CAREER EPISODE:1

INTRODUCTION:

CE 1.1 During my [redacted] Australia, I worked on the assessment task on "Produce an ICT Network Architecture Design (ICTTEN622)", in [redacted] I designed, analyzed, benchmarked and assessed a complete ICT network architecture from requirements collecting to final cost and performance validation.

BACKGROUND:

CE 1.2 As part of my Diploma, I worked on an ICT network planning and analysis assessment where I analyzed network requirements and developed a LAN and WAN design. I identified current and future network requirements and predicted traffic demands using forecasting techniques that helped me understand expected growth and its impact on network design. I analyzed how growing systems and new routing paths affect bandwidth, IP addressing and network complexity. I documented user requirements including file sharing, hardware sharing, application usage, user communication, network gaming and VoIP for the design to be as per the requirements. After that, I benchmarked the network using performance parameters; latency, jitter, packet loss and packet duplication to assess expected network behavior. I also estimated total cost by choosing hardware, software and vendor products while matching with technical specifications. I also reviewed network performance using tools like Wireshark, Ethernet frame analysis, ARP/ICMP inspection and SNMP monitoring for understanding actual data flow behavior. I then developed a network design using topology, subnetting, security control and scalability planning and checked it against business needs through benchmarking techniques. I finally identified support, training and vendor requirements, completed assessment reports and ensured that the final design met performance, cost and business specifications as needed.

REPORTING HIERARCHY:

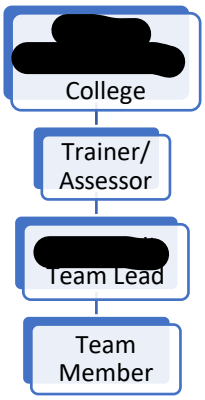


Figure 1: Hierarchy

PERSONAL ENGINEERING ACTIVITIES:

Network Planning & Compliance Assessment:

CE 1.3 Working on this Assessment task, I studied and analyzed the legislative requirements related to telecom network planning to enhance my knowledge of industry compliance and technical implementation practices. I reviewed workplace legislation, safety of employees, protection of data and operational compliance to understand how legal requirements influence network planning tasks. I reviewed how these requirements support the safe installation, maintenance and working of telecom systems while safeguarding customer data and providing service reliability. I also studied industry codes of practice on cabling installation, equipment handling, network configuration and communication reliability. I evaluated the company work practices for effective telecom project execution and team coordination. I analyzed how defining expectations enhances activity management by helping technical teams understand objectives, performance requirements and working responsibilities of the project. I explored the significance of assigning technical tasks based on skill set; network setup, troubleshooting and infrastructure support to enhance work efficiency. I examined the significance of supporting team members via technical guidance, training and resource allocation to achieve the aims of the project. I also assessed collaborative work practices where technical staff give ideas to enhance network performance, solve issues and improve service delivery. It improved my teamwork, technical support skills as well as continuous learning.

CE 1.4 I further studied information security standards including [redacted] by [redacted] to understand secure communication management and data protection. I studied [redacted] by [redacted] for analyzing their network threat management and system

protection techniques. I studied engineering communication standards developed by [redacted] for understanding communication reliability and infrastructure performance. I also analyzed workplace safety requirements associated with electrical hazards, cable installation, equipment handling and field maintenance tasks. I studied the risk management procedures, emergency response planning and the use of PPE to reduce workplace incidents. It enhanced my practical understanding of compliance, safety management, and technical standards significant for telecom network planning and operational reliability.

Implementation of Telecom access, Core Network Architectures & Communication Technologies:

CE 1.5 I assessed multiple telecom access network technologies to find suitable connectivity solutions for various service infrastructure needs. I compared Ethernet, DSL, FTTH, Wireless LAN and LTE based on transmission medium, bandwidth capacity, coverage range, deployment cost and scalability to find their practical suitability in access network environments. I chose Ethernet based connectivity for reliable high-speed local connectivity, considered DSL for cost effective broadband over existing copper infrastructure and came to know that FTTH is the most suitable choice for high bandwidth optical delivery to end users. For wireless access, I evaluated WI-FI and LTE based on mobility support, signal coverage and service continuity. I examined core network functions; traffic aggregation, user authentication, switching, charging and gateway functions to understand how traffic is managed, secured and routed across interconnected telecom systems.

CE 1.6 I developed and proposed ICT network architecture by choosing a star-based topology for the LAN to support centralized switching, easier fault isolation and simplified future expansion for classrooms and admin departments. I divided the network into separate subnetworks and VLAN segments for enhancing traffic management, user isolation and internal security. For external and internetwork connectivity, I included router-based WAN integration and firewall protection for secure communication between internal users and internet services. I chose Cat6 cabling for access layer connectivity and fiber optic links for backbone transmission for higher bandwidth and lower transmission delay. During planning of network performance. I applied communication protocols; SNMP for device monitoring, ICMP for connectivity test, HTTPS and SFTP for secure transfer of data and Wireshark for packet level traffic analysis. I also assessed wireless access needs and considered including dual band access points to enhance coverage and support mobile users. These choices that

I made, enhanced network reliability, scalability, performance efficiency and security within the proposed environment.

Integration of ICT Business Processes & Cost Optimization:

CE 1.7 I considered ICT business process needs by first identifying operational requirements; communication management, data handling, user support, cybersecurity controls and service continuity needs in the proposed environment. On the basis of these requirements, I then chose and matched appropriate software tools for network operation and business workflows. I used Salesforce for managing customer and service related data and Microsoft Dynamics 365 for integrated resource planning, coordination and business process alignment. I also used Microsoft Power BI to interpret operational and network related data for decision making and Trello for project tasks, monitoring progress and coordinating tasks during the network design process.

CE 1.8 In parallel, I conducted supplier costing for the network by preparing a cost comparison of vendor quotations for main components; routers, switches, servers, firewall systems and cabling. I applied basic cost estimation method by multiplying unit prices with needed quantities and aggregating total cost for budget feasibility and procurement accuracy. I assessed every component based on technical specifications; bandwidth capacity, port density, scalability, reliability and maintenance need along with lifecycle cost consideration. I compared several supplier options to find the most cost-effective solution that met performance needs while minimizing capital expenditure. Based on this evaluation, I chose optimized equipment that satisfied both technical standards and future expansion needs within the project budget constraints. Through this, I developed practical knowledge of ICT business operations, software-based process management and cost evaluation.

Network Fault Diagnosis and Connectivity Troubleshooting:

CE 1.9 I assessed and overcame network connectivity problems during the design and testing by applying troubleshooting procedures for stable communication in the ICT network. I identified duplicate IP address conflicts by reviewing active device logs an DHCP assignment records. I then overcame the issue by isolating conflicting endpoints, checking DHCP server allocations and reassigning IP addresses while refreshing network release using DHCP release/renew functions to restore connectivity. I overcame IP address exhaustion by reviewing subnet utilization and DHCP scope distribution, then extended the available address pool via subnet re-configuration and re-claimed unused IP addresses for scalability for extra devices, while considering IPv6 readiness for future expansion. I overcame DNS resolution failures by checking DNS server configuration settings, testing name resolution

using diagnostic commands; nslookup and clearing cached DNS entries to restore proper domain to IP mapping. For workstation level failures, I performed hardware and software checks; NIC status verification, TCP/IP configuration inspection and drive validation to restore individual device connectivity. For network wide outages, I isolated faults by testing gateway response, checking router and switch configuration and distinguishing between internal problems and external ISP related failures before escalation. This troubleshooting approach enhanced my ability to maintain network reliability, fault isolation and service continuity.

Analysis of IP Protocols & Network Configuration:

CE 1.10 I analyzed IP as a main communication protocol used in telecom and data networks to enable reliable data exchange between devices. I learned that IP works at the network layer of the OSI model and is responsible for logical addressing, packet forwarding and routing of data across interconnected networks. I assessed how every network device is assigned a unique IP address for correct identification and communication in both LAN and WAN. I examined 2 versions of IP where IPv4 used a 32-bit addressing scheme that provides a limited address space. While IPv6 uses a 128-bit format to support large scale network expansion required in modern infrastructure. Through this I developed an understanding of how IP addressing and routing mechanisms support efficient data transmission, network scalability and service continuity.

Analysis & Implementation of LAN/WAN Architecture Design:

CE 1.11 I analyzed the ICT network case study and translated the business needs into LAN and WAN network design. I identified main business issues like poor network performance, increasing traffic demand, security vulnerabilities, configuration complexity, cost limitations and continuous network growth. I learned that these problems directly impact service availability, scalability and reliability that I learned are critical in telecom network environments. At the same time, I identified improvement opportunities including better information sharing, communication systems, business continuity and adoption of modern ICT solutions as per the telecom objectives like redundancy, high availability and scalable architecture. Based on the client demands, I confirmed objectives; reduced cost, enhanced performance, secure connectivity, customized solutions and uninterrupted service continuity after discussing with my professor. I then chose Intel Ethernet I210-T1 adapters, Cisco Catalyst 2960 24TT switches, Cisco C841M-8X/K9 ISR routers and Cat6/fiber cabling for high bandwidth, low latency and future scalability. I specified Cisco prime infrastructure for network management, supported by compatible drivers and tools; Microsoft 365, zoom,

google workspace and Wireshark for communication and troubleshooting. I also developed a layered LAN/WAN design using routers, switches, firewalls, servers and access points with proper subnetting, segmentation and scalable architecture as per the telecom network planning principles of modularity, fault tolerance, optimized traffic flow and future expansion readiness.

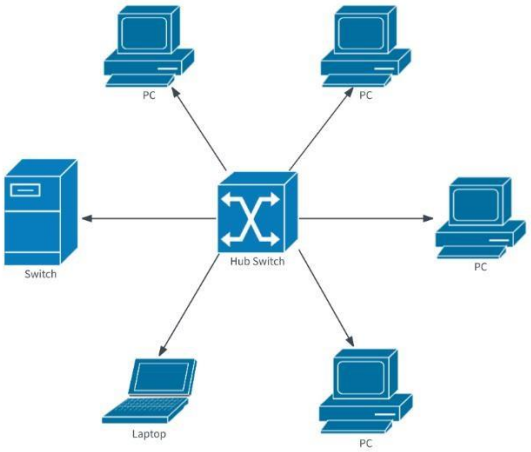


Figure 2: Network Layout (LAN)

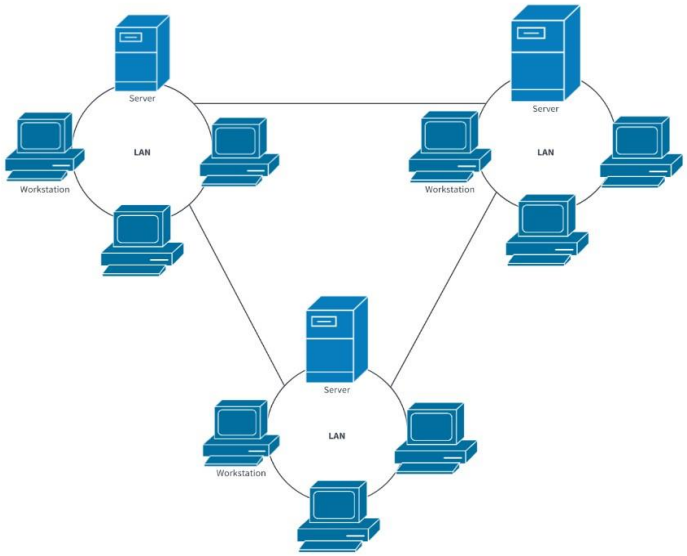


Figure 3: Network Layout (WAN)

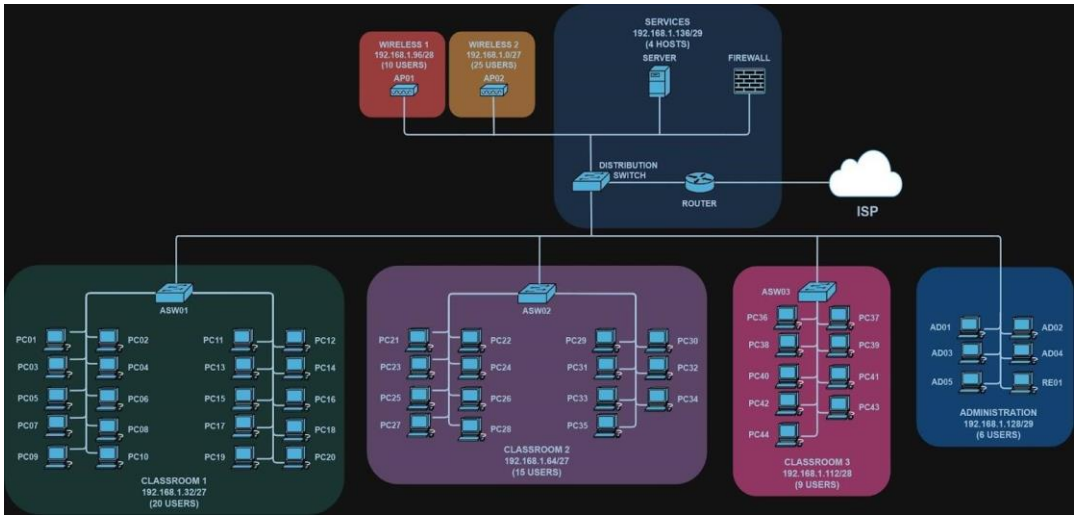


Figure 4: Network diagram

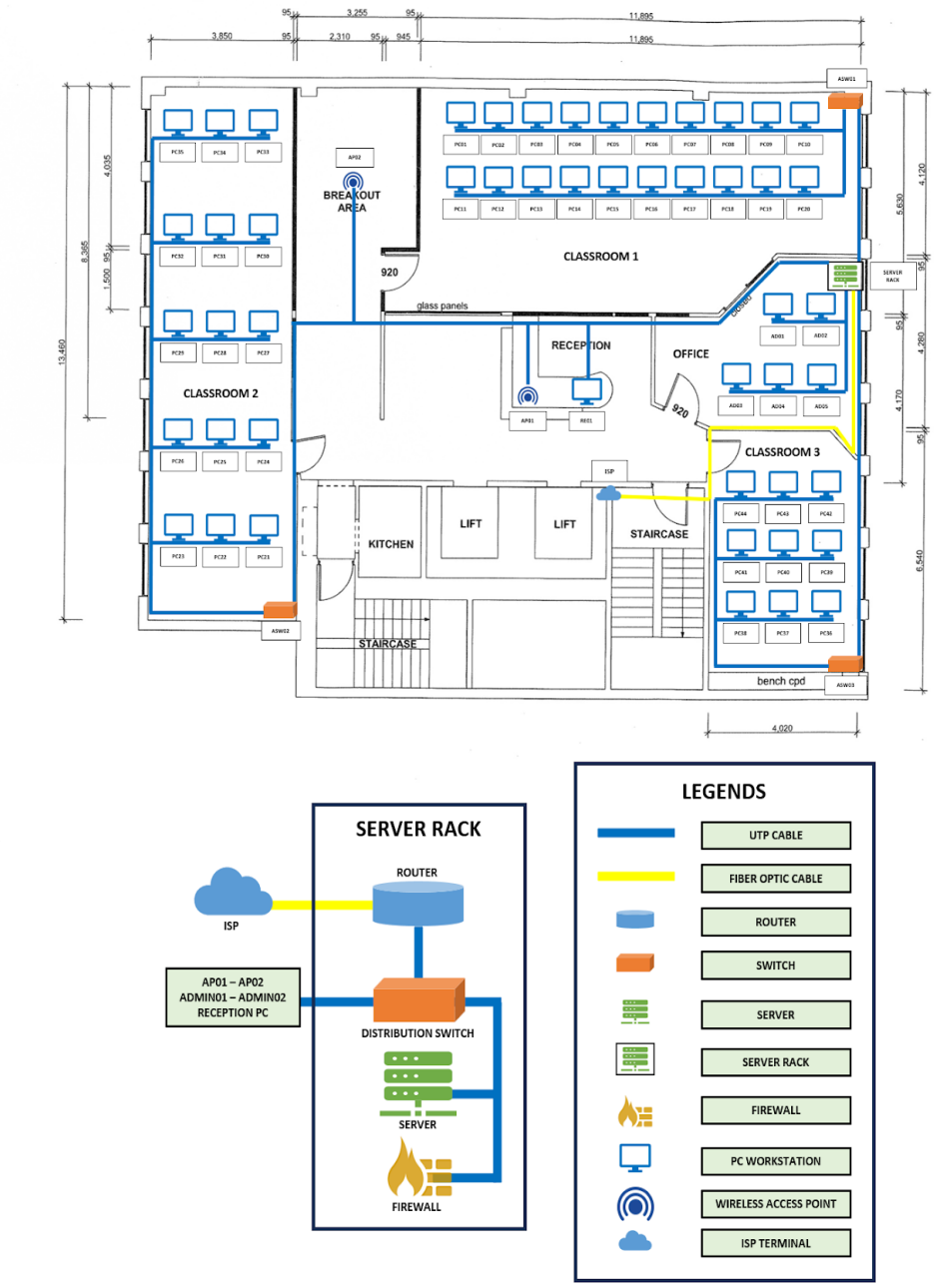


Figure 5: Physical diagram

Analysis of Forecasting, Performance Benchmarking, Network design, Costing & Requirement Evaluation for LAN/WAN:

CE 1.12 I designed and evaluated a LAN/WAN telecom network by analyzing traffic forecasting, performance metrics, network design, cost estimation and business requirements. I forecasted network traffic using last value predictor, windowed moving average and double exponential smoothing. I understood that low value shows recent usage trends, moving average smooths fluctuations to identify patterns and double exponential smoothing considers both level and trend for more accurate future demand prediction. Based on this, I

concluded that future traffic growth will need increased bandwidth, scalable infrastructure and efficient routing design. I assessed network performance using latency, jitter, packet loss and packet duplication. I ensured latency remains <200ms for real-time services, while controlling jitter for stable voice and video communication. I also learned that packet loss >1% affects quality and duplication results from routing/hardware problems. I applied benchmarking methods for compliance with industry standards and performance expectations. I designed a hierarchical network architecture using routers, switches, firewalls, servers and ISP connectivity with VLAN based segmentation for security and efficiency. I also analyzed current and future requirements like file sharing, VoIP, application sharing and network gaming which required high bandwidth, low latency and secure communication. I estimated total infrastructure cost approx. $70,500 based on vendor hardware and software selection. I also assessed enterprise technologies including cybersecurity systems, virtualization, cloud management, monitoring tools and access control systems. I then applied CPM, CCM and PERT techniques to optimize planning and reduce allocation. I confirmed that the suggested network design met performance, cost, scalability and security requirements.

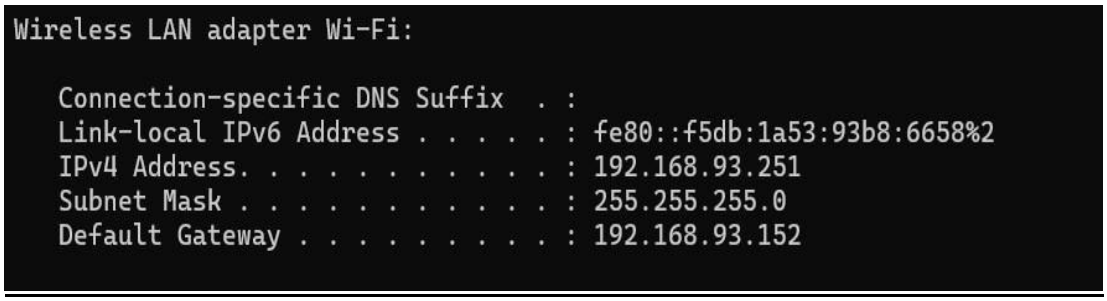


Figure 6: IP and gateway details

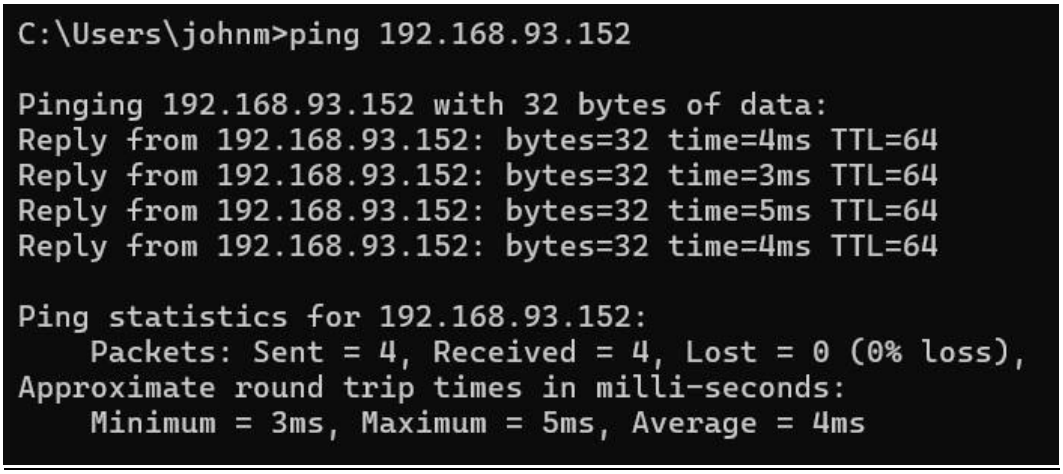


Figure 7: Gateway connectivity test

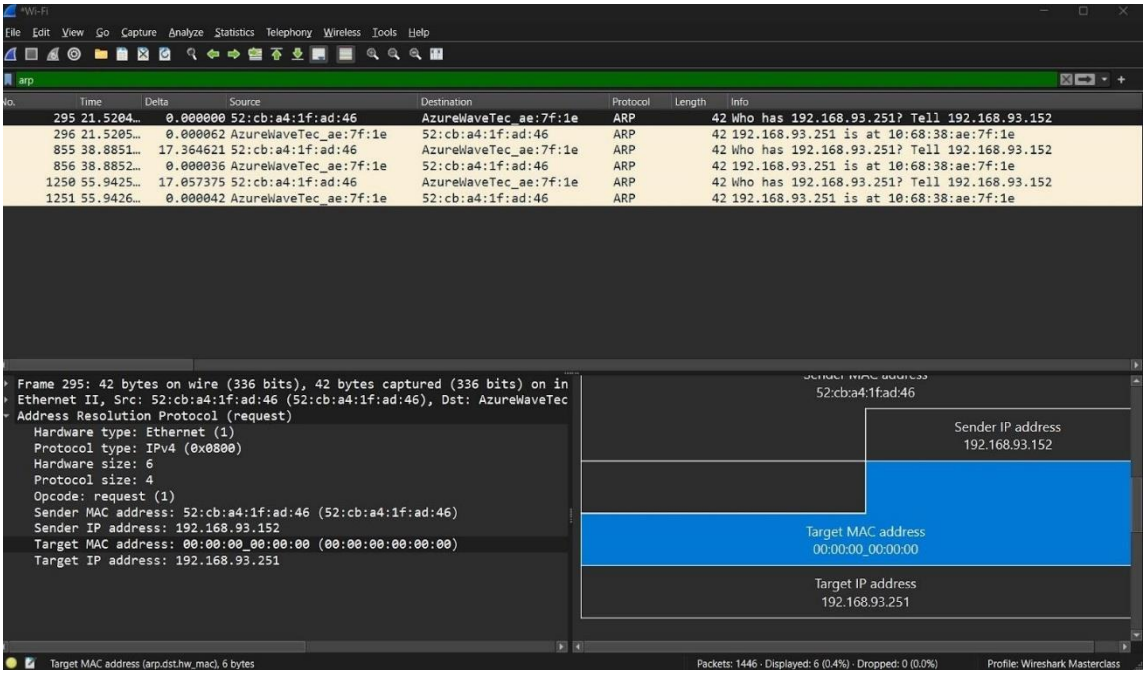


Figure 8: ARP Request

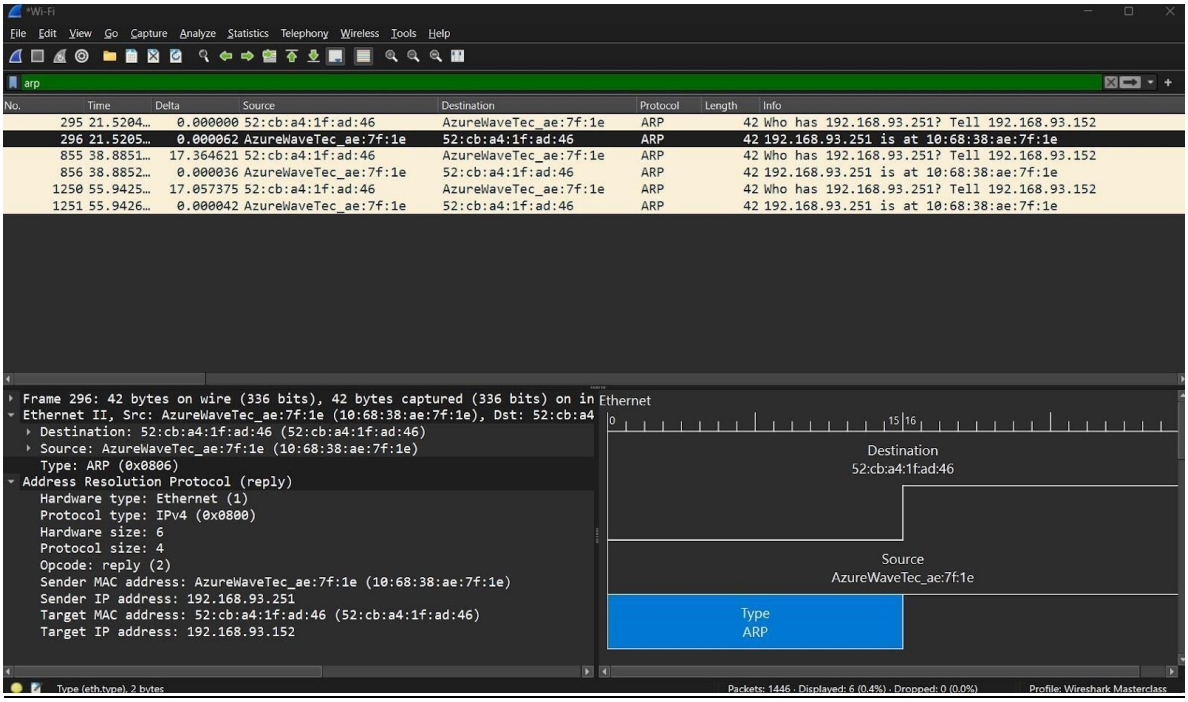


Figure 9: ARP reply from router

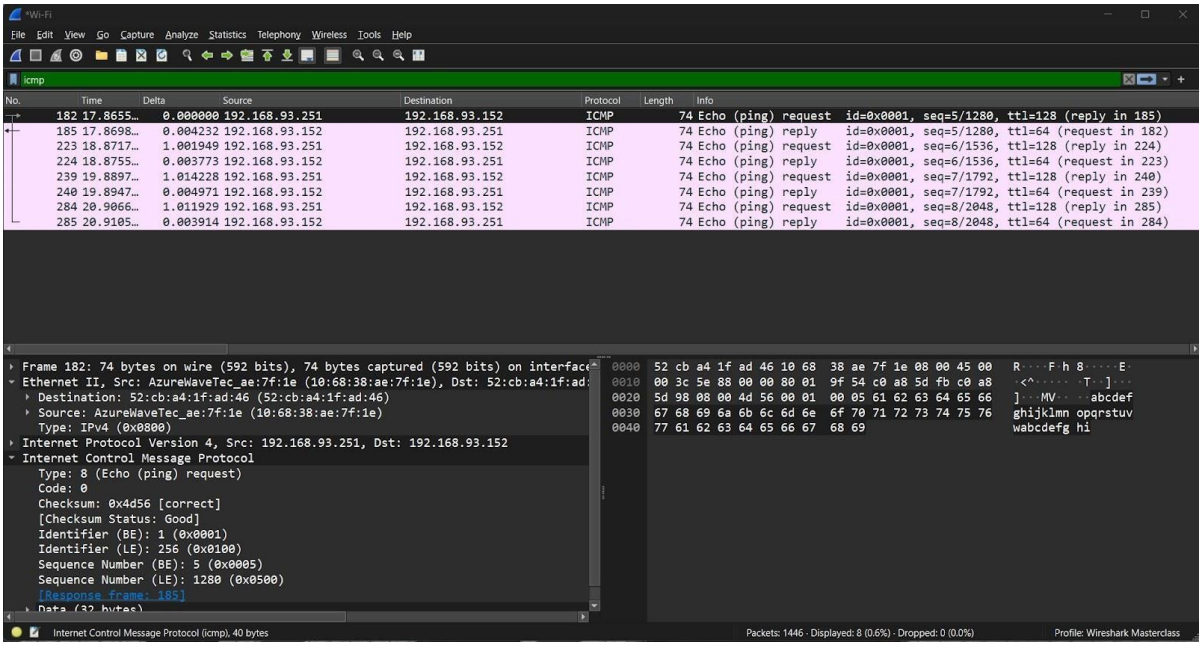


Figure 10: ICMP Request

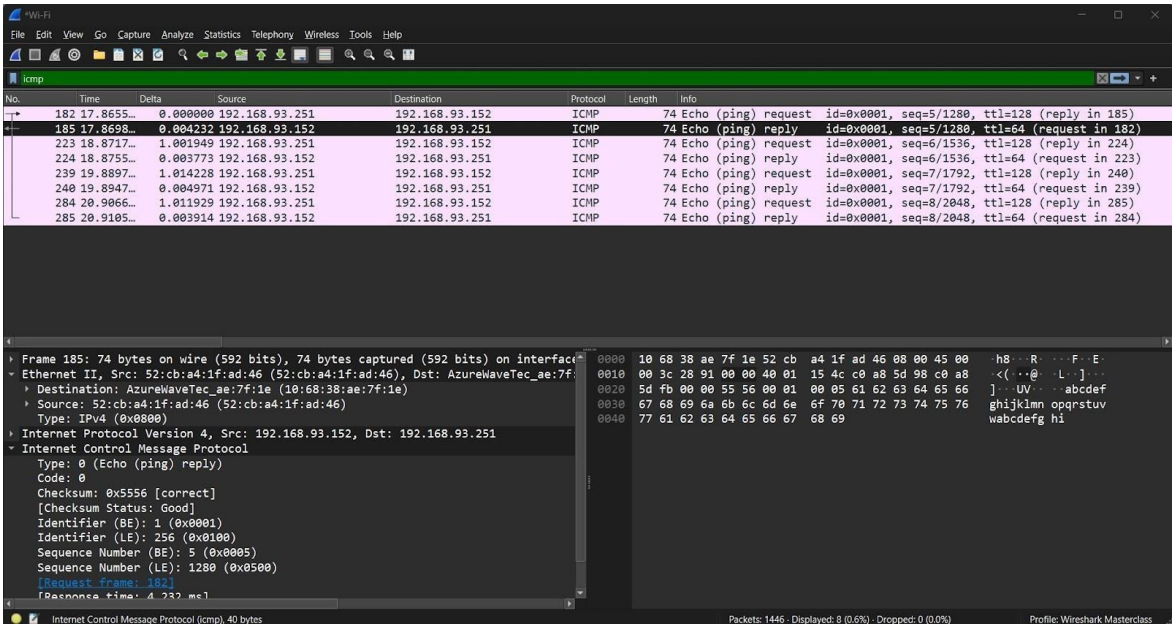


Figure 11: ICMP reply

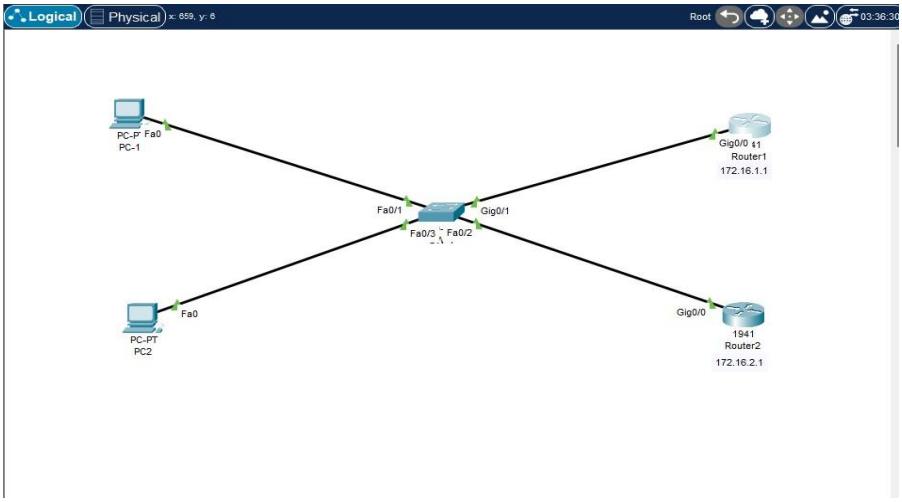


Figure 12: SNMP Topology

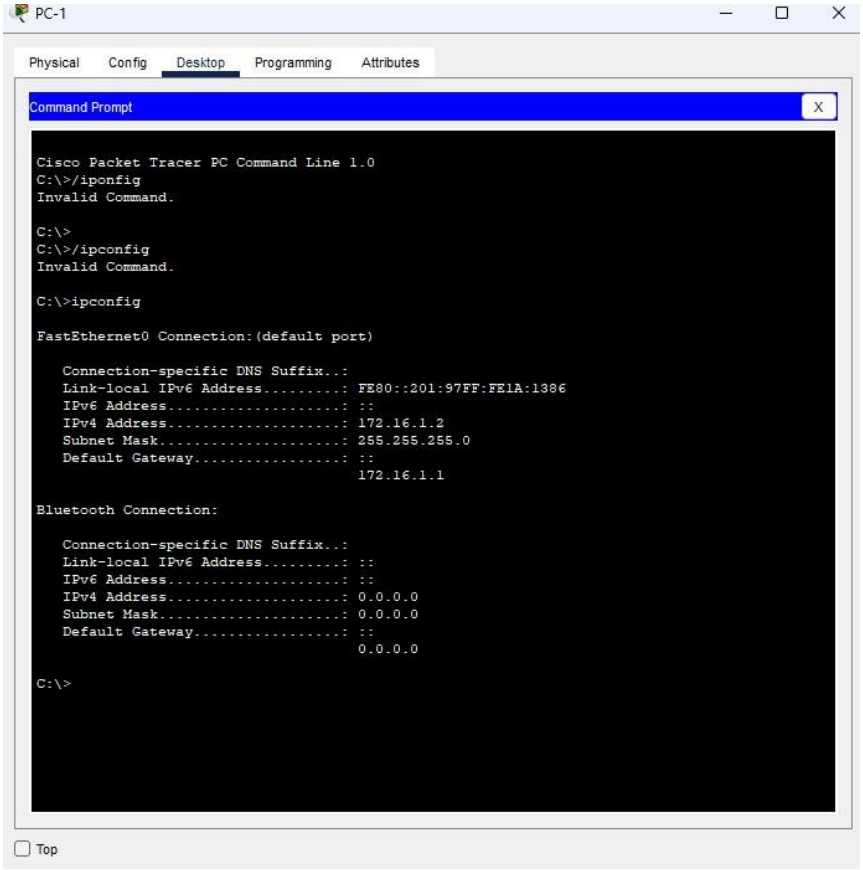


Figure 13: SNMP monitoring

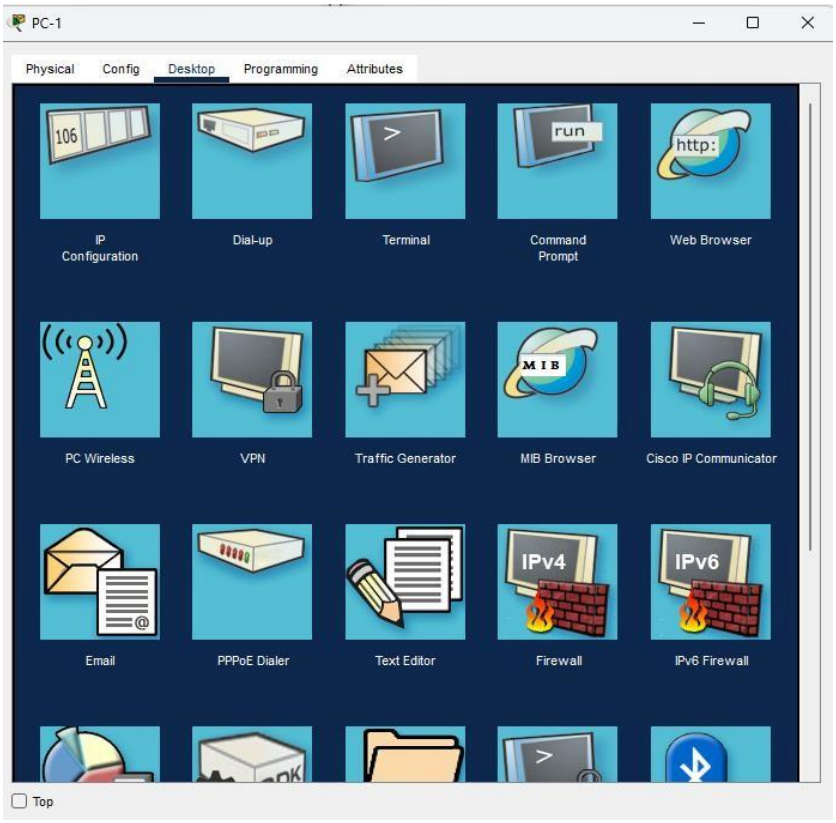


Figure 14: Command prompt IP address verification

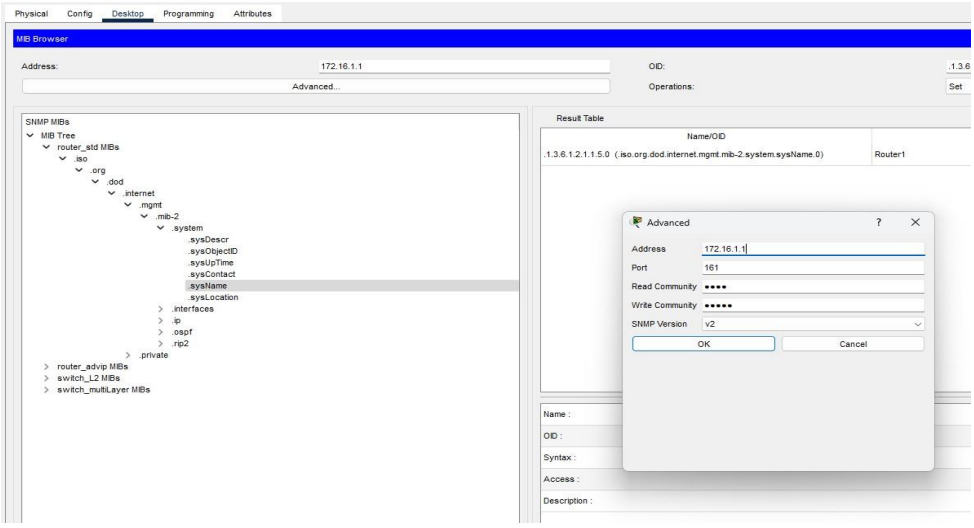


Figure 15:MIB browser configuration

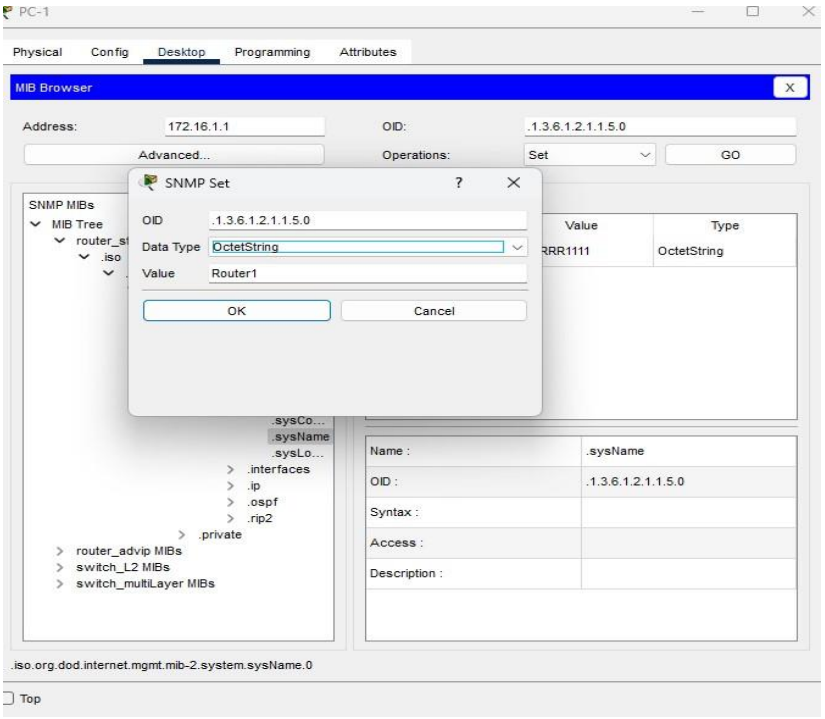


Figure 16: MIB browser settings

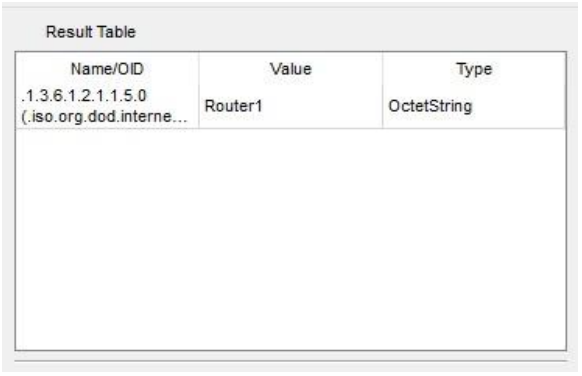


Figure 17: Checking

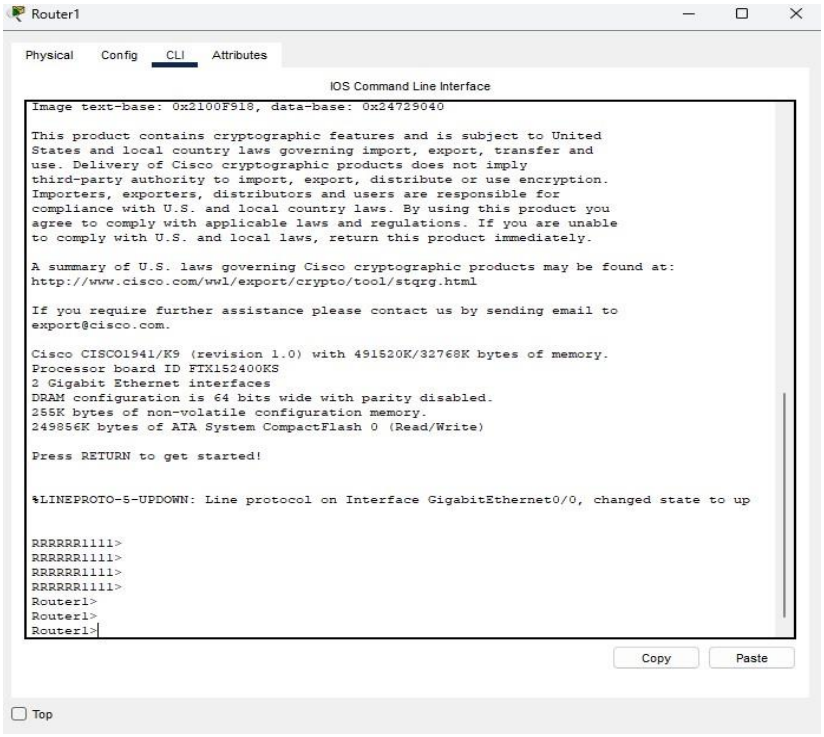
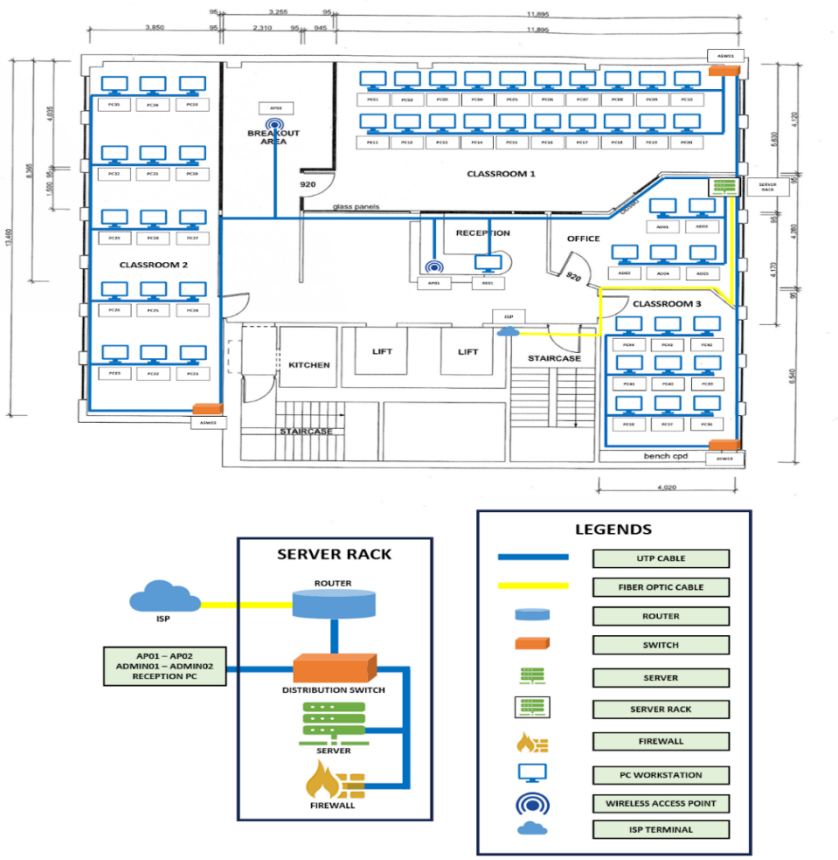


Figure 18: Router1 configuration result



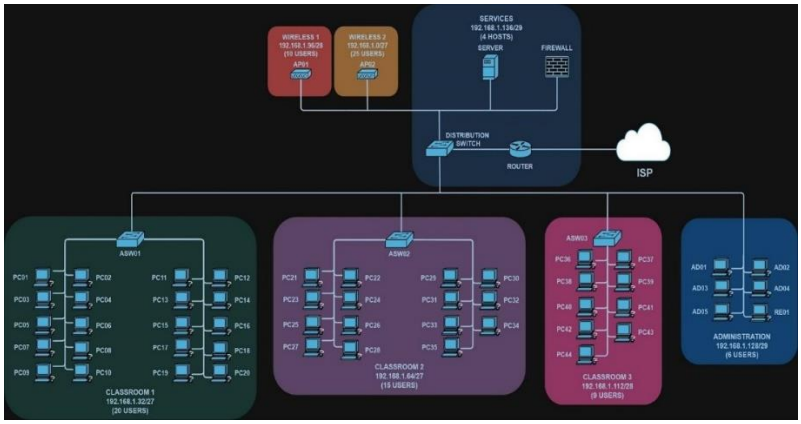


Figure 19: Network Designed

Challenges Faced and Project Management:

CE 1.13 I faced issues during these tasks in analyzing network needs, forecasting traffic requirements and choosing suitable network components within the given constraints. I overcome them by conducting technical research and discussing design decisions with my professor. I also worked with my fellow student as a team to review requirements, share ideas and enhance the proposed network design. I guided them where required by sharing my knowledge, motivated them during complex tasks and worked together to overcome issues to achieve the project objectives.

SUMMARY:

CE 1.14 During my diploma studies, I worked on an ICT network design assessment, where I analyzed and designed a LAN/WAN architecture based on the requirements. I identified current and future network requirements and applied forecasting techniques to estimate traffic growth and its impact on bandwidth, routing and IP addressing. I assessed user requirements for the design to match expectations. I then analyzed various network topologies and communication technologies and chose appropriate components based on performance and scalability requirements. I also performed cost estimation by comparing vendor products and assessed network performance using parameters like latency, jitter, packet loss and packet duplication. I reviewed network behavior to understand real time data flow and troubleshooting. I developed a secure and scalable network design using subnetting, segmentations and layered architecture principles. I evaluated it against business and technical needs. Working on this task enhanced my understanding of network troubleshooting, IP management and telecom planning concepts through analysis of common network problems and their resolutions.