



TECHNET srl

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# Building Cisco Multilayer Switched Networks

Il corso insegna come implementare le reti di tipo campus usando le tecnologie switching multilayer con Ethernet ad alta velocità e le tipologie wireless. Inoltre affronta i temi dell'integrazione delle tecnologie di routing e switching per creare una rete efficiente. Insegna a progettare, costruire e configurare una rete campus al fine di mantenere un elevato grado di affidabilità, performance e sicurezza indipendentemente da guasti di livello fisico o di apparati (router o switch) conservando intatti i requisiti delle applicazioni quali voce, video e wireless.

Tecnologie come lo Spanning Tree (802.1D), Rapid Spanning Tree (802.1W), Multiple Spanning Tree (802.1S), Uplinkfast e Backbonefast verranno spiegate in dettaglio al fine determinare come si può ottimizzare i tempi di convergenza di una rete in caso di guasto. Si impara come ottenere più banda passante tra apparati di rete per mezzo di EtherChannel. Si impara come configurare e ricercare i guasti in ambito HSRP, convergenza voce, in ambiente real-time e QOS. Configurare la sicurezza di base come 802.1x, Port security, BPDU guard e prevenire attacchi di tipo DHCP spoof.

## Cosa si impara

- Creare una VLAN
- Diffondere informazioni VLAN con VTP
- Gestire le ridondanze dei Link con Spanning Tree
- Consentire InterVLAN Routing
- Incrementare la performance dell'IP Routing con il Multilayer Switching
- Implementare HSRP, VRRP e GLBP per Fault Tolerant Routing
- Gestire high bandwidth broadcasts con IP Multicast
- Implementare la sicurezza della connettività wireless nella topologia del campus
- Usare QoS per far incontrare i livelli di servizio richiesti dalle applicazioni
- Rendere sicura la rete e eliminare in traffico indesiderato

## Chi dovrebbe partecipare

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Il corso è indirizzato ad amministratori di rete che svolgono attività legate alla progettazione, alla sicurezza ed alle performance della rete stessa. In corso è particolarmente indicato per:

- Amministratori di Rete e tecnici responsabili dell'implementazione e del troubleshooting di una rete Multilayer Switched in ambiente Enterprise
- Candidati alle certificazioni CCNP e CCDP
- Candidati alla certificazione CCIE Routing and Switching

## Contenuto dettagliato

### 1. Introduction to Campus Networks

- Course Introduction
- Campus Networks as part of an Enterprise Network
- Devices in a Nonhierarchical Network
- Layer 2 Network Issues
- Routed Network Issues
- What is a Multilayer Switch
- Issues with Multilayer Switches and VLANs in a Nonhierarchical Network
- The Enterprise Composite Model
  - Building Access
  - Building Distribution
  - Server Farm Module
  - Campus Core
  - Network Management
- Benefits of the Enterprise Composite Model
- Campus Infrastructure Module

### 2. Defining Virtual Networks (VLANs)

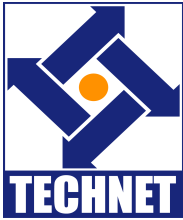
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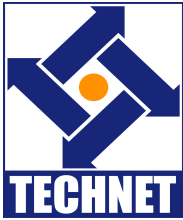
- Best Practices for VLAN Topologies
  - Issues in a Poorly Designed Network
  - Grouping Business Functions into VLANs
  - Interconnection Technologies
  - Determining Equipment and Cabling Needs
  - Mapping VLANs in a Hierarchical Network
  - Considering Traffic Source to Destination
  - Reviewing Switch Configuration Interfaces
- Implementing VLANs
  - Benefits of VLANs in an Enterprise Network
  - Local VLANs
  - End-to-End VLANs
  - VLAN Configuration Modes
  - VLAN Access Ports
  - VLAN Implementation Commands
  - Implementing a VLAN
- Implementing Trunks
  - VLAN Trunks
  - ISL Trunking
  - 802.1Q Trunking
  - 802.1Q Native VLANs
  - Issues with 802.1Q Native VLANs
  - VLAN Ranges
  - Trunking Configuration Commands
  - Configuring Trunking
  - Setting Dynamic Trunking Protocol (DTP)
- Propagating VLAN Configurations with VTP
  - VTP Domains
  - VTP Protocol
  - VTP Modes
  - VTP Pruning
  - VTP Operation
  - VTP Configuration Commands
  - Configuring a VTP Management Domain
  - Adding New Switches to an Existing VTP
- Correcting Common VLAN Configuration Errors
  - Issues with 802.1Q Native VLANS
  - Resolving Trunk Link Problems

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### 3. Implementing Spanning Tree

- Spanning Tree Protocol
  2. Transparent Bridges
  3. Identifying Traffic Loops
  4. Loop Free Network
  5. 802.1D Spanning Tree Protocol
  6. Root Bridge
  7. Port Roles
  8. Enhancements to STP
- Preventing STP Forwarding Loops
  10. Unidirectional Link Detection
  11. Loop Guard
  12. Preventing STP Failures Due to Unidirectional Links
  13. Configuring UDLD and Loop Guard
- Implementing Rapid Spanning Tree Protocol (RSTP)
  15. RSTP
  16. RSTP Port States
  17. RSTP Port Roles
  18. Edge Ports
  19. RSTP Link Types
  20. RSTP BPDU
  21. RSTP Proposal and Agreement Process
  22. RSTP Topology Change
  23. RSTP Implementation Commands
  24. Implementing RSTP Commands
- Implementing the Multiple Spanning Tree Protocol (MSTP)
  26. MSTP
  27. MSTP Regions
  28. Extended System ID
  29. Interacting between MSTP regions and 802.1Q
  30. MSTP Implementation Commands
  31. Configuring and Verifying MSTP
- Configuring Link Aggregation and EtherChannel
  33. EtherChannel
  34. PAgP and LACP Protocols
  35. EtherChannel Configuration
  36. Configuring Port Channels using EtherChannel

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## 37. Configuring Load Balancing over EtherChannel

### 4. Implementing InterVLAN Routing

- Routing Between VLANs
  2. Multilayer Switching
  3. Layer 2 Switch Forwarding Process
  4. Inter-VLAN Routing using an External Router
  5. Inter-VLAN Routing using External Router Configuration Commands
  6. Configuring Inter-VLAN Routing using an External Router
- Deploying CEF-Based Multilayer Switching
  8. Layer 3 Switching
  9. CEF-Based Multilayer Switches
  10. Multilayer Switch Packet Forwarding Process
  11. CEF Configuration Commands
  12. Enabling CEF-Based Multilayer Switching
  13. Common CEF problems and Solutions
  14. CEF Troubleshooting Commands
  15. Troubleshooting CEF-Based Multilayer Switching
- Enabling Routing Between VLANs
  17. Layer 3 Switch Virtual Interfaces
  18. Routed Interfaces on a Multilayer Switch
  19. Configuration Commands for Inter-VLAN Communication on a Multilayer Switch
  20. Configuring Inter-VLAN Routing on a Multilayer Switch

### 5. Implementing High Availability in a Campus Environment

- Configuring Layer 3 Redundancy with HSRP
  - Router Redundancy Process
  - Routing Issues
  - HSRP
  - HSRP Operations
  - HSRP States
  - HSRP Configuration Commands

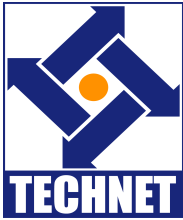
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- Enabling HSRP
- HSRP Optimization Options
- Tuning HSRP Operations
- HSRP Debug Commands
- Debugging HSRP Operations
- Configuring Layer 3 Redundancy with VRRP and GLBP
  - Virtual Router Redundancy
  - VRRP Operations Process
  - Gateway Load Balancing Protocol
  - GLBP Operations Process
  - VRRP and GLBP Configuration
  - Enabling VRRP and GLBP

## 6. Wireless Client Access

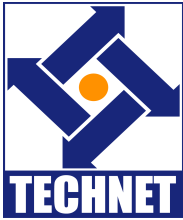
- Introducing Wireless LANs (WLANs)
  - WLANs
  - Similarities Between A LAN and a WLAN
  - Differences Between a LAN and WLAN
  - WLAN Components
  - WLAN Technology Implementations
  - Building Blocks of AP WLAN Topologies
  - Building Blocks of Bridging WLAN Topologies
  - Topology Implementations
- Wireless Theory and Standards
  - Radio Frequency (RF) Basics
  - WLAN Math
  - Types of Antennas
  - Regulatory Agencies Governing WLANs
  - Operational Standards of IEEE 802.11
  - IEEE 802.11 Standards in the 2.4GHz Band
  - IEEE 802.11a
  - Comparing the 802.11 Standards
- Implementing WLANs
  - 802.11b/g Channel Reuse
  - 802.11a Channel Reuse

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- WLAN as a Shared Medium - Best Practices
- Bridging Path Considerations
- Power Implementation
- Cisco WLAN
  - Enterprise WLAN Issues
  - Overview of Cisco WLAN
  - Comparing Autonomous and Lightweight WLAN
  - Comparing Core and Advanced Feature Roaming
  - Split MAC Architecture
  - LWAPP AP Association
  - Mixing WLAPP with Autonomous APs
- Cisco Wireless Clients
  - Wireless Client Association
  - Open Authentication
  - Pre-Shared Key Authentication (WEP)
  - Introducing WLAN Security
  - Cisco Client Cards
  - Cisco Compatible Extensions Program
- Configuring Basic WLAN
  - Available Interfaces for WLAN Configuration
  - Connect to Controller
  - Configuring the Controller
  - Verify Controller Configuration

## 7. Configuring Campus Switches to Support Voice

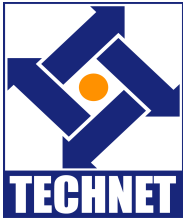
- Planning for Implementation of Voice in a Campus Network
  - Converged Network Benefits
  - VoIP Network Components
  - Traffic Characteristics of Voice and Data
  - VoIP Call Flow
  - Auxiliary VLANs
  - Quality of Service (QoS)
  - Importance of High Availability for VoIP
  - Power Requirements in Support of VoIP
- Accommodating Voice Traffic on Campus Switches

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- QoS Trust Boundaries
- LAN-Based Classification and Marking
- Basic Switch Commands to Support Attachment of a Cisco IP Phone
- Configuring a Switch for the Attachment of a Cisco IP Phone
- What is AutoQoS VoIP?
- Configuring AutoQoS VoIP on a Catalyst Switch

## 8. Minimizing Service Loss and Data Theft in a Campus Network

Switch Security Issues

Overview of Switch Security Concerns

Switch Attack Categories

MAC Flood Attack

Port Security

Port Security Configuration

Configuring Port Security on a Switch

Port Security with Sticky MAC Addresses

Unauthorized Access by Rogue Devices

802.1x Port-Based Authentication

Protecting Against VLAN Attacks

VLAN Hopping

Mitigating VLAN Hopping

VLAN Access Control Lists (VACLs)

Configuring VACLs

Private VLANs (PVLANS)

Configuring PVLANS

Protecting Against Spoof Attacks

DHCP Spoof Attack

DHCP Snooping

DHCP Snooping Configuration Commands

Configuring DHCP Snooping

MAC Spoof Attack

Address Resolution Protocol

Commands to Configure Dynamic ARP Inspection

Protecting Against ARP Spoofing Attacks

Securing Network Switches

Vulnerabilities in the Cisco Discovery Protocol

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Vulnerabilities in the Secure Shell Protocol  
Vulnerabilities in the Telnet Protocol  
VTY ACLs  
Commands to Apply ACLs to VTY  
STP Security Mechanisms  
Protecting the Operation of STP  
BPDU Guard Configuration  
BPDU Filtering Configuration  
Root Guard  
Root Guard Configuration Commands  
Configuring Root Guard

## Prerequisiti

- (CI-ICND1) Interconnecting Cisco Network Devices 1
- (CI-ICND2) Interconnecting Cisco Network Devices 2

Oppure:

- (CI-CCNA) Cisco Certified Network Associate

## Corsi successivi

(CI-ONT) Optimizing Converged Cisco Networks  
(CI-BSCI) Building Scalable Cisco Internetworks v3.0  
(CI-ISCW) Integrating Secure Converged Wide Area Networks

## Esami / Certificazioni

L'esame BCMSN è parte dei percorsi di certificazione [CCDP](#)/ CCIP e CCNP.

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