a VLAN Template Service

5: Creating an L3VPN Template Service

6: Creating an SVI Python Template Service

7: Using NSO REST API with Postman

DISCOVERY LABS

- 1: Get Started with Cisco CLI
- 2: Perform Basic Switch Configuration
- 3: Observe How a Switch Operates
- 4: Troubleshoot Switch Media and Port Issues
- 5: Inspect TCP/IP Applications
- 6: Start with Cisco Router Configuration
- 7: Configure Cisco Discovery Protocol
- 8: Configure Default Gateway
- 9: Exploration of Packet Forwarding
- 10: Configure and Verify Static Routes
- 11: Configure and Verify ACLs
- 12: Configure a Provider-Assigned IP Address
- 13: Configure Static NAT
- 14: Configure Dynamic NAT and PAT
- 15: Troubleshoot NAT
- 16: Configure VLAN and Trunk
- 17: Troubleshoot VLANs and Trunks
- 18: Configure Root Bridge and Analyze STP Topology
- 19: Troubleshoot STP Issues
- 20: Configure and Verify EtherChannel
- 21: Configure a Router on a Stick
- 22: Configure a Cisco Router as a DHCP Server
- 23: Troubleshoot DHCP Issues
- 24: Configure and Verify HSRP
- 25: Troubleshoot HSRP
- 26: Configure and Verify RIPv2
- 27: Troubleshoot RIPv2
- 28: Configure Basic IPv6 Connectivity
- 29: Configure IPv6 Static Routes
- 30: Use Troubleshooting Tools
- 31: Configure and Verify IPv4 Extended Access Lists
- 32: Troubleshoot IPv4 Network Connectivity
- 33: Configure and Verify IPv6 Extended Access Lists
- 34: Troubleshoot IPv6 Network Connectivity
- 35: Enhance Security of Initial Configuration
- 36: Limit Remote Access Connectivity
- 37: Configure and Verify Port Security
- 38: Configure and Verify NTP
- 39: Configure External Authentication Using RADIUS and TACACS+
- 40: Configure and Verify EIGRP
- 41: Configure and Verify EIGRP for IPv6
- 42: Troubleshoot EIGRP

- 43: Configure and Verify Single-Area OSPF
- 44: Configure and Verify Multiarea OSPF
- 45: Configure and Verify OSPFv3
- 46: Troubleshoot Multiarea OSPF
- 47: Configure Serial Interface and PPP
- 48: Configure and Verify MLP
- 49: Configure and Verify PPPoE Client
- 50: Configure and Verify GRE Tunnel
- 51: Configure and Verify Single Homed EBGP

CHALLENGE LABS

- 1: Summary Lab: 1
- 2: Summary Lab: 2
- 3: Implementing RIPv2
- 4: Implement IPv6 Static Routing
- 5: Troubleshooting IPv4 Connectivit
- 6: Troubleshooting IPv6 Connectivity
- 7: Securing Device Administrative Access
- 8: Implementing Device Hardening
- 9: Troubleshooting EIGRP
- 10: Summary Lab: 3
- 11: Summary Lab: 4
- 12: Troubleshooting OSPF