

## **I. General Networking Theory**

- A. General Routing Concepts
  - 1. Link State and Distance Vector Protocols
  - 2. Split Horizon
  - 3. Summarization
  - 4. Classful and a Classless routing protocol
  - 5. Routing decision criteria
- B. Routing Information Base (RIB) and Routing Protocols Interaction
  - 1. Administrative Distance
  - 2. Routing Table
  - 3. RIB and Forwarding Information Base interaction
- C. Redistribution
  - 1. Redistribution between routing
  - 2. Troubleshooting routing loop

## **II. Bridging and LAN Switching**

- A. Spanning Tree Protocol (STP)
  - 1. 802.1d
  - 2. 802.1w
  - 3. 802.1s
  - 4. Loopguard
  - 5. Rootguard
  - 6. Bridge Protocol Data Unit (BPDU) Guard
  - 7. Storm Control
  - 8. Rapid Spanning Tree Protocol (RSTP)
  - 9. Unicast flooding
  - 10. STP port roles, failure propagation and loopguard operation
- B. LAN Switching
  - 1. Trunks
  - 2. VLAN Trunking Protocol (VTP) administrative functions
- C. Ethernet
  - 1. Speed
  - 2. Duplex
  - 3. Ethernet
  - 4. Fast Ethernet
  - 5. Gigabit Ethernet

### III. **IP**

- A. Addressing
  - 1. Subnetting
  - 2. Hot Standby Routing Protocol (HSRP)
  - 3. Gateway Load Balancing Protocol (GLBP)
  - 4. Virtual Router Redundancy Protocol (VRRP)
  - 5. Network Address Translation (NAT)
- B. Services
  - 1. Network Time Protocol (NTP)
  - 2. Dynamic Host Control Protocol (DHCP)
  - 3. Web Cache Communication Protocol (WCCP)
- C. Network Management
  - 1. Logging and Syslog

### IV. **IP Routing**

- A. OSPF
  - 1. Standard OSPF area
  - 2. Stub area
  - 3. Totally stub area
  - 4. Not-so-stubby-area (NSSA)
  - 5. Totally NSSA
  - 6. Link State Advertisement (LSA) types
  - 7. Adjacency on a point-to-point and on a multi-access (broadcast)
  - 8. OSPF graceful restart
  - 9. Troubleshooting failing adjacency formation to fail
  - 10. Troubleshooting of external route installation in the RIB
- B. BGP
  - 1. Protocol on which BGP peers communicate
  - 2. Next Hop
  - 3. Peering
  - 4. Troubleshooting of BGP route that will not install in the routing table
- C. EIGRP
  - 1. Best path
  - 2. Loop free paths
  - 3. EIGRP operations when alternate loop free paths are available and when it is not available
  - 4. EIGRP queries
  - 5. Manual summarization
  - 6. Auto-summarization
  - 7. EIGRP Stubs
  - 8. Troubleshooting of EIGRP neighbor adjacencies

- D. Policy Routing
  - 1. Concept of policy routing

V. **QoS**

- A. Modular QoS command-line (MQC) applied to:
  - 1. Network-Based Application Recognition (NBAR)
  - 2. Class-based weighted fair queueing (CBWFQ) / Modified Deficit Round Robin (MDRR)
  - 3. Policing
  - 4. Shaping
  - 5. Marking
  - 6. Random Early Detection (RED)

VI. **WAN**

- A. Frame Relay
  - 1. Local Management Interface (LMI)
  - 2. Traffic Shaping
  - 3. HUB and Spoke routers
  - 4. Dynamic Multipoint VPN (DMVPN)
  - 5. DE

VII. **IP Multicast**

- A. Internet Group Management Protocol (IGMP) v2
- B. Group addresses
- C. Shared Trees
- D. Source Trees
- E. Protocol Independent Multicast (PIM) Mechanic
- F. PIM Sparse Mode
- G. Auto-RP
- H. Anycast RP

VIII. **Security**

- A. Extended IP access lists
- B. Unicast Reverse Path Forwarding (uRPF)
- C. IP Source Guard
- D. Context Based Access Control (CBAC)

**IX. MPLS (New)**

- A. Label Switching Router (LSR)
- B. Label Switched Path (LSP)
- C. Route Descriptor
- D. Label Format
- E. Label imposition/disposition
- F. Label Distribution

**X. IPv6 (New)**

- A. IPv6 Addressing and types
- B. IPv6 Neighbor Discovery
- C. Basic IPv6 functionality protocols
- D. IPv6 Multicast and related Multicast protocols
- E. Tunneling Techniques
- F. OSPFv3
- G. EIGRPv6