642-813 Switch: Implementing Cisco IP Switched Networks

Course Introduction — 6m

Course Introduction

Module 01 - Analyzing Campus Network Designs — 1hr 1m

Campus Network Design
Overview of Cisco SONA
Benefits of SONA
Layers in the Heirarchical Model
Enterprise Campus Architecture
Access Layer
Distribution Layer
Core Layer
Is a Core Layer Needed?
Campus Core Layer
Small Campus Network
Medium Campus Network
Data Center Infrastructure Overview
Network Traffic Types
Client Server Farm Applications
Client Enterprise Edge Applications
Section 01 Summary
PPDIOO Network Life-Cycle Approach
Benefits of the Life-Cycle Approach
Planning an Implementation
Major Implementation Components
Example: Summary Implementation Plan
Example: Detailed Implementation Play
Section 02 Summary
Demo - Topology
Module 01 Review

Module 02 - Implementing VLANs in a Campus Network — 2hrs 24m

Implementing VLANs
VLAN Deployment
End-to-End VLANs vs. Local VLANs
Planning an End-to-End VLAN Implementation
VLAN Configuration
Verifying the VLAN Configuration
Trunk Configuration
Demo - End-to-End VLANs
Switchport Mode Interactions
Trunk Configuration Recommendations
VTP Configuration
Verifying the VTP Configuration
Common Problems with VTP Configuration
Demo - VTP Configuration
Verifying General VLAN Operations
Common Trunk Link Problems
Example of a Troubleshooting Process
Resolving Trunk Link Problems

Issues with 802.1Q Native VLAN
Section 01 Summary
Access Switch: Protected Port
About PVLANs
PVLAN Port Types
Isolated PVLAN Configuration
Isolated PVLAN Configuration (1)
Isolated PVLAN Configuration (2)
Isolated PVLAN Configuration (3)
Isolated PVLAN Verification
Demo - Private VLANs
Demo - Promiscuous Mode
Community PVLAN Configuration
Community PVLAN Configuration (1)
Community PVLAN Configuration (2)
Community PVLAN Configuration (3)
Community PVLAN Verification
PVLAN Example
PVLANs Across Multiple Switches
Section 02 Summary
Multiple Links
EtherChannel
PAgP and LACP
PAgP Modes
LACP Modes
How to Configure Port Channels Using EtherChannel
Guidelines for Configuring EtherChannel
How to Configure Layer 2 EtherChannel
How to Verify EtherChannel
How to Configure EtherChannel Load Balancing
Demo - Ether Channel
Section 03 Summary
Module 02 Review

Module 03 - Implementing Spanning Tree 2hrs

Implementing Spanning Tree
STP Standards
Comparison of Spanning-Tree Protocols
About STP
Spanning-Tree Cost and Priority
Default Spanning-Tree Configuration
PVRST+ Configuration
RSTP Port Roles
Spanning-Tree Port Types and States
RSTP State Transitions
RSTP Proposal-Agreement Sequence
RSTP Link Types
RSTP Edge Ports
PortFast Configuration
Bridge Priority with Extended System ID
Verifying PVRST+
Demo - Spanning Tree
Demo - Spanning Tree Cost
Introducing MSTP
MST Regions
Extended System ID in Bridge ID Field

Implementing MST
Verifying MSTP
Summary 01 Review
Cisco STP Toolkit
Protecting the Operation of STP
BPDUGuard Configuration
BPDUFilter Configuartion
RootGuard
Verifying RootGuard
Before LoopGuard
With LoopGuard
Configuring LoopGuard
Unidirectional Link Failure
Configuring UDLD
Comparing LoopGuard with UDLD
Recommended Practices - UDLD Configuration
Implementing a Spanning-Tree Protocol
Spanning-Tree Recommendations
FlexLinks in the Access Layer
Section 02 Summary
Module 03 Review

Module 04 - Implementing Inter-VLAN Routing 1hr 42m

Inter-VLAN Routing
Inter-VLAN Routing Using an External Router
Router on a Stick
Exteral Router Configuration
Demo - Router on a Stick
External Router: Advantages and Disadvantages
Routed vs. Switched Campus Architecture
Switch Virtual Interfaces
SVI Configuration
SVI autostate exclude Command
Demo - SVI
Routed Ports on a Multilayer Switch
Configuration of a Routed Interface
Demo - Layer 3 Port
Layer 2 EtherChannel vs. Layer 3 EtherChannel
Configuration of Layer 3 EtherChannel
Verification of SVIs and Routed Interfaces
Routing Protocol Configuration
Verification of Routing Protocol
DHCP Service
About DHCP
DHCP Configuration
DHCP with the ip helper Command
Verification of the DHCP Operation
Section 01 Summary
Multilayer Switching
IP Unicast Frame and Packet Rewrite

CAM and TCAM Tables
Distributed Hardware Forwarding
Layer 3 Switch Processing
Cisco Switching Methods
Route Caching
Topology-Based Switching
Multilayer Switches Based on Cisco Express Forwarding
Verifying Cisco Express Forwarding
Section 02 Summary
Module 04 Review

Module 05 - Implementing a Highly Available Network 2hrs 8m

High Availability
Components of High Availability
Redundancy
Technology
People
Processes
Tools
Resiliency for High Availability
Network-Level Resiliency
High Availability and Failover Times
Optimal Redundancy
Provide Alternate Paths
Avoid Too Much Redundancy
Avoid Single Points of Failure
Cisco NSF with SSO
Routing Protocol Requirements for Cisco NSF
Section 01 Summary
Layer 2 Distributed VLANs on Access Switches
Layer 2 Local VLANs on Access Switches
Layer 3 Access-to-Distribution Interconnection
Daisy-Chaining Access Layer Switches
Daisy-Chaining Access Switch Issues
StackWise Technology Access Switches
Avoiding Too Little Redundancy
Impact of Uplink Failure
Section 02 Summary
Network Management Overview
Syslog Overview
Syslog Features
Cisco Syslog Message Standard
Example: Syslog Messages
System Log Configuration
Demo - Logging
SNMP Overview
About SNMPv2
About SNMPv3
SNMP Recommendations
SNMP Configuration

Demo - SNMP
SLA Review
IP SLA Measurements
IP SLA Operations
IP SLA Source and Responder
IP SLA Operation with Responder
IP SLA Responder Time Stamps
IP SLA Configuration
IP SLA Verification
Section 03 Summary
Module 05 Review

Module 06 - Implementing Layer 3 High Availability 1hr 46m

First-Hop Redundancy
Routing Issues: Using Proxy ARP
Routing Issues: Using Default Gateways
Router Redundancy
Router Redundancy Failover
HSRP Configuration
Virtual Router MAC Address
Forwarding Through Active Router
Active and Standby Routers
HSRP States
HSRP State Transition
HSRP Priority and Preemption
HSRP and STP
HSRP Authentication
HSRP and Timers
HSRP Timer Configuration
HSRP Versions
Displaying the Standby Status
HSRP Interface Tracking
Tracking Options
HSRP and IP SLA Tracking
Demo - HSRP
Multiple HSRP Groups
Multiple HSRP Group Configuration
Monitoring HSRP
Section 01 Summary
HSRP vs. VRRP
About VRRP
VRRP Operations Process
VRRP Configuration
About GLBP
GLBP vs. HSRP
GLBP Operations
GLBP Operation
GLBP Interface Tracking
GLBP Weights and Decrements
GLBP Configuration
GLBP and VLAN Spanning
Section 02 Summary
Module 06 Review

Module 07 - Minimizing Service Loss and Data Theft in a Campus Network — 2hrs 55m

Minimizing Service Loss and Data Theft
Overview of Switch Security
Modularizing Internal Security
Reasons for Internal Security
Rogue Devices
Switch Attack Categories
MAC Flooding Attack
Port Security Prevents MAC-Based Attacks
Configuring Port Security on a Switch
Verifying Port Security
Verifying Port Security (Cont.)
Configuring Sticky MAC Addresses
Demo - Port Security
AAA Network Configuration
Configuring User AAA Authentication
Demo - Authentication
802.1X Port-Based Authentication
Configuring 802.1X
Section 01 Summary
Explaining VLAN Hopping
VLAN Hopping with Double Tagging
Mitigating VLAN Hopping
Types of ACLs
Configuring VACLs
Demo - VACL
Section 02 Summary
Cisco Catalyst Intergrated Security Features
DHCP Spoofing Attacks
DHCP Messages
DHCP Snooping Protects Against Rogue and Malicious DHCP Servers
DHCP Snooping
Configuring DHCP Snooping
Verifying DHCP Snooping
ARP Poisoning
DAI Protection Against ARP Poisoning
About DAI
Configuring DAI
IP Source Guard Protection Against Spoofed IP Addresses
IP Source Guard
Catalyst Intergrated Security Configuration
Section 03 Summary
Discovering Neighbors with Cisco Discovery Protocol
Neighbor Discovery Protocols
Cisco Discovery Protocol Configuration
Demo - Neighbor Discovery
LLDP Configuration
Vulnerabilities of Discovery Protocols
Vulnerabilities of the Telnet Protocol
About SSH
Configuration of SSH
Configuration of vty ACLs
Configuration of an HTTP Server
Section 04 Summary
Module 07 Review

Module 08 - Accommodating Voice and Video in Campus Networks 1hr 34m

Voice and Video
Unified Communications
IP Telephony Components
Characteristics of Voice and Data
Video Applications
Voice and Video Traffic
Requirements for Voice, Data, and Video Traffic
Voice and Video in the Campus Network
Section 01 Summary
Meeting the Requirements
Voice Implementation Steps
Voice VLANs
IP Telephony Extends the Network Edge
Multi-VLAN Access Port
Voice VLAN Configuration
Demo - Voice VLANs
Power Sources for Access Points and IP Phones
Power over Ethernet (PoE)
Power over Ethernet 802.3af
New PoE Developments
PoE Switch
Switch Power Budget
PoE Switch Port Status
Additional VoIP Services
Test Plan
Section 02 Summary
High Availability for VoIP and Video
Building a Voice, Video, and Data Campus Network
Determining Equipment and Cabling Needs
Resource Contention
Recommended Practices: QoS
QoS in the Campus Network
Classification and Marking
Layer 2 Marking: 802.1p, CoS
Layer 3 Marking: IP Precedence, DSCP
Classification Tools: Trust Boundaries
Cisco IP Phone Connected to a Switch
Voice VLAN Configuration 2
Demo - MLS QOS
Cisco AutoQoS
Cisco AutoQoS Configuration
Monitoring Cisco AutoQoS
Section 03 Summary
Module 08 Review

Module 09 - Integrating Wireless LAN into a Campus Network 1hr 20m

Wireless LAN
Cisco Unified Wireless Network Components
Wireless LAN 2
WLANs and LANs
Similarities Between WLANs and LANs
Differences Between WLANs and LANs
Summary of Differences Between WLANs and LANs
WLAN AP Topology

About SSIDs
SSID and VLAN Support
Client Roaming
Layer 2 vs. Layer 3 Roaming
Security on WLANs and LANs
Section 01 Summary
Cisco WLAN Implementations
Standalone WLAN Solution 1
Traffic Flow Between Wireless Clients - Standalone WLAN Solution
Controller-Based WLAN Solution 1
Controller-Based WLAN Solution 1 (Cont.)
Traffic Flow Between Wireless Clients - Controller-Based WLAN Solution
About H-REAP
Comparison of WLAN Solutions
Types of WLAN Controllers
Standalone WLAN Solution 2
SSIDs, VLANs, and Trunks in the Standalone Solution
Controller-Based WLAN Solution 2
SSIDs, VLANs, and Trunks in the Controller-Based Solution
SSIDs, VLANs, and Trunks with the H-REAP
Controller-Based AP Protocol
WLC Ports and Protocols
Section 02 Summary
AP and Controller Placement
Distributed WLC Deployment
Centralized WLC Deployment
WLAN Devices Connected to Switches
WLAN Device Connections
Standalone AP and H-REAP
Controller-Based AP
WLAN Controller
4400 Series Controller with Link Aggregation
Link Aggregation
Switch Configuration for Link Aggregation
Cisco WiSM in Catalyst 6500 Series Switch
Cisco WiSM in Catalyst 6500 Series Switch (Cont.)
Gathering Requirements
Implementation Plan
Test Plan
Section 03 Summary
Module 09 Review
Course Closure

Total Duration: 17hrs 2m