

CCNA/CCNP Training Outline

Networking concepts

- Components of network – router, switch, hub, bridge etc
- Types of Network - LAN, WAN, VPN, & Content Network
- Defining Network requirements – NIC- Ethernet (CSMA/CD) • 10/100/1000 mbps DUPLEX (Half/Full/Auto) - Connecting Media – Coax.
- 10 base 2T - UTP/STP - CAT 1/2/3.. • Straight through/cross crimping (only details no practical)
- Fiber optics - Single/Multimedia • 100 Base TX/FX etc - wireless communication. • Ethernet cabling Standard.
- Connecting Devices • Repeater – Hub – Switch – Bridge - Topology – Bus/Star/Ring

OSI – Model

- 7 Layers - Communication between the Layers (Encapsulation & De-encapsulation) - PDU. • Layer 2 - MAC/LLC - 802.3/802.2 (SAP/SNAP) /Ethernet II – Frames
- Broadcast/Collision domain - point of -Hub/Switch/Router
- L4 - 3way handshake - windowing - and about – Connectionless
- Packet size [64B (mini) to 1518B (Max)]

TCP/IP Model & Ipv4 Addressing

- All Layers of TCP/IP Compound with - OS
- Application Layer - TFTP/FTP/SMTP/TELNET/SNMP/DNS
- Transport Layer - TCP/UDP - TCP Segment Format
- 3 way handshake/windowing - UDP segment Format
- Internet Layer
- IP datagram format - Protocol No. - TCP 6 - UDP 17
- ICMP – ARP – RARP
- Introduction to IP addressing - Class A/B/C/D/E
- Private IP address - First OCTET range etc. Subnetting
- Default

Subnet Mask

- Class C Subnetting & Practice no. given
- Class B Subnetting & problems
- Class A Subnetting & problems

Introduction to IPV6

- Introduction to IPv6
- Host Address Assignment
- Unicast, Multicast and other Special IPv6 Addresses
- Configuring IPv6 Routing and Routing Protocols
- Translations between IPv4 and IPv6
- Describing IPv6 Features Defining IPv6 Addressing
- Describing IPv6 Addressing Architecture
- Defining Address Representation
- IPv6 Address Types
- IPv6 Tunnels
- Multiple ISPs and LANs with Multiple Routers

- Summary

Basic of Router & Configuration

• Selection of Router & Cabling a Route

- o When Router used - LAN with WAN connect – to connect networks of different IP
- o Different interface of Router - AUI /S0/S1/AUX - console / BRI etc.
- o Cables used in different interfaces/purpose of interfaces.
- o WAN interface cable - EIA/TIA - 232/449/530 - V.35 - X.21
- o Different CISCO series - modular/fixed - 10mbps/100 etc
- o Straight through between DTE & DCE

Different modes of operation & basic commands

• Internal Components:

- o ROM - POST - BSL - ROM-MONITOR PRG – MINI IOS
- o Different interface of Router - AUI /S0/S1/AUX - console / BRI etc.
- o DRAM -Running Config
- o NVRAM - Startup Config
- o Flash MEM – IOS

• Different Modes:

- o ROM Monitor - Reboot Mode - Setup – Exec Model

• Exec Mode

- o User -Privilege - Global - Sub-configuration mode

- o Syntax/command to switch between modes
- o Assigning IP address for -E0-S0-S1 o Enabling/disabling - console/privilege / vty password
- o Mold – command o Show Config / start / run / version / flash

Basic commands practice

- o Changing between modes - (user-privilege- Global-etc)
- o IP address configuration-E0-S0-S1
- o Password - enabling - encrypting it o Practice – motd – show commands – editing commands
- o Assigning host name (for Router)

Advanced Commands

- o Register value - X2102 - boot field value/purpose ROM monitor made - password breaking 8th/6th/13th bit of register value
- o Boot system flash/network/ROM - config-register (Changing register value) - etc command purpose Booting sequence - Backup & Recovery – CDP
- o Practice an above commands as well as following
- o Telnet - [ctrl+shift+6]x - disconnect – sh users /Sessions
- o Clear lines resume - [hostname resolving in telnet domain Enabling/disabling etc - no practical for this alone]

IP Routing

- IP Routing, Static Routing & Default Routing
- o IP routing - static routing - default- dynamic routing.
- o Providing clock rate to up the link after identifying DCE by "Sh controllers" command. o Commands/syntax - Static/default routing

Static Routing & Default Routing

- o Practical-session for Static & default routing

Dynamic Routing and RIP o Dynamic Routing

- IGP & EGP. o IGP - RIP-OSPF - EGRP – EIGRP
- o Classes of Routing Protocol - Distance vector
- Link State - Balanced hybrid o Role of Routing Protocol
- builds/updates/selects & Routes the packet o Soluting for Routing loops
- Max. loop count - split horizon
- Route poison Reverse –
- Hold down Timer o Features of RIP –
- distance vector algorithm
- RIP V1/V2 - load sharing - metric (depends – loop count)
- o Metric value depends - loop count - Ticks - delay - Reliability - cost - MTU – Bandwidth
- o Command - Router RIP Network o Sh IP route
- o Timer value for RIP– Update/Invalid/ hold down/flush Timer

Dynamic Routing – RIP Practical, Dynamic Routing EIGRP & OSPF

- o Limitations of distance vector algorithm
- o Features of EIGRP and its operations
- o Configuring EIGRP – “Auto-redistribution”
- o Verify and troubleshooting EIGRP
- o Features of OSPF and its operation
- o Selection of DR and BDR election
- o Configuring single area OSPF
- o Verify and troubleshoot

Access List

- o Purpose/advantage of Access-list o IP [-for a host – for a network/sub network].
- o Std IP access-list - wild card calculation
- o Extd IP access list o Switch port ACL,
 - o Step involved in creating access list
- o Applying access list at the interface – (inbound/outbound)
- o Named access-list for IP
- o Access-list in Telnet sessiont

IP standard Access List

- o Practical on
- o IP Std access-list

IP Extended Access List

- o IP Extd access-list, named access lists

NAT

- o Implement, Verify & Troubleshoot NAT
- ♣ Explain the Basic Operation Of NAT
- ♣ Using (including CLI/SDM)
- ♣ Practicals on Static NAT, Dynamic NAT and PAT
- ♣ Troubleshoot NAT issues

WAN Technologies

- o WAN Technologies- Leased Line
- ♣ Leased line
- ♣ P to P communication
- ♣ HDLC & PPP protocol-features

- ♣ Enabling HDLC & PPP

o PPP Link

- ♣ PPP layer & its explanation/role
- ♣ PAP/CHAP role
- ♣ Configuring PAP/CHAP using commands

o VPN

- ♣ Describe VPN technology
- ♣ Importance Of VPN
- ♣ Benefits & Role
- ♣ Impact & Components

o Frame-Relay

- ♣ Packet Switched Network
- ♣ Virtual circuit – DLCI – Access-link – CRI – FECN – BECN - LMI
- ♣ Enabling Frame-
- ♣ Inverse ARP
- ♣ Configuring frame-relay for
 - ♣ Mesh Network
 - ♣ Star Network
 - ♣ Combination of above two

Switching

- Operation and Configuration

- ♣ Function –add-learning / Forward-filters the Frame / loop avoidance
- ♣ Redundant path and its problems
- ♣ Spanning Tree Protocol - purpose – its different state (blocking/listening/learning/forwarding)
- ♣ Modes of operation of switch/Bridge
- ♣ Port duplexing
 - ♣ Switch & hub – half duplex
 - ♣ Switch & Server – full duplex
- ♣ Basic and advanced commands
- ♣ Enabling & configuring MAC address table

o VLAN Configuration

- ♣ VLAN – ISL – Trunking
- ♣ Enabling Trunking

- ♣ Assigning VLAN No. & name
- ♣ Configuring ports to a specific VLAN
- ♣ VTP purpose
- ♣ VTP domain
- ♣ VTP modes of operation
- ♣ Switching Technologies (including VTP , RSTP , PVSTP, 802.1q)
- ♣ Implement Basic Switch Security (including Port Security , Trunk access .etc)

Wireless LAN

o Wireless Intro & Operation

- ♣ Standards associated with Wireless Media (including WI-FI Alliance, ITU/FCC)
- ♣ Ad-hoc mode, infrastructure mode
- ♣ SSID, BSS, ESS
- ♣ Basic Parameters to configure on a Wireless Network
- ♣ Wireless Security Feature's (WEP, WPA 1 / 2)
- ♣ Implementing Wireless Networks

Routing

- Addressing
- Routing and its Importance

Introducing EIGRP

- EIGRP Capabilities and Attributes
- Underlying Processes and Technologies
- EIGRP Operation
- EIGRP Tables
- EIGRP Metric
- Calculating the EIGRP Metric
- Integrating the EIGRP and IGRP Routes Implementing and Verifying EIGRP
- Configuring Basic EIGRP
 - Using a Wildcard Mask in EIGRP
- Configuring the ip default-network Command
 - ip default-network Command
- Verify EIGRP IP Routes
- EIGRP Configuration, Verify EIGRP IP Operations
- Configuring Advanced EIGRP Options

- Route Summarization
- Configuring Manual Route Summarization
- Load Balancing Across Equal Paths
- Configuring Load Balancing Across Unequal-Cost Paths
- Variance
 - EIGRP Bandwidth Use Across WAN Links
 - Configuring EIGRP Bandwidth Use Across WAN Links
- WAN Configuration—Frame Relay Hub-and-Spoke Topology
- WAN Configuration—Hybrid Multipoint Configuring
 - Router Authentication
 - MD5 Authentication
 - Configuring MD5 Authentication
 - Verifying MD5 Authentication
 - Troubleshooting MD5 Authentication Using EIGRP in an Enterprise Network
- Scalability in Large Networks
- EIGRP Queries
- EIGRP Stubs
 - Limiting Updates and Queries: Using EIGRP Stub
 - EIGRP stub Parameters
- SIA Connections
- Preventing SIA Connections
- Graceful Shutdown

Introducing the OSPF Protocol

- Link-State Routing Protocols
- OSPF Area Structure
- OSPF Adjacency Databases
- Calculating the OSPF Metric
- Link-State Data Structures
- OSPF Neighbor Adjacencies
- Exchanging and Synchronizing LSDBs
- Maintaining Network Routes
- Maintaining Link-State Sequence Numbers
- debug ip ospf packet
- Configuring Basic Single-Area and Multiarea OSPF
- Configuring OSPF on Internal Routers of a Single Area
- Configuring OSPF for Multiple Areas
- Configuring a Router ID
- Verifying the OSPF Router ID
- Verifying OSPF Operation
 - The show ip route ospf Command
 - The show ip ospf interface Command
 - The show ip ospf neighbor Command
- Introducing OSPF Network Types

- Adjacency Behavior for a Point-to-Point Link
- Adjacency Behavior for a Broadcast Network Link
- Selecting the DR and BDR
- Adjacency Behavior for an NBMA Network
- OSPF over Frame Relay Configuration Options
- Sample Configuration of a Router Using OSPF Broadcast Mode
- OSPF over Frame Relay NBMA Configuration
- neighbor Command
- OSPF over Frame Relay Point-to-Multipoint Configuration
- Point-to-Multipoint Configuration
- Using Subinterfaces in OSPF over Frame Relay Configuration
- Point-to-Point Sub interface
- Multipoint Sub interface
- OSPF over NBMA Topology Summary
- Tracking OSPF Adjacencies Link-State Advertisements
- OSPF Router Types
- OSPF Hierarchical Routing
- OSPF Virtual Links
- OSPF Virtual Link Configuration
- show ip ospf virtual-links Command
- **OSPF LSA Types • Type 1 • Type 2 • Types 3 and 4 • Type 5 • Type 6 • Type 7 • Type 8 • Types 9, 10, and 11**
- LSA Type 4—Summary LSA
- Interpreting the OSPF LSDB and Routing Table
- Interpreting the OSPF Database
- Configuring OSPF LSDB Overload Protection
- Changing the Cost Metric OSPF Route Summarization
- OSPF Route Summarization
- Using Route Summarization
- Configuring OSPF Route Summarization
- Route Summarization Configuration at ABR
 - Route Summarization Configuration at ASBR
- Benefits of a Default Route in OSPF
- Default Routes in OSPF
- Configuring a Default Route in OSPF
- Default Route Configuration Configuring OSPF Special Area
- Configuring OSPF Area Types
- Configuring Stub Areas
 - Configuring Totally Stubby Areas
- Interpreting Routing Tables
 - Routing Table in a Standard Area
 - Routing Table in a Stub Area
 - Routing Table in a Stub Area with Summarization
 - Routing Table in a Totally Stubby Area
- Configuring NSSAs Configuring OSPF Authentication
- Types of Authentication

- Configuring Simple Password Authentication
- Troubleshooting Simple Password Authentication
- Configuring MD5 Authentication
- Verifying MD5 Authentication
- Troubleshooting MD5 Authentication Operating a Network Using Multiple IP Routing Protocols
- Using Multiple IP Routing Protocols
 - Defining Route Redistribution
- Using Seed Metrics Configuring and Verifying Route Redistribution
- Configuring Redistribution
- Redistributing Routes into RIP
- Redistributing Routes into OSPF
- Redistributing Routes into EIGRP
- Redistributing Routes into IS-IS
- Verifying Route Redistribution Controlling Routing Update Traffic
- Configuring a Passive Interface
- Configuring Route Filtering Using Distribute Lists
- Implementing the Distribute List
- Defining Route Maps
- Using route-map Commands
- Implementing Route Maps with Redistribution
- Defining Administrative Distance
- Modifying Administrative Distance DHCP (Dynamic Host Configuration Protocol)
- Describing the Purpose of DHCP
- Understanding the Function of DHCP
- Configuring DHCP
- Configuring the DHCP Client
- Explaining the IP Helper Address
- Configuring DHCP Relay Services

Explaining BGP Concepts and Terminology

- Using BGP in an Enterprise Network
- BGP Multihoming Options
- BGP Routing Between Autonomous Systems
- BGP Is Used Between Autonomous Systems
- AS Numbers
- Comparison with IGP
- Path-Vector Functionality
- Features of BGP
- BGP Message Types Explaining EBGP and IBGP
- BGP Neighbor Relationships
- Establishing EBGP Neighbor Relationships
- Establishing IBGP Neighbor Relationships
- IBGP on All Routers in Transit Path

- IBGP in a Transit AS
- IBGP in a Nontransit AS
- TCP and Full Mesh Configuring Basic BGP Operations
- Initiate Basic BGP Configuration
- Activate a BGP Session
- The BGP neighbor Command
- Shutting Down a BGP Neighbor
- BGP Configuration Considerations
- Identifying BGP Neighbor States
- Authenticating in BGP
- Troubleshooting BGP Selecting a BGP Path
- Characteristics of BGP Attributes
- AS Path Attribute • Next-Hop Attribute
- Origin Attribute
- Local Preference Attribute
- MED Attribute
- Weight Attribute
- Determining the BGP Path Selection
- Selecting a BGP Path
- Path Selection with Multi-homed Connection Using Route Maps to Manipulate Basic BGP Paths
- Setting Local Preference with Route Maps
- Setting the MED with Route Maps
- Implementing BGP in an Enterprise Network

Cloud

Azure Cloud

- Vm (Virtual Machine)
- Virtual network (point to site & site to site)
- Peering (vnet peering & Global peering)
- Load Balancer
- Application gateway
- Traffic Manager
- Network security group
- Force Tunneling
- Regional VNet
- Cross Premises
- Backup and site recovery
- Storage Security

- Scaling
- Media services
- Webapp services
- SQL Database
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