**Use MS Word, please copy/paste in Word for submittal**

Section 1

1. Switches and Vlan assignment below:

Write 2 or more paragraphs on Layer 2 Switches vs Layer 3 Switches and their importance in Networking.

A network switch: On a network, a switch is a hardware device that filters and forwards network packets, but is often not capable of much more. A network switch is more advanced than a hub, but not as advanced as a router.

The term Layer 2 is adopted from the Open System Interconnect (OSI) model, which is a reference model for explaining and describing network communications. It is the process of using devices and MAC addresses on a LAN to segment a network. Switches and bridges are mostly used for Layer 2 switching. They help to break up large size collision domain into separate smaller ones.

Layer 2 CISCO switches are similar to bridges. They interconnect networks at layer 2, mostly at the MAC sub-layer, and operate as bridges. It builds tables for the transfer of frames among systems. Helps to forward packets based on unique MAC address and it can be deployed at a low cost

**What is Layer 3 Switching?**

A Layer 3 switch is a switch that performs routing functions in addition to switching. A client computer needs a default gateway for layer 3 connectivity to any remote subnets.

This type of layer helps you to combine the functionality of a switch and a router. It acts as a switch to connect devices that are on the same subnet or virtual LAN.

This type of CISCO network switches support routing protocols. It helps to inspect incoming packets and makes routing decisions based on the source and destination addresses. That is how layer 3 switch acts as both for switch and a router.

L3 support routing between virtual LANs, Improve fault isolation and it also Provide ease of security management.

Layer 2 switches are used to reduce traffic on the local network, whereas Layer 3 switches mostly used to Implement VLAN.

The advantage of Layer 2 switches is that it helps to forward packets based on unique MAC addresses

The advantage of Layer 3 switches offers flow accounting and high-speed scalability.

The main drawback of Layer 2 switches is that it does not allow you to implement any intelligence while forwarding packets.

The picture shows an example of a NETGEAR 5 port switch



**VLAN : Short for virtual local area network, VLAN** allows a network administrator to set up separate networks by configuring a network device, such as a router, without adjusting cabling. A VLAN allows a network to be divided, set up, and changed by a network administrator to organize and filter data accordingly.

VLANs are also critical because they improve overall network efficiency by grouping devices that most frequently communicate. VLANs offer protection in bigger networks by enabling a greater degree of control over the equipment. VLANs for enhanced traffic control are mostly set up by bigger organizations for repartition devices. VLANs can be allocated using single or multiple ports (interfaces) and are grouped into logical classes depending on the connection or control type and their interaction with themselves

Section 2

Networking Layer 3,

Define terms: Trunking, ICANN, IETF, BGP, Layer 3 Switch, IPv4, IPv6, Edge Routers, and APIPA

Write out the Class C Cheatsheet in under 2 minutes, how many times did it take to memorize and recognize patterns?

This is a cognizant assignment that does not require an application or a calculator. Write it out on paper using a pencil and start writing the cheat sheet twice a day. A great brain trainer.

Resolve Class C sub mask shows all work.

192.168.11.0 /25

192.168.12.12 /26

192.168.25.32 / 28

Suggestions: Check the Network Tools folder to learn more on subnetting

An Internet Protocol (IP)Addressing for Class C is a dotted-decimal

Sample Correct: 192.168.110.11 /26 (subnet)

255.255.255.192 (sub mask)

**Subnet Basics**

A. **What is the sub mask for Class C IP addresses below**:

1. 192.168.11.0 /26

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Reference Chart** | | | | | | | |
| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **26 Bits converted to binary** | | | | | | | |
| 11111111 | 11111111 | 11111111 | 11000000 |  |  |  |  |
| **Binary conversion to decimal** | | | | | | | |
| 255 | 255 | 255 | 128+64 =192 |  |  |  |  |

**Therefore, Submask for 192.168.11.0/26 is 255.255.255.192**

**2. 192.168.122.33 /30**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Reference Chart** | | | | | | | |
| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **30 Bits converted to binary** | | | | | | | |
| 11111111 | 11111111 | 11111111 | 11111100 |  |  |  |  |
| **Binary conversion to decimal** | | | | | | | |
| 255 | 255 | 255 | 128+64 +32+16+8+4=252 |  |  |  |  |

**Therefore, Submask for 192.168.122.33/30 is 255.255.255.252**

**3. 192.168.11.0 /27 : Subnet mask = 255.255.255.224**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Reference Chart** | | | | | | | |
| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **26 Bits converted to binary** | | | | | | | |
| 11111111 | 11111111 | 11111111 | 11100000 |  |  |  |  |
| **Binary conversion to decimal** | | | | | | | |
| 255 | 255 | 255 | 128+64+32 = 224 |  |  |  |  |

Resolve Class C sub mask shows all work.

**192.168.11.0 /25 submask = 255.255.255.128**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **26 Bits converted to binary** | | | | | | | |
| 11111111 | 11111111 | 11111111 | 10000000 |  |  |  |  |
| **Binary conversion to decimal** | | | | | | | |
| 255 | 255 | 255 | 128 |  |  |  |  |

192.168.12.12 /26 :

submask = **255.255.255.192 ( see number 1 above for all work)**

**192.168.25.32 / 28,**

**submask = 255.255.255.240**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **26 Bits converted to binary** | | | | | | | |
| 11111111 | 11111111 | 11111111 | 11110000 |  |  |  |  |
| **Binary conversion to decimal** | | | | | | | |
| 255 | 255 | 255 | **128+64+32 +16 = 240** |  |  |  |  |

B**. What is the sub mask for Class B IP addresses below?**

**By default, Class B IPs are assigned 2 octets which is 16 bits when expressed as a submask in decimal it is 255.255.0.0**

**4. 172.16.0.0 /18**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Reference Chart** | | | | | | | |
| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **26 Bits converted to binary** | | | | | | | |
| 11111111 | 11111111 | 11000000 | 00000000 |  |  |  |  |
| **Binary conversion to decimal** | | | | | | | |
| 255 | 255 | 128+64=192 | 0 |  |  |  |  |

**Therefore, subnet mask for 172.16.0.0 /18 is** **255.255.192.0**

**5. 172.16.0.0 /24**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Reference Chart** | | | | | | | |
| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **26 Bits converted to binary** | | | | | | | |
| 11111111 | 11111111 | 00000000 | 00000000 |  |  |  |  |
| **Binary conversion to decimal** | | | | | | | |
| 255 | 255 | 0 | 0 |  |  |  |  |

**Therefore, subnet mask for 172.16.0.0 /24 is 255.255.0.0**

**6. 172,16.0.0 /22**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Reference Chart** | | | | | | | |
| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **26 Bits converted to binary** | | | | | | | |
| 11111111 | 11111111 | 11111100 | 00000000 |  |  |  |  |
| **Binary conversion to decimal** | | | | | | | |
| 255 | 255 | **128+64+32+16+8+4 =252** | 0 |  |  |  |  |

**Therefore, subnet mask for 172.16.0.0 /22 is 255.255.252.0**

**C. What is the sub mask for Class A IP addresses below:**

**By default, Class A IPs are assigned 1 octet which is 8 bits which when expressed as a submask in decimal it is 255.0.0.0**

**7. 10.0.0.0 /10**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Reference Chart** | | | | | | | |
| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **26 Bits converted to binary** | | | | | | | |
| 11111111 | 11000000 | 00000000 | 00000000 |  |  |  |  |
| **Binary conversion to decimal** | | | | | | | |
| 255 | **128+64=192** | 0 | 0 |  |  |  |  |

**Therefore, subnet mask for 10.0.0.0 /10 is** = **255.192.0.0**

**8. 10.0.0.0 /14**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Reference Chart** | | | | | | | |
| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **26 Bits converted to binary** | | | | | | | |
| 11111111 | 11110000 | 00000000 | 00000000 |  |  |  |  |
| **Binary conversion to decimal** | | | | | | | |
| 255 | **128+64+32+16=240** | 0 | 0 |  |  |  |  |

**Therefore, subnet mask for 10.0.0.0 /14 is** = **255.240.0.0**

**Write 3 paragraphs for each title and add pictures/diagrams on each of these router algorithms and devices.**

1. OSPF and RIpv2

2. EIGRP and IS-IS

3. BGP and AS

4. Stateful and Stateless connections differences

5. Edge routers and aggregation

6, Jumbo Frames Technology

7. MPLS

**Routers are located on the Network layer 3, Routers like servers play specific roles for different type of networks The four primary routers used throughout networks based on their topology and the business needs based on number of users.**

EIGRP

OSPF

IS-IS

Ripv2