

## **Computer Networks and Communication**

### **Module Summary**

This subject covered a number of important topics related to computer networks, such as the allocation and maintenance of IP addresses and the use of fundamental network protocols. Dealing with the global IPv4 address shortage—a problem caused by the small amount of IP addresses available in the IPv4 system—was one of the main tasks. We covered how to assign IP addresses to devices automatically using the Dynamic Host Configuration Protocol (DHCP), making the best use of the remaining address space, and how to use Network Address Translation (NAT) to allow multiple devices on a local network to share a single public IP address.

Using Cisco Packet Tracer, we had to create a network, which included setting up a DHCP server, defining network pools, and making ensuring that hosts were connected to one another. This exercise taught us how to set up a router to dynamically assign IP addresses to subnets, manage numerous subnets, and use various network tools to confirm connections. To further understand how data is transmitted over the network, we also used the ping and traceroute commands to investigate the Internet Control Message Protocol (ICMP) and analyse the packet information.

An further beneficial activity involved recording and examining DHCP packets using Wireshark. This enabled us to view the real flow of communications, including DHCP find, offer, request, and acknowledgement messages, that transpire between devices and the DHCP server. Additionally, we investigated the distinctions between intra-AS (Autonomous System) and inter-AS routing protocols. We discovered that while inter-AS protocols, such as BGP (Border Gateway Protocol), handle routing between multiple ASes and prioritise scalability, intra-AS protocols, such as OSPF (Open Shortest Path First), concentrate on performance within a single AS.

**Reflecting on the content**

I gained useful knowledge from this module that I can immediately use to networking situations in the real world. Using DHCP to configure a network showed how important automation is for managing IP addresses, a crucial task for large-scale networks. I had a primarily theoretical understanding of IP addressing and network configuration before taking this module. My understanding of how protocols like DHCP and NAT cooperate to guarantee effective network functioning has improved as a result of the practical exercises.

Analyzing ICMP packets and comprehending how devices communicate through various network tiers was one of the most crucial lessons learnt. My understanding of networks' layered design and how various protocols manage particular communication-related jobs has improved as a result of this.

By combining theoretical understanding with real-world application, I think the course designers aimed to provide us a comprehensive understanding of network configuration and protocol analysis. With this strategy, we can be confident that we are ready to take on real-world problems like managing networks with a restricted number of IP addresses and guaranteeing smooth device-to-device communication. My technical proficiency as well as my ability to successfully analyse and troubleshoot network setups have both increased as a result of this training.