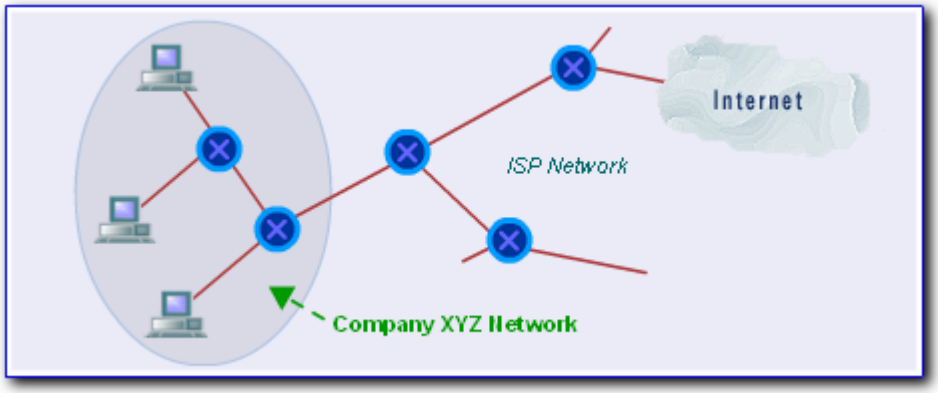
Portfolio Exercise 1a: Supernetting and Variable Length Subnet Masks

Objectives

- Carry out route aggregation/supernetting calculations
- Carry out VLSM subnet calculations
- *Collect portfolio evidence for part of Grading Criteria P1*

Scenario



The Internet's regulating authorities now expect every Internet service provider (ISP) to use CIDR, route aggregation and supernetting. A newly formed ISP company has the task of calculating the supernet address it will use when advertising to the rest of the Internet.

Task1: Calculating Supernets

The ISP has the addressing responsibility for the following three Class B address ranges …

- 172.24.0.0
- 172.25.0.0
- 172.26.0.0

… and wishes to advertise the three address blocks as a single supernet to the rest of the Internet. You have been asked you to calculate the supernet address.

a. Calculate the ISP's Supernet

To calculate the ISP's supernet start by completing the table below

Network Address	***First Octet***	***Second Octet***
172.24.0.0/16		
172.25.0.0/16		
172.26.0.0/16		

Portfolio Exercise 1a: Supernetting and Variable Length Subnet Masks

Write down the bits (*starting from the left*) that are the same for all three network addresses. Stop when you reach any bits that are not common to all three network addresses.

_____

How many bits are common to the three network addresses? _____

Using your previous results, write down the supernet address _____

Explain the advantages of route aggregation and supernetting:- _____

_____

_____

_____

b. Calculate the XYZ Network Supernet

The XYZ network has decided to purchase the following four address blocks from the ISP …

- 172.24.35.0
- 172.24.36.0
- 172.24.37.0
- 172.24.38.0

… and you have been asked you to calculate the company's supernet address.

To calculate the supernet for XYZ start by completing the table below

Network Address	***First Octet***	***Second Octet***	***Third Octet***
172.24.35.0/24			
172.24.36.0/24			
172.24.37.0/24			
172.24.38.0/24			

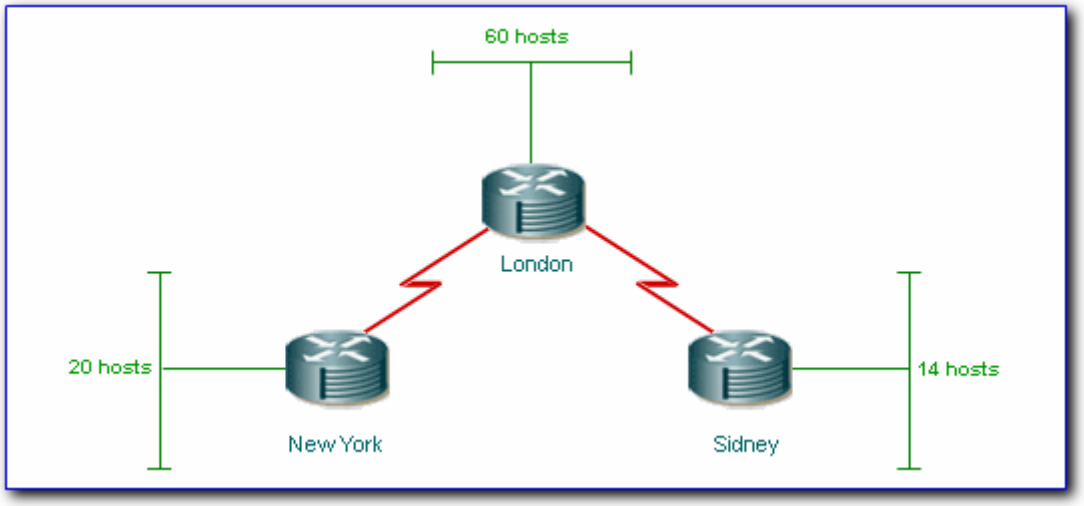
Write down the bits (*starting from the left*) that are the same for all three network addresses. Stop when you reach any bits that are not common to all three network addresses.

_____

How many bits are common to the three network addresses? _____

Using your previous results, write down the CIDR supernet address _____

Portfolio Exercise 1a: Supernetting and Variable Length Subnet Masks



Scenario

A Class C network address of **206.100.24.0** has been allocated to the network shown above. New York and Sydney connect to London through two separate WAN connections.

- London requires 60 hosts
- New York requires 20 hosts
- Sidney requires 14 hosts
- Each WAN connection requires 2 IP addresses on separate subnets

You are required to calculate VLSM subnets that represent the most efficient partitioning of the assigned IP address range.

Task 2: Calculating VLSM Subnets

You will need to calculate the subnets starting from the subnet that requires the largest IP address range, proceeding on to the next largest and so on to the smallest subnet. You may use **subnet 0**.

a. Calculate the Largest Subnet - London

First you need to calculate the largest subnet.

How many useable addresses does the largest subnet (**London**) require? _____

How many host bits are needed to accommodate this many addresses? _____

How many network bits will you need to borrow from the last octet? _____

How many total subnets will you initially divide the network into? _____

Write down the CIDR notation specifying the number of network bits, e.g. /25 _____

Portfolio Exercise 1a: Supernetting and Variable Length Subnet Masks

Fill in the table below using CIDR notation:-

Main Network Address:			
No.	***CIDR Subnet Addresses***	***Subnet Broadcast Address***	***Useable Address Range***
0			
1			

Allocate **subnet 0** to **London** and write down the CIDR subnet address below

_____

b. Calculate the Next Largest Subnet – New York

Now you can calculate the next largest subnet by dividing your unused subnet 1 into smaller subnets.

Write down the CIDR address of **subnet 1** _____

How many useable addresses does the next largest subnet (**New York**) require? _____

What should the subnet size be to accommodate this many addresses? _____

How many subnets should you divide **subnet 1** into? _____

How many host bits are needed to accommodate this many addresses? _____

How many network bits will you need to borrow from the last octet? _____

Write down the CIDR notation specifying the number of network bits, e.g. /25 _____

Fill in the table below using CIDR notation:-

Subnet 1 Address:			
No.	***CIDR Subnet Addresses***	***Subnet Broadcast Address***	***Useable Address Range***
0			
1			

Allocate the first subnet from the table above to **New York** and write down it's subnet address below:-

_____

Portfolio Exercise 1a: Supernetting and Variable Length Subnet Masks

c. Calculate the Next Largest Subnet - Sidney

The Sidney subnet needs to be calculated next. Choose the first unused subnets from the previous table and divide it even further.

Write down the CIDR address of the first *unused* subnet _____

How many *total* IP addresses are available within this subnet? _____

How many useable addresses does the next largest subnet (**Sidney**) require? _____

How many subnets should you divide the *unused* subnet into? _____

How many host bits are needed to accommodate this many addresses? _____

How many network bits will you need to borrow from the last octet? _____

Write down the CIDR notation specifying the number of network bits, e.g. /25 _____

Fill in the table below using CIDR notation:-

Subnet Address:			
No.	***CIDR Subnet Addresses***	***Subnet Broadcast Address***	***Useable Address Range***
0			
1			

Allocate the first subnet from the table above to **Sydney** and write down it's subnet address below:-

_____

d. Calculate the WAN link subnets

The WAN link subnet needs to be calculated next. Choose the first unused subnets from the previous table and divide it even further.

Which unused subnet will you divide into smaller subnets? _____

How many *total* IP addresses are available within this subnet? _____

How many addresses does each WAN link require? Useable: _____ Total _____

How many subnets should you divide the *unused* subnet into? _____

How many host bits are needed to accommodate this many addresses? _____

Portfolio Exercise 1a: Supernetting and Variable Length Subnet Masks

How many network bits will you need to borrow from the last octet? _____

Write down the CIDR notation for specifying the number of network bits, e.g. /25 _____

Fill in the table below using CIDR notation:-

Subnet Address:			
No.	***CIDR Subnet Addresses***	***Subnet Broadcast Address***	***Useable Address Range***
0			
1			

Write down the CIDR subnet address you are going to allocate to the **London** to **New York** WAN link

_____

Write down the CIDR subnet address you are going to allocate to the **London** to **Sidney** WAN link

_____

Draw the VLSM Subnets

Using the circle below, create a Pie Chart illustrating the division of the network into subnets. Make sure each slice of the chart is labeled with the appropriate subnet address and the number of total addresses available in that subnet.