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CPT 115 Final Project

Online Vendor for Home Decorations Network Infrastructure

Business Model

We are an online vendor who creates, sells, and ships home decorations at an affordable price directly to the customer's homes. Our specialty is basic and unique home decorations, and we offer special custom decorations that can be customized by the customers online to make an even more creative and personal decoration. These special custom decorations, of course, may come at a higher price, depending on what they want done. We also sell third-party decorations from vendors who utilize our online network and shipping services. In the future, we plan on expanding to selling, and possibly creating our own, home appliances, tools, furniture, etc.

Mission

Our mission is a simple one; we want to offer more affordable, creative, custom, unique, and personal home decorations to customers who have an interest in home décor and interior design. We want to cut out the process of going to the store, and what we believe, shopping for basic options that fail to bring "life" to the home's presentation and having very few options available and waiting for stock. We strive to be different to fit many different customers' needs and ship their decorations, safely, directly to their doorstep, all at an affordable price.

Network Details/Design

Our Original Network is **150.160.0.0/16**

We will use **VLSM** to design subnets for the network infrastructure based off of this **original network**. The total amount of networks we will have is **five** which will be: 2 for **Future Growth,** 1 for **Guests/Vendors,** 1 for **Employees,** and 1 for our **Servers.**

Each network will have a different amount of hosts depending on their use and role. The networks for Future Growth will have the most, with one of them being bigger than the other, the network for Employees will be the third largest, and then following in decreasing size for each we will have the Guests/Vendors network, and finally the network for our Servers.

Future Growth (1): 220 Hosts

Future Growth (2): 100 Hosts

Employees: 60 Hosts

Guests/Vendors: 30 Hosts

Servers: 10 Hosts

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150.160.0.0/16 VLSM Subnetting

We have 32 bits, 16 bits for the network portion and 16 bits from the host portion, /16 /16.

We are creating a bare minimum of 5 networks. So, to subnet a /16 network for this design the prefix length will be /19. This gives the capability of 8 subnets (networks) and 8190 hosts. The subnet mask will be 255.255.224.0 after doing the binary.

2^S to figure out the number of newly created subnets **(DO FIRST BEFORE 2^h-2)**

"S" should be a number to get the amount of subnets (networks) we need. We have to use a /19 that gives us 8 subnets because a /18 only gives 4, "S" will be 3.

2^(3) = 8 subnets. We took 3 bits from the host to get the 8 subnets leaving 13 bits left for the host.

2^h-2 to get amount of IP Addresses for devices. "h" is the number of bits the host has left after we take the bits we need to make the subnets. In this scenario we are taking 3 bits to get 8 subnets.

2^(13)-2 = 8190 IP Addresses. This the amount of IP Addresses we will have available for each network.

Since we are using 3 bits from the host to make the unique network IPs the prefix or subnet mask will be /19 because the 3 bits are added onto the network portion to make the new networks. Each 3rd octet must be different for each network, so as to differentiate each network and maximize the available and usable IP Addresses. They also must be in increasing sequential order for each network. The first usable address is 150.160.0.1/19.

150.160.64.0/19 VLSM Subnetting

We have 32 bits, 19 bits for the network portion and 13 bits from the host portion, /19 /13.

We are creating 3 networks. So, to subnet a /19 network for this design the prefix length will be /21. This gives the capability of 4 subnets (networks) and 2046 hosts. The subnet mask will be 255.255.248.0 after doing the binary.

2^S to figure out the number of newly created subnets **(DO FIRST BEFORE 2^h-2)**

"S" should be a number to get the amount of subnets (networks) we need. We will use a /21 that gives us 4 subnets which is perfect, "S" will be 2.

2^(2) = 4 subnets. We took 2 bits from the host to get the 4 subnets leaving 11 bits left for the host.

2^h-2 to get amount of IP Addresses for devices. “h” is the number of bits the host has left after we take the bits we need to make the subnets. In this scenario we are taking 2 bits to get 4 subnets.

2^(11)-2 = 2046 IP Addresses. This the amount of IP Addresses we will have available for each network.

Since we are using 2 bits from the host to make the unique network IPs the prefix or subnet mask will be /21 because the 2 bits are added onto the network portion to make the new networks. Each 3rd octet must be different for each network, so as to differentiate each network and maximize the available and usable IP Addresses. They also must be in increasing sequential order for each network. The first usable address is 150.160.64.1/21.

Future Growth (1)

150.160.0.0/19. The range of usable IP Addresses for this network will be from 150.160.0.0/19 which is the Network Address (NA) to 150.160.31.255/19 which is the Broadcast Address (BA) The usable IPs fall in between these two ranges: 150.160.0.1-150.160.31.254

Future Growth (2)

150.160.32.0/19 The range of usable IP Addresses for this network will be from 150.160.32.0/19 which is the Network Address (NA) to 150.160.63.255/19 which is the Broadcast Address (BA) The usable IPs fall in between these two ranges: 150.160.32.1-150.160.63.254

Employees

150.160.64.0/21 The range of usable IP Addresses for this network will be from 150.160.64.0/21 which is the Network Address (NA) to 150.160.71.255/21 which is the Broadcast Address (BA) The usable IPs fall in between these two ranges: 150.160.64.1-150.160.71.254

Guests/Vendors

150.160.72.0/21 The range of usable IP Addresses for this network will be from 150.160.72.0/21 which is the Network Address (NA) to 150.160.79.255/21 which is the Broadcast Address (BA) The usable IPs fall in between these two ranges: 150.160.72.1-150.160.79.254

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Servers

150.160.80.0/21 The range of usable IP Addresses for this network will be from 150.160.80.0/21 which is the Network Address (NA) to 150.160.87.255/21 which is the Broadcast Address (BA) The usable IPs fall in between these two ranges: 150.160.80.1-150.160.87.254

WAN Link

150.160.88.36/30 The range of usable IP Addresses for this network will be from 150.160.88.36/30 which is the Network Address (NA) to 150.160.88.39/30 which is the Broadcast Address (BA) The usable IPs fall in between these two ranges:150.160.88.37-150.160.88.38

The WAN Link is the link(network) between the 2 routers. We had to subnet to a /30 to only have to usable IPs for this network to prevent overlapping. First, we subnetted to a /27 by borrowing 6 bits from the host portion which resulted in 150.160.88.32/27 then we subnetted again to /30 by borrowing 3 more bits from the host resulting in 150.160.88.36/30. The subnet mask decimal for this /30 is 255.255.255.252.

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150.160.0.0 / 16

"The subnets should be contiguous. There should be no unused address space between subnets."

Address Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R0	G0/2-G0/0/2 G0/2-G0/0/0 G0/0/1-G0/0/1	150.160.0.1 150.160.32.1 150.160.88.37	255.255.224.0 255.255.224.0 255.255.255.252	N/A
R1	G0/1-g0/0/0 G0/1-g0/0/2 G0/1-G0/1/0 G0/0/1-G0/0/1	150.160.64.1 150.160.72.1 150.160.80.1 150.160.88.38	255.255.248.0 255.255.248.0 255.255.248.0 255.255.255.252	N/A
S1	VLAN1	150.160.0.2	255.255.224.0	150.160.0.1
S2	VLAN1	150.160.32.2	255.255.224.0	150.160.32.1
S0	VLAN1	150.160.64.2	255.255.248.0	150.160.64.1
S3	VLAN1	150.160.72.2	255.255.248.0	150.160.72.1
S4	VLAN1	150.160.80.2	255.255.248.0	150.160.80.1
PC1	NIC	150.160.31.254	255.255.224.0	150.160.0.1
PC2	NIC	150.160.63.254	255.255.224.0	150.160.32.1
PC0	NIC	150.160.71.254	255.255.248.0	150.160.64.1
PC3	NIC	150.160.79.254	255.255.248.0	150.160.72.1
PC4	NIC	150.160.87.254	255.255.248.0	150.160.80.1

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Device	Hosts needed	Hosts Avail.	Unused hosts	NA	Slash	Subnet Mask	Usable Range	BA
Future use Subnet1	220	8190	7970	150.160.0.0	/19	255.255.224.0	150.160.0.1-150.160.31.254	150.160.31.255
Future use Subnet2	100	8190	8090	150.160.32.0	/19	255.255.224.0	150.160.32.1 - 150.160.63.254	150.160.63.255
Employees Subnet0	60	2046	1986	150.160.64.0	/21	255.255.248.0	150.160.64.1 - 150.160.71.254	150.160.71.255
guests Subnet3	30	2046	2016	150.160.72.0	/21	255.255.248.0	150.160.72.1 - 150.160.79.254	150.160.79.255
Servers Subnet4	10	2046	2036	150.160.80.0	/21	255.255.248.0	150.160.80.1 - 150.160.87.254	150.160.87.255
WAN link R->R, Subnet5	N/A	2	0	150.160.88.36	/30	255.255.255.252	150.160.88.37- 150.160.88.38	150.160.88.39

Addressing scheme

a. Assign the first usable IP addresses in each subnet to R0 for the two LAN links and the WAN link.

b. Assign the first usable IP addresses in each subnet to R1 for the 3 LAN links. Assign the last usable IP address for the WAN link.

c. Assign the second usable IP address in the attached subnets to the switches.

d. Assign the last usable IP addresses to the PCs in each subnet.