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# CCNP ENTERPRISE SYLLABUS

**Prepared For :**  
Eduva Tech

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# Course Outline

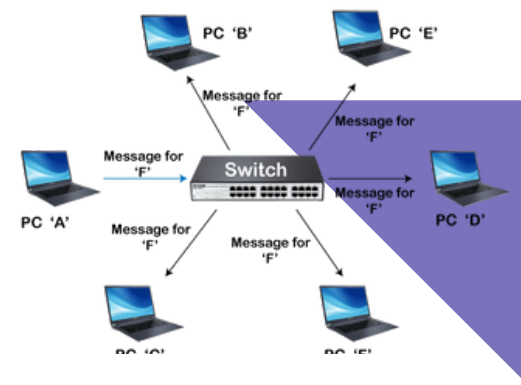
## BASIC SWITCHING

## SWITCH ADMINISTRATION

- Managing MAC address table
- Errdisable recovery
- L2 MTU

## LAYER 2 PROTOCOLS

- CDP, LLDP
- UDLD



## VLAN TECHNOLOGIES

- Access ports
- Trunk ports (802.1Q)
- Native VLAN
- Manual VLAN pruning
- VLAN database
- Normal range and extended range VLANs
- Voice VLAN
- VTP

## ETHERCHANNEL

- LACP, static
- Layer 2, Layer 3
- Load balancing
- EtherChannel Misconfiguration Guard

## SPANNING TREE PROTOCOL

- PVST+, Rapid PVST+, MST
- Switch priority, port priority, path cost, STP timers
- PortFast, BPDU Guard, BPDU Filter
- Loop Guard, Root Guard



## **ROUTING CONCEPTS**

- Administrative distance
- VRF-lite
- Static routing
- Policy Based Routing
- VRF-aware routing with any routing protocol
- Route filtering with any routing protocol
- Manual summarization with any routing protocol
- Redistribution between any pair of routing protocols
- Routing protocol authentication
- Bidirectional Forwarding Detection

## **EIGRP**

### 1. Adjacencies

- Best path selection
- RD, FD, FC, successor, feasible successor
- Classic Metrics and Wide Metrics

### 2. Operations

- General operations
- Topology table
- Packet types
- Stuck In Active
- Graceful shutdown



## **EIGRP LOAD BALANCING**

- Equal-cost
- Unequal-cost
- Add-path

## **EIGRP NAMED MODE**

- Optimization, convergence and scalability
  1. Fast convergence requirements
  2. Query propagation boundaries
  3. Leak-map with summary routes
  4. EIGRP stub with leak map

## **OSPF (V2 AND V3)**

1. Adjacencies
2. Network types, area types
3. Path preference

## **OPERATIONS**

1. General operations
2. Graceful shutdown
3. GTSM (Generic TTL Security Mechanism)

## **OPTIMIZATION, CONVERGENCE AND SCALABILITY**

- Metrics
- LSA throttling, SPF tuning, fast hello
- LSA propagation control (area types)
- Stub router
- Loop-free alternate
- Prefix suppression



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## **BGP**

- IBGP and EBGP peer relationships
- Peer-group/update-group, template
- Active, passive
- Timers
- Dynamic neighbors
- 4-byte AS numbers
- Private AS

## **PATH SELECTION**

- Attributes
- Best path selection algorithm
- Load balancing

## **ROUTING POLICIES**

- Attribute manipulation
- Conditional advertisement
- Outbound Route Filtering
- Standard and extended communities
- Multi-homing

## **AS PATH MANIPULATIONS**

- local-AS, allowas-in, remove-private-as
- Prepend
- Regexp



## CONVERGENCE AND SCALABILITY

- Route reflector
- Aggregation, as-set

## OTHER BGP FEATURES

- Multipath, add-path
- Soft reconfiguration, Route Refresh

## MULTICAST

- Layer 2 multicast
- IGMPv2, IGMPv3
- IGMP Snooping, PIM Snooping
- IGMP Querier
- IGMP Filter
- ML

## REVERSE PATH FORWARDING CHECK

- PIM
- Sparse Mode
- Static RP, BSR, AutoRP
- Group to RP Mapping
- Bidirectional PIM
- Source-Specific Multicast
- Multicast boundary, RP announcement filter
- PIMv6 Anycast RP
- IPv4 Anycast RP using MSDP
- Multicast multipath



## **CISCO SD ACCESS**

- Design a Cisco SD Access solution
  - 1.Underlay network (IS-IS, manual/PnP)
  - 2.Overlay fabric design (LISP, VXLAN, Cisco TrustSec)
  - 3.Fabric domains (single-site and multi-site using SD-WAN transit)

## **CISCO SD ACCESS DEPLOYMENT**

- 1.Cisco DNA Center device discovery and device management
- 2.Add fabric node devices to an existing fabric
- 3.Host onboarding (wired endpoints only)
- 4.Fabric border handoff

## **SEGMENTATION**

- 1.Macro-level segmentation using VNs
- 2.Micro-level segmentation using SGTs (using Cisco ISE)

## **ASSURANCE**

- 1.Network and client health (360)
- 2.Monitoring and troubleshooting



## CISCO SD-WAN

- Design a Cisco SD-WAN solution
- Orchestration plane (vBond, NAT)
- Management plane (vManage)
- Control plane (vSmart, OMP)
- Data plane (vEdge/cEdge)

## CONFIGURATION TEMPLATES

## LOCALIZED POLICIES (ONLY QOS)

## CENTRALIZED POLICIES

- Application Aware Routing
- Topologies
- MPLS

## OPERATION

- stack, LSR, LSP
- LDP
- MPLS ping, MPLS traceroute

## OPERATIONS

- Label stack, LSR, LSP
- LDP
- MPLS ping, MPLS traceroute

## L3VPN

- PE-CE routing
- MP-BGP VPNv4/VPNv6
- Extranet (route leaking)
- DMVPN



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## TROUBLESHOOT DMVPN PHASE 3 WITH DUAL-HUB

- NHRP
- IPsec/IKEv2 using pre-shared key
- Per-Tunnel QoS

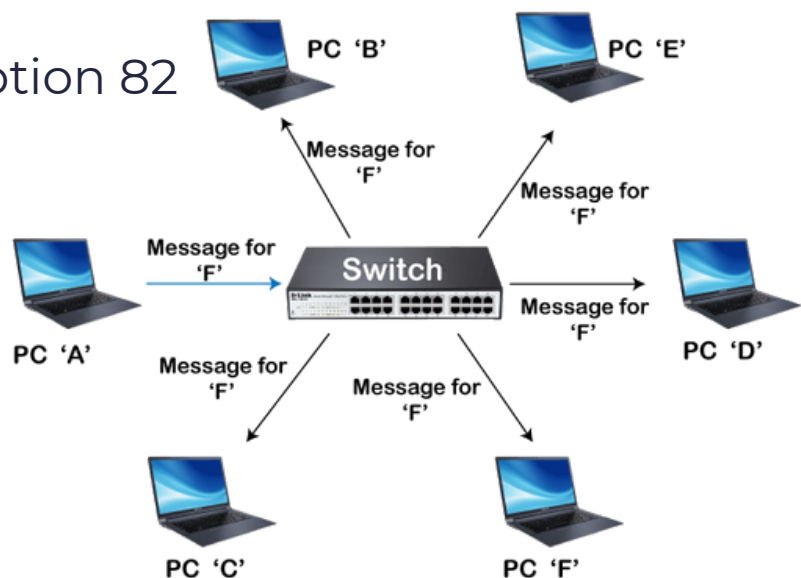
## IDENTIFY USE CASES FOR FLEXVPN

- Site-to-site, Server, Client, Spoke-to-Spoke
- IPsec/IKEv2 using pre-shared key
- MPLS over FlexVPN

## SEGMENTATION

### Device Security on Cisco IOS XE

- Control plane policing and protection
- AAA
- Network Security
- 1. Switch security features
- VACL, PACL
- Storm control
- DHCP Snooping, DHCP option 82
- IP Source Guard
- Dynamic ARP Inspection
- Port Security
- Private VLAN





## ROUTER SECURITY FEATURES

- IPv6 Traffic Filters
- IPv4 Access Control Lists
- Unicast Reverse Path Forwarding

## IPV6 INFRASTRUCTURE SECURITY FEATURES

- RA Guard
- DHCP Guard
- Binding table
- Device tracking
- ND Inspection/Snooping
- Source Guard
- RA Guard
- DHCP Guard
- Binding table
- Device tracking
- ND Inspection/Snooping
- Source Guar

## IEEE 802.1X PORT-BASED AUTHENTICATION

- Device roles, port states
- Authentication process
- Host modes

## SYSTEM MANAGEMEME

- Device management
  1. Console and VTY
  2. SSH, SCP
  3. RESTCONF, NETCONF
- SNMP
- 4. Local logging, syslog, debugs, conditional debugs
- 5. Timestamps



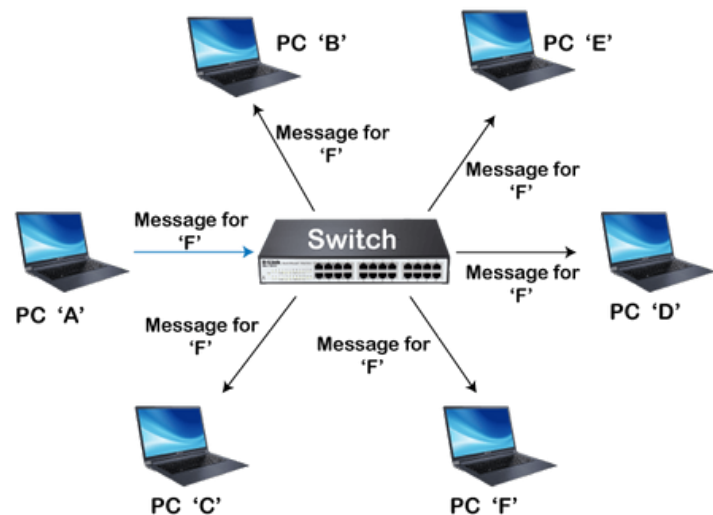
## QUALITY OF SERVICE

### END TO END L3 QOS USING MQC

- DiffServ
- CoS and DSCP Mapping
- Classification
- Network Based Application Recognition (NBAR)
- Marking using IP Precedence, DSCP, CoS
- Policing, shaping
- Congestion management and avoidance
- HQoS, Sub-rate Ethernet Link

### NETWORK SERVICES

- First Hop Redundancy Protocols
  - 1.HSRP, GLBP, VRRP
  - 2.Redundancy using IPv6 RS/RA
- Network Time Protocol
  - 3.Master, client
  - 4.Authentication
- DHCP on Cisco IOS
  - 5.Client, server, relay
  - 6.Options
  - 7.SLAAC/DHCPv6 interaction
  - 8.Stateful, stateless DHCPv6
  - 9.DHCPv6 Prefix Delegation





## IPV4 NETWORK ADDRESS TRANSLATION

- Static NAT, PAT
- Dynamic NAT, PAT
- Policy-based NAT, PAT
- VRF-aware NAT, PAT
- IOS-XE VRF-Aware Infrastructure (VASI) NA

Software

## NETWORK OPTIMIZATION

### IP SLA

- ICMP probes
- UDP probes
- TCP probes

### TRACKING OBJECT

### FLEXIBLE NETFLOW

### NETWORK OPERATIONS

### TRAFFIC CAPTURE

- SPAN
- RSPAN
- ERSPAN
- Embedded Packet Capture

## CISCO IOS-XE TROUBLESHOOTING TOOLS

- Packet Trace
- Conditional debugger (debug platform condition)
- Data encoding formats
- JSON
- XM



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## **AUTOMATION AND SCRIPTING**

### **GUEST SHELL**

- Linux environment
- CLI Python module
- .EEM Python module
- Programmability
- Interaction with vManage API
- Python requests library and Postman
- Monitoring endpoints
- Configuration endpoints

### **INTERACTION WITH CISCO DNA CENTER API**

- HTTP request (GET, PUT, POST) via Python requests library and Postman

### **INTERACTION WITH CISCO IOS XE API**

- Via NETCONF/YANG using Python ncclient library
- Via RESTCONF/YANG using Python requests library and Postman

### **DEPLOY AND VERIFY MODEL-DRIVEN TELEMETRY**

- Configure on-change subscription using gRPC3