

## NSO Essentials for Programmers and Network Architects

**Duration: 4 Days**    **Course Code: NSO201**    **Version: 4.2**    **Delivery Method: Company Event**

### Overview:

The Cisco NSO Essentials for Programmers and Network Architects (NSO201) course introduces you to Cisco® Network Services Orchestrator (NSO). You will learn to install Cisco NSO and use it to manage devices and create services based on YANG templates with XPath. This course provides an overview of NSO as a network automation solution, as well as introductions to NETCONF, YANG, and XPath. You will learn about managing devices and creating device templates, service management and service package creation, network element drivers, interfacing with other systems using APIs, configuring and troubleshooting system settings, managing alarms and reporting, configuring NSO for scalability and performance, and capabilities that can be added to Cisco NSO.

**This course is worth 40 Continuing Education (CE) Credits.**

#### Company Events

These events can be delivered exclusively for your company at our locations or yours, specifically for your delegates and your needs. The Company Events can be tailored or standard course deliveries.

### Target Audience:

System installers, system integrators, system administrators, network administrators, and solutions designers.

### Objectives:

- **After completing this course you should be able to:**
- Explain the transactional service activation and how it relates to business requirements
- Explain how Cisco NSO communicates with network devices
- Understand the NETCONF protocol and be able to read and write simple YANG models
- Understand the difference between devices that are fully NETCONF capable and those that are less or not NETCONF capable
- Understand the support for candidate configuration and confirmed commit support
- Use logs to troubleshoot the Cisco NSO deployment and check NSO communication with network devices
- Explain the YANG service model structure
- Design a real-world usable service
- Explain the mapping logic of service parameters to device models and consequently to device configurations
- Describe the use of different integration options and APIs
- Explain how to implement action with use of config-templates in NSO package
- Explain the use of Reactive FASTMAP in for manipulating and implementing advanced NFV components
- Describe the use of feature components and function packs
- Define and explain the ETSI MANO principles and solution
- Work with the alarm console, and understand the NSO alarm structure and how it conforms to modern network operations procedures
- Describe Cisco NSO 6.0 new features and changes in NSO

### Prerequisites:

**Attendees should meet the following prerequisites:**

- Basic knowledge of the Cisco Command-Line Interface (CLI) or the CLI of UNIX-like operating systems
- Working knowledge of UNIX-based operating systems and basic

### Testing and Certification

**Recommended as preparation for the following exams.**

- There are no exams currently aligned to this course.

tasks

- Basic knowledge of programming constructs and YANG data modeling
  - Basic knowledge of the NETCONF communication protocol
  - Knowledge of XML data structures and schemas
  - Basic management of network components (routers, switches, etc.)
  - PRNE-CPLL - Programming for Network Engineers - CPLL
  - CSAU - Introducing Automation for Cisco Solutions
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## Content:

### Introducing Service Orchestration with Cisco NSO

- Challenges of Network Management
- Network Management without Cisco NSO
- Network Management with Cisco NSO
- Challenges of Network Orchestration
- Main Components of NSO

### Exploring Cisco NSO Architecture

- Cisco NSO Architecture
- Cisco NSO Components
- Cisco NSO and Ansible

### Orchestrating Network Solutions

- Orchestration Use Cases Overview
- Orchestration Use Case Examples

### Describing Cisco NSO Operation

- NETCONF and YANG Overview
- Cisco NSO Packages
- Cisco NSO Mapping Logic
- Network Element Drivers

### Installing Cisco NSO

- Setup Overview
- Cisco NSO Local Installation
- Installing NEDs
- Using Netsim

### Exploring the Advantages of NETCONF

- NETCONF Basics
- NETCONF Operation

### Managing Devices Using the Device Manager

- Device Manager Overview
- Device Configuration Management
- Device Connection Management
- Templates and Groups
- Device Template Processing
- Commit Queues

### Creating YANG Models

- YANG Basics
- YANG Data Types
- XPath Overview
- Basic YANG Statements
- Other Representations of YANG
- Verify Yang Statements

### Using Services

- Package Architecture
- Creating a Service Package
- Sample Service Configuration
- Service Template
- YANG Service Model
- Deploying a Service

### Implementing Services with Model-to-Model Mapping

- Mapping Service Parameters
- FASTMAP
- Template Processing
- NSO Transaction Model

### Designing Services in Cisco NSO

- Service Design Overview
- Top-Down Service Design
- Bottom-Up Service Design
- Device Configuration
- Service Model

### Managing the Service Lifecycle

- Service Management Tasks
- CDM Migration
- Service Lifecycle Management Guidelines

### Programming with Python in Cisco NSO

- Cisco NSO Programmability Overview
- NSO Python API Overview
- Python Scripting
- Python Service Skeleton
- Creating a Service YANG Model
- Creating a Service Template
- Template Processing with Python

### Configuring and Troubleshooting System Settings

- System Configuration
- Role-Based Access Control
- System Troubleshooting

### Discovering Cisco NSO Northbound APIs

- NSO Integration Options
- NETCONF Server
- Web Integration
- SNMP Agent

### Managing Alarms and Reporting

- Alarm Management
- Reporting

### Configuring Cisco NSO for Scalability and Performance

- High Availability
- High-Availability Cluster Communications
- Addressing Performance Limitations
- Layered Service Architecture

### Describing Cisco NSO VNF Manager and Function Packs

- Function Packs
- Cisco SD-WAN Solution
- NFV Orchestration
- Reactive FastMap

### Labs

- Discovery Lab 1: Install Cisco NSO
- Discovery Lab 2: Use Device Manager
- Discovery Lab 3: Create a Device Template
- Discovery Lab 4: Create a Loopback Template Service
- Discovery Lab 5: Create a VLAN Template Service
- Discovery Lab 6: Create an L3VPN Template Service
- Discovery Lab 7: Migrate a CDM Device
- Discovery Lab 8: Set Up Device Using Python Scripts
- Discovery Lab 9: Create an SVI Python Template Service
- Discovery Lab 10: Use NSO RESTCONF API with Postman

## Further Information:

For More information, or to book your course, please call us on Head Office 01189 123456 / Northern Office 0113 242 5931

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