Formative Assessment

Computer & Mobile Networks - Feb 2023

The network design as shown in the above diagram is hierarchal, consisting of a distribution layer, a control layer and access layer.

A firewall

Each department will be assigned its own VLAN through the Layer 3 switch. The layer 3 switch will be configured with virtual interfaces for each VLAN to allow the switch to route traffic between VLANs, whilst also enforcing access control policies to restrict access to resources between departments. Each VLAN will have a specific VLAN ID to route network traffic and all devices within each respective departments VLAN are assigned IP addresses from the corresponding subnet.

A wireless access point provides access to the network for staff owned wireless devices which is also assigned a VLAN to prevent access to any internal resources — Dynamic IP addressing

The IPv4 addressing scheme chosen for the network utilises a private IPv4 addressing scheme with Class C addresses. A private IPv4 addressing scheme is suitable for the network given requirements as this is a company private network and thus should be inaccessible to devices outside of the network. Private IP addressing provides several benefits in relation to the network design requirements, firstly it provides security as the company allows staff to bring their own wireless devices to access the internet however as the company network is not routable via public internet this will prevent staff wireless devices from being able to access internal resources.

The private IPv4 addressing scheme will also allow for scalability of the network as private IP addresses can be assigned or removed within the network without need for coordination with any external authority as there is no risk newly assigned IP addresses will conflict with any existing external addressing schemes. This will also control costs as should additional IP addresses be required they will not need to be purchased from an ISP.

Class C addresses have been used as this provides a sufficient number of addresses for the existing network requirements whilst also allowing for further scalability of the network and still maintaining efficient usage of the IP address space. Class C addresses provide 24 bits for network portion and 8 bits of the host portion which provisions for up to 254 hosts on each subnet. They are also easy to manage as they can be easily subnetted allowing for the creation of smaller sub-networks, which given the network requirements supports the departmental segmentation of the network and allows for scalability within each departmental subnet.[[1]](#footnote-1) Using subnetting of IP addresses at departmental level allows minimises wasted address space as additional subnets can be added as with respect to the department requiring the additional address space which may not be unanimous across all departments dependent on business growth and recruitment strategy.

A DHCP server could be a valuable addition to the network to support scalability of the network. A DHCP server automates the allocation of IP addresses as it is configured with a range of IP addresses available for each VLAN respectively and assigns an available IP address from the appropriate VLAN range when a device connects. This would remove the need for manual-IP addressing which is time consuming and susceptible to errors as a network grows, and creates a centralised location for provisioning IP address leases and allows for tracking IP addresses active within the network.

1. https://www.cisco.com/c/en/us/support/docs/ip/routing-information-protocol-rip/13788-3.html#anc0 [↑](#footnote-ref-1)