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CSF3223 K2 - Networking

Prepared for

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MOBILE COMPUTING

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1) INTRODUCTION

1.1 Basic information about the sub-netting

Subnetting is a technique used in computer networking to divide a large network into smaller subnetworks, called subnets. It helps in efficient utilization of IP addresses and improves network performance and security. Subnetting involves dividing the network's IP address space into multiple subnets, each with its own unique network address and range of host addresses.

1.2 Basic information about the variable-length subnet mask (VLSM)

Variable-Length Subnet Mask (VLSM) is a subnetting technique that allows different subnets to have different sizes or variable-length subnet masks. In VLSM, subnets can be divided into smaller or larger subnets based on the specific requirements of each subnet. This enables more efficient allocation of IP addresses and helps in optimizing network resources.

2) NETWORK REQUIREMENT FOR EACH SUBNET

2.1 Number of subnets is needed in the network topology.

The network topology requires multiple subnets to accommodate the different departments or segments of the multinational organization. Based on the given requirements, we need a total of 5 subnets: VLAN 1, VLAN 2, LAN 1, VLAN 3, VLAN 4, WAN1 and WAN2.

2.2 Total number of host address available for each subnetwork

- ➔ VLAN 1: 254 usable hosts
- ➔ VLAN 2: 254 usable hosts
- ➔ LAN 1: 254 usable hosts
- ➔ VLAN 3: 62 usable hosts
- ➔ VLAN 4: 62 usable hosts
- ➔ WAN 1: 4 usable host
- ➔ WAN 2: 4 usable host

2.3 Total number of host addresses needed in the topology diagram for each subnetwork.

- VLAN 1: 250 hosts
- VLAN 2: 200 hosts
- LAN 1: 170 hosts
- VLAN 3: 60 hosts
- VLAN 4: 50 hosts
- WAN 1: 2 host
- WAN 2: 2 host

3) VLSM SUBNET

3.1 steps to calculate VLSM subnets

IP address = 172.168.0.0/16

First we need to arrange the required networks from the largest to the smallest

- VLAN 1: 250 hosts
- VLAN 2: 200 hosts
- LAN 1: 170 hosts
- VLAN 3: 60 hosts
- VLAN 4: 50 hosts
  - WAN 1: 2 host
  - WAN 2: 2 host

VLAN1

Since the required host is 250, therefore it can not be subdivided so it will take 8 bits, 2 to the power of 8 is = 256.

Subnet Name	**Network IP address**	**Network bit**	**Subnet Mask**	**Usable host**	**BroadCast**
VLAN1	172.168.0.0	/24	255.255.255.0	172.168.0.1 - 172.168.0.254	172.168.0.255

VLAN2

The required host is 200, therefore it can not be subdivided so it will take 8 bits, 2 to the power of 8 is = 256.

Subnet Name	**Network IP address**	**Network bit**	**Subnet Mask**	**Usable host**	**BroadCast**
VLAN2	172.168.1.0	/24	255.255.255.0	172.168.1.1 - 172.168.1.254	172.168.1.255

LAN1

The required host is 170, therefore it can not be subdivided so it will take 8 bits, 2 to the power of 8 is = 256.

Subnet Name	**Network IP address**	**Network bit**	**Subnet Mask**	**Usable host**	**BroadCast**
LAN1	172.168.2.0	/24	255.255.255.0	172.168.2.1 - 172.168.2.254	172.168.2.255

VLAN3

The required host is 60, moreover it can be subdivided so this network can take 6 bits, 2 to the power of 6 is = 64.

Subnet Name	**Network IP address**	**Network bit**	**Subnet Mask**	**Usable host**	**BroadCast**
VLAN3	172.168.3.0	/26	255.255.255.192	172.168.3.1 - 172.168.3.62	172.168.3.63
EMPTY	172.168.3.64	/26	255.255.255.192	172.168.3.65 - 172.168.3.126	172.168.3.127
EMPTY	172.168.3.128	/26	255.255.255.192	172.168.3.129 - 172.168.3.190	172.168.3.191
EMPTY	172.168.3.192	/26	255.255.255.192	172.168.3.193 - 172.168.3.254	172.168.3.255

VLAN4

The required host is 50, however we can still use one of the empty IP addresses. For example, 172.168.3.64 a network can take 6 bits, 2 to the power of 6 is = 64. More than the required hosts.

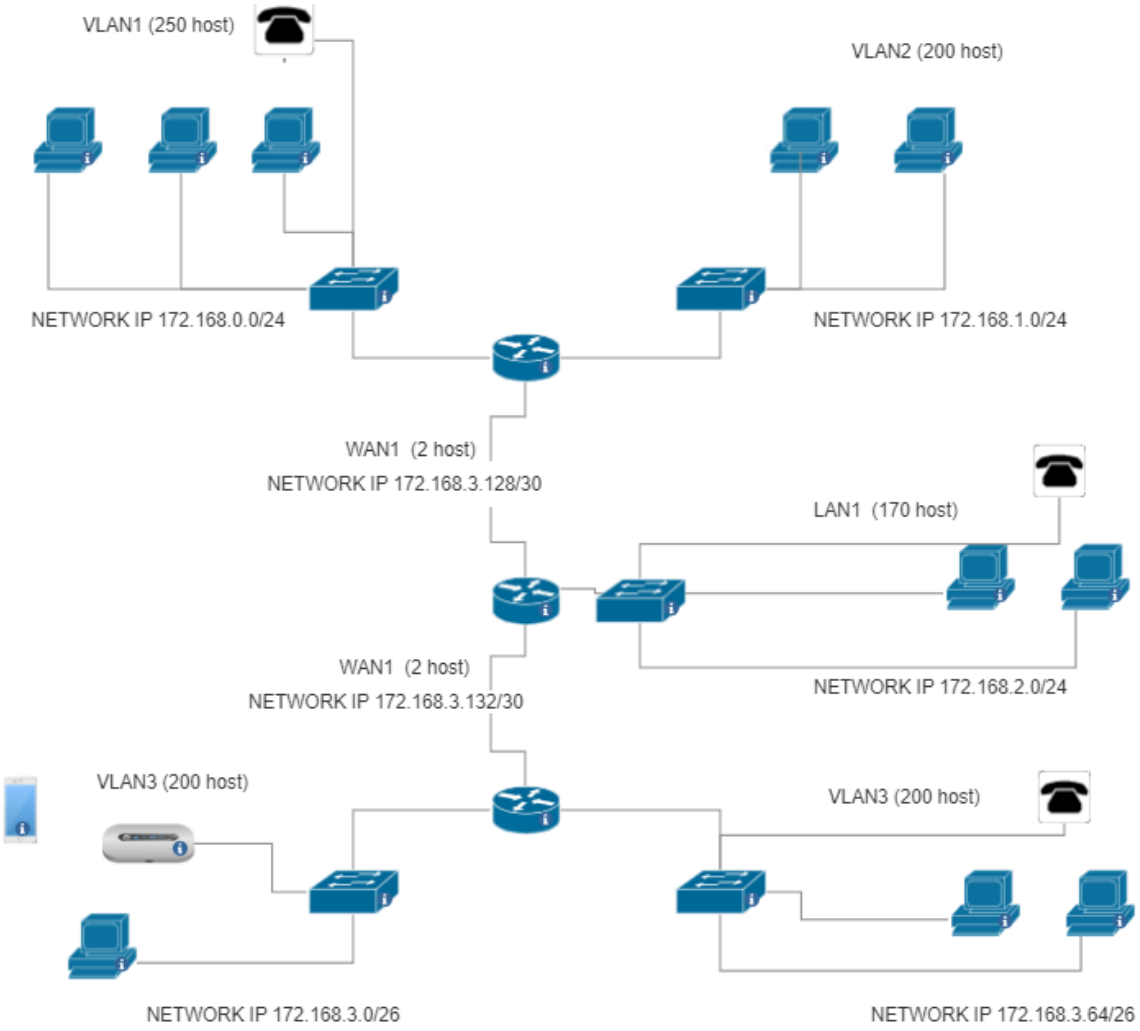
Subnet Name	Network IP address	Network bit	Subnet Mask	Usable host	BroadCast
VLAN3	172.168.3.0	/26	255.255.255.192	172.168.3.1 - 172.168.3.62	172.168.3.63
VLAN4	172.168.3.64	/26	255.255.255.192	172.168.3.65 - 172.168.3.126	172.168.3.127
EMPTY	172.168.3.128	/26	255.255.255.192	172.168.3.129 - 172.168.3.190	172.168.3.191
EMPTY	172.168.3.192	/26	255.255.255.192	172.168.3.193 - 172.168.3.254	172.168.3.255

We still need to connect two WANS networks to establish the link between VLAN1 and VLAN2 to LAN1, and VLAN3 and VLAN4 to LAN1. so the final table would look like this

Subnet Name	Network IP address	Network bit	Subnet Mask	Usable host	BroadCast
VLAN1	172.168.0.0	/24	255.255.255.0	172.168.0.1 - 172.168.0.254	172.168.0.255
VLAN2	172.168.1.0	/24	255.255.255.0	172.168.1.1 - 172.168.1.254	172.168.1.255
LAN1	172.168.2.0	/24	255.255.255.0	172.168.2.1 - 172.168.2.254	172.168.2.255
VLAN3	172.168.3.0	/26	255.255.255.192	172.168.3.1 - 172.168.3.62	172.168.3.63
VLAN4	172.168.3.64	/26	255.255.255.192	172.168.3.65 - 172.168.3.126	172.168.3.127
WAN1	172.168.3.128	/30	255.255.255.252	172.168.3.129 - 172.168.3.130	172.168.3.131
WAN2	172.168.3.132	/30	255.255.255.252	172.168.3.133 - 172.168.3.134	172.168.3.135

EMPTY	172.168.3.192	/26	255.255.255.192	172.168.3.193 - 172.168.3.254	172.168.3.255

3.2 Diagram of the network design (including interface and the network address for each LAN and WAN).



4) CONCLUSION

In conclusion, the efficient IP addressing scheme for the multinational organization in Southeast Asia involves subnetting and Variable Length Subnet Mask (VLSM). By dividing the network into smaller subnets, the organization achieves better network management, enhanced security, and optimal IP address usage.

After examining the network requirements for each subnet, it was determined that 5 subnets are needed: VLAN 1, VLAN 2, LAN 1, VLAN 3,,VLAN 4 WAN1 and WAN2. Each subnet has a specific number of available and required host addresses.

By applying VLSM, subnets were allocated based on their requirements, ensuring efficient IP address usage. The logical network diagram provides a visual representation of the subnet allocation and connectivity between subnets and LANs.

Overall, this IP addressing scheme meets the organization's needs for efficient network management and optimized IP address utilization in its Southeast Asian corporate offices.

What we have learnt along the way

The concepts learned in class regarding IP addressing and network design are crucial for efficiently managing and organizing networks. Understanding Variable Length Subnet Masking (VLSM) allows for the allocation of IP addresses based on specific requirements, ensuring optimal utilization of available addresses while accommodating the needs of different network segments.

Logical network diagrams provide a visual representation of network architecture, aiding in understanding and communicating the connectivity between different VLANs, LANs, and WANs. These diagrams are essential for planning and troubleshooting network configurations.

By applying VLSM and creating logical network diagrams, IT professionals can design scalable and well-organized networks that meet the requirements of organizations. This ensures efficient communication, connectivity, and management of resources across various locations and VLANs.

Overall, the knowledge gained in class about IP addressing schemes, VLSM, and network design is fundamental for designing, implementing, and maintaining robust and efficient networks in today's interconnected world.

Reflection

This project provided an opportunity to apply the concepts of IP addressing and network design in a real-world scenario. By considering the requirements of the organization and the given IP address range, we was able to calculate the necessary subnet masks for each VLAN and design an efficient IP addressing scheme using Variable Length Subnet Masking (VLSM).

The process of VLSM involved allocating the appropriate number of hosts to each VLAN while minimizing IP address wastage. This required careful subnetting and subnet mask selection to ensure sufficient IP addresses were available for the required number of hosts in each VLAN.

Through this project, we gained a deeper understanding of how IP addressing and subnetting can be effectively used to meet the specific requirements of an organization. It reinforced the importance of efficient address allocation, scalability, and clear network documentation.

Overall, this project provided a practical application of theoretical knowledge, allowing me to enhance my skills in IP addressing, VLSM, and logical network design.

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