

Task 10.1P: Lesson Review

Module Summary

We worked with a range of fundamental ideas in computer networks and communication during this subject, emphasizing practical application of theoretical knowledge through hands-on exercises. The assignments, which included packet capturing, network configuration, and protocol analysis, gave us a better grasp of how data flows across various network layers. One of the main tasks was to describe the processes a laptop goes through to connect to a website, from turning it on to downloading a page. Important protocols including QUIC for quicker and more secure data transport, ARP for address resolution, DNS for domain name resolution, and DHCP for IP address assignment were found and examined. Together, these protocols—which are all a part of the network stack—assure smooth communication and connectivity.

By utilising Wireshark for packet capture and analysis, we were able to gain even more insight. This made it possible for us to watch real-time protocol exchanges, like how TLS encrypts data to guarantee security, how QUIC enhances traditional connections with reduced latency, and how TCP creates dependable connections through a three-way handshake. The necessity of the transport and security layers in preserving safe, dependable communication between clients and servers was highlighted by the analysis of these collected packets, which offered important insights into the roles that each protocol performs at various OSI model tiers. We also looked at how IP configurations are assigned to devices in a network using the Dynamic Host Configuration Protocol (DHCP) and the Address Resolution Protocol (ARP), which maps IP addresses to MAC addresses.

Additionally, the lesson addressed network implementation using Cisco Packet Tracer, in which we configured a network architecture consisting of wired and wireless local area networks (LANs). We were able to set up wireless access points, setup static IP addresses, and learn about the distinctions between wired and wireless communication thanks to this activity. We learnt more about how wired LANs rely on direct MAC address communication while wireless LANs use more intricate routing through access points and multiple MAC addresses for communication by examining the Protocol Data Units (PDUs) in both types of connections.

Reflecting on the content

The module was very helpful in emphasizing both academic and practical learning. The packet capture analysis using Wireshark, which offered a practical way to comprehend how data moves across a network and how various protocols assure stability and security, was, in my opinion, the most important component. Seeing these protocols in action, such as the three-way handshake of TCP, the quicker data transmission of QUIC, and the encryption of TLS, opened my eyes and helped me see the connection between theoretical ideas and practical uses. My knowledge of networking has increased as a result of this experience, especially with regard to packet analysis, network security, and protocol behavior.

My understanding of networking was more fundamental before this semester, centered on ideas like IP addresses and straightforward network configurations. Nonetheless, this curriculum broadened my knowledge of network architecture and security by introducing me to more complex subjects like TLS and QUIC, along with packet-level analysis. It also made it easier for me to comprehend how crucial it is to use encryption protocols to secure communication and how newer protocols, like QUIC, outperform more established ones.

It's evident that the course team's goal in instructing us on this material is to give us the analytical and practical skills required to debug, examine, and comprehend intricate networking circumstances. A thorough learning experience was guaranteed by the integration of theoretical content with practical assignments. In addition to enhancing my technical abilities, this curriculum has given me insightful knowledge that will be useful in a professional networking setting, particularly in positions involving network management, security, or troubleshooting.