1. Welcome

Welcome text

2. How to Set Up a Lab

3. Host to Host Communications

4. The Cisco IOS Operating System

5. OSI Layer 4 - The Transport Layer

6. OSI Layer 3 - The Network Layer

7. IP Address Classes

Class A addresses	
assigned to networks with a very large number of hosts	
Class A	1.0.0.0 - 126.0.0.0 /8
Reserved Class A Addresses	0.0.0.0/8 is reserved and signifies 'this network' 0.0.0.1 to 0.255.255.255 are not valid host addresses
	127.0.0.0/8 is the loopback address for the local computer 127.0.0.1 to 127.255.255.255 are not valid host addresses

Class B addresses	
assigned to medium-sized to large-sized networks	
Class B	128.0.0.0 - 191.255.0.0 /16

Class C addresses	
used for small networks	
Class C	192.0.0.0 - 233.255.255.0 /24

Class D addresses	
reserved for IP multicast addresses**	
Class D	224.0.0.0 - 239.255.255.255

Class E addresses	
'experimental and reserved for future use'**	
Class E	240.0.0.0 - 255.255.255.255

7. IP Address Classes (cont)

Reserved Class E Addresses	255.255.255.255 is the broadcast address for 'this network'

Private Addresses	
assigned to hosts but not routable on the public internet	
Class A 10.0.0.0/8	10.0.0.0 - 10.255.255.255
Class B{{nl]}172.16.0.0/16	172.16.0.0 - 172.31.255.255
Class C 192.168.0.0/16	192.168.0.0 - 192.168.255.255

8. Subnetting

❯ CIDR - Classless Inter-Domain Routing ❮

Removes the fixed /8, /16 and /24 address classes and allows them to be split or *'subnetted'* into smaller networks

For example: 175.10.10.0/20

Number of available subnets	$2^{subnet\text{-}bits}$
Example for Class C: network uses /28 subnet	We've borrowed 4 bits from the default Class C /24 subnet 2^4=16 available subnets
Example for Class B: network uses /28 subnet	We've borrowed 12 bits from the default Class B /16 subnet 2^{12}=4096 available subnets

Number of available hosts	$2^{host\text{-}bits}\text{-}2$
Substract 2 for network and broadcast addresses	

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8. Subnetting (cont)

Example for Class C: network uses /28 subnet	We have 4 bits left for hosts 2^4-2=14 available hosts per subnet
Example for Class B: network uses /20 subnet	We have 12 bits left for hosts 2^{12}-2=4094 available hosts per subnet

❯ VLSM - Variable Length Subnet Masks ❮

Allows using subnets of different sizes in the same network

9. OSI Layer 2 - The Data-Link Layer

**Operates on MAC address and ARP tables

10. OSI Layer 1 - The Physical Layer

11. Cisco Device Functions

12. The Life of a Packet

13. The Cisco Troubleshooting Methodology

14. Cisco Router and Switch Basics

15. Cisco Device Management

16. Routing Fundamentals

17. Dynamic Routing Protocols

18. Connectivity Troubleshooting

19. IGP - Interior Gateway Protocol Fundamentals

20. OSPF - Open Shortest Path First

21. VLANs - VIrtual Local Area Networks

22. Inter-VLAN Routing

23. DHCP - Dynamic Host Configuration Protocol

24. HSRP - Hot Standby Router Protocol

R1(config-if)# standby 1 ip 10.10.10.1	Add Virtual IP Address
R1# show standby	Show HSRP configuration
R1(config-if)# standby 1 priority 110	Set Priority
R1(config-if)# standby 1 preempt	Set Preemption

If no priority and no preemption is set, the router with the highest interface IP will be used as default

25. STP - Spanning Tree Protocol

*R1(config)#*text

Layer 2 Ethernet path selection is controlled by the switch's MAC address table

26. EtherChannel

27. Switch Security

28. ACLs - Access Control Lists

29. NAT - Network Address Translation

NAT was implemented as a temporary workaround to mitigate the lack of IPv4 addresses

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30. IPv6

IPv6 uses a 128bit address, compared to IPv4's 32 bit address

31. WAN - Wide Area Networks

32. The Security Threat Landscape

33. Cisco Device Security

34. Network Device Management

35. QoS - Quality of Service

36. Cloud Computing

37. Wireless Networking Fundamentals

38. Network Automation and Programmability

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