Module Code: **CS2CA17**

Assignment report Title: Internet Control Message Protocol (ICMP) and Small Network configuration Student Number (e.g., 25098635): **31022399**

Date (when the work completed): **10th December 2023**

Actual hours spent for the assignment: **15**

Assignment evaluation (3 key points) (e.g. point I 100% completed, point II 80% completed, point III 50% completed):

*1: Small Office Network Configuration proved the simplest task (100% complete)*

*2: Completing the DNS and HTTP Server configuration was a bit of a challenge (80% complete)*

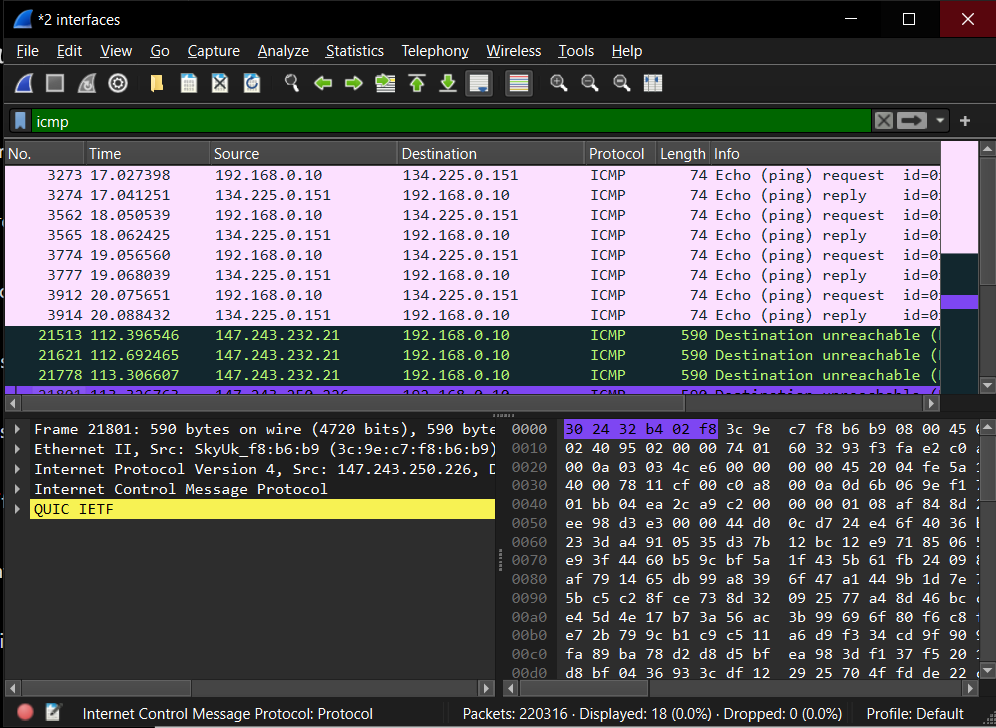
*3: Sourcing the MAC addresses in Wireshark proved to be a challenge (50% complete)*

**INTERNET CONTROL MESSAGE PROTOCOL (ICMP) AND SMALL NETWORK CONFIGURATION** **LAB REPORT**

**Introduction:** In the dynamic realm of computer networking, the prevalent importance of packet sniffing, a data analysis tool used for network diagnostics and statistical review is paramount for any IT user. This report aims to provide a comprehensive overview and insight into the implementation of the relevant methodologies employed in a range of contexts, such as configuring a small office network, and testing connection with a remote (not on LAN) host using Wireshark, ultimately intending to demonstrate thorough understanding of network architecture and management.

**Wireshark Packet Sniffing and Remote Host ‘Ping’**

***ICMP (Internet Control Message Protocol):*** *ICMP can be defined as a network layer protocol in the Internet Protocol (IP) suite used for sending error messages, conducting network diagnostics (e.g., with the "ping" command), and exchanging operational information about IP packet delivery.*

**In the screenshot (left):** a series of ICMP ‘request’ and ‘reply’ captures can be seen with regards to the ’ping’ request sent via the run command on the device. These packet captures validate a connection between the host (LAN and the remote host (not on LAN) which is reading.ac.uk in this case.

**IP And MAC Addresses**

**Remote:** IP address was on a different subnet to LAN, indicating significant distance, MAC address (20:01:63:05:31:01:97). Used to communicate between devices. MAC address is router’s as replaces source MAC forward packet.

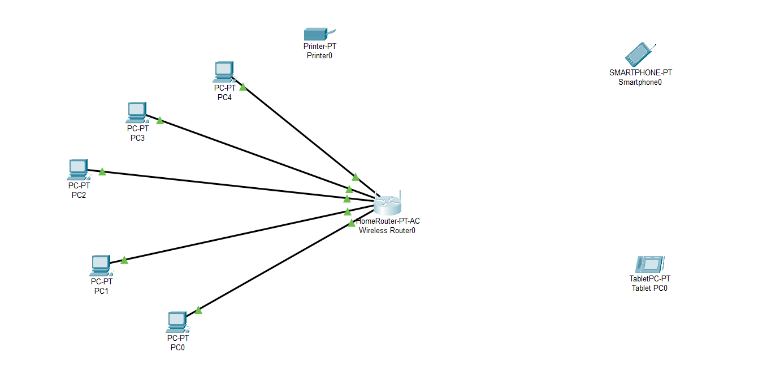
**LAN:** IP address assigned DHCP and only used for local communication, MAC addresses used for communication in same broadcast domain, and to send frames directly to each other if in same LAN.

**A screenshot of a computer

Description automatically generatedMAC Address Reflection**

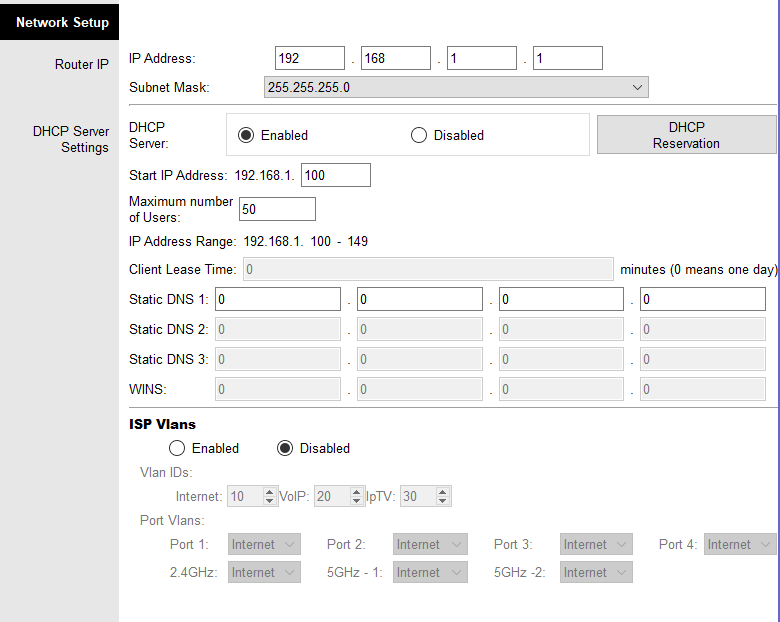
ARP is used to find the MAC address of remote host router.

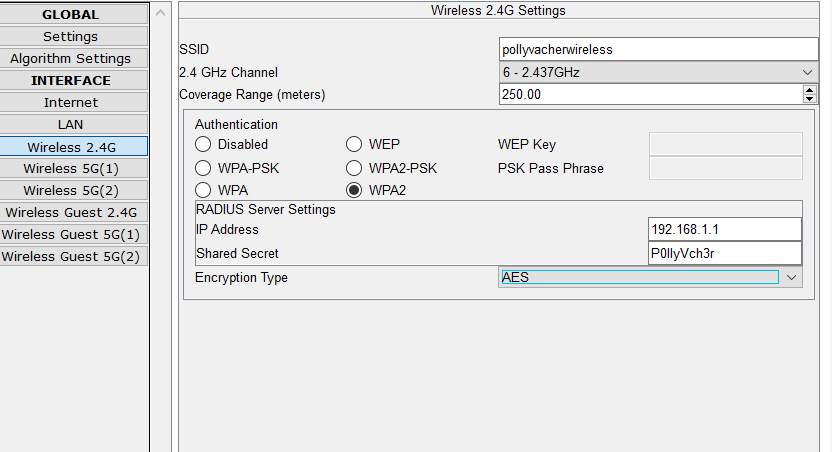
The actual MAC address was not that of the source host, but instead had been replaced by the router MAC address in order to allow for packet routing and forwarding across different subnets. Some ways the MAC address is significant is as the destination and source MAC addresses are now that of the routers of the communicating devices instead.

**Small Office Network LAN configuration**

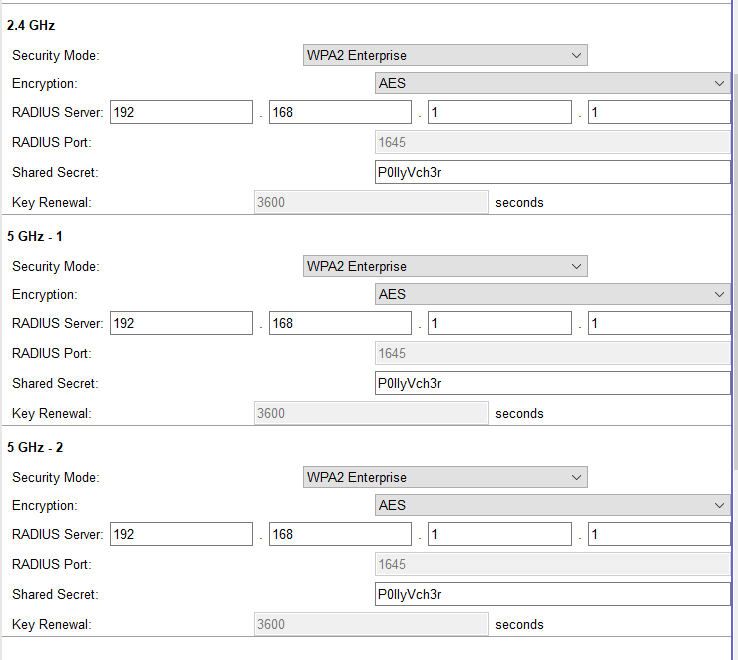
The 5 PCs and Printer were connected to the Wireless Router via copper straight-through wires on available interface ports, whilst the tablet and mobile were connected wirelessly by using the Router as a DHCP server.

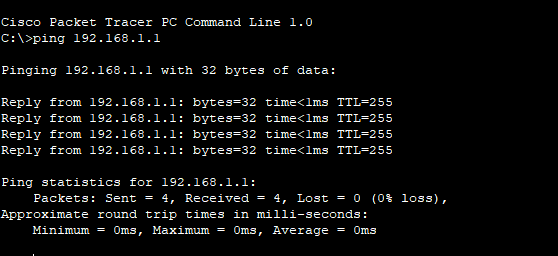
**DHCP Server Configuration**

In screenshot (right): By accessing the Wireless Router GUI, I was able to configure the DHCP server by correcting the default gateway IP address and setting limits on parameters such as ‘number of users’ and ‘IP address range’. Further to this, I attempted to add clients (PCs and Printer) via DHCP Reservation, using MAC addresses. By using the ‘ping’ command, as well as running the Packet Tracer simulation I was able to see the DHCP server was live, as there was visible communication between the wireless devices (tablet and mobile) with the router.

**Wireless Router Setup**

***In screenshots (left):*** The screenshot details the configuration of the Wireless Router using the provided SSID and configuring a WPA2 Authentication with Shared Key Encryption using the provided Key Phrase. This was done on both Router GUI as well the Router Interface. In addition to this, to configure the Router, I ensured to enable internet access and add the PCs and Printer as clients.



**Connectivity Tests**

1. *Ran ‘ping’ command on IP address of router from PC 1 – Status:* ***successful***
2. *Ran ‘ping’ command on IP address of router from PC 2 – Status:* ***successful***

**DNS and HTTP Servers**

**A white sheet with black text

Description automatically generatedDNS Server Configuration**

**Screenshot (left):** By configuring 5 ports for DNS protocol single port forwarding to the 5 PC client IP addresses, I was able to establish a DNS Server complex for the Wireless Router.

**HTTP Server Configuration**

**A screenshot of a computer

Description automatically generated**

**Screenshot (right):** Similarly, by configuring 5 ports with the HTTP protocol to the 5 PC Client IP addresses, I was able to establish the fundamentals for the HTTP server.

**Service Tests**

**A computer screen shot of a computer screen

Description automatically generatedA** *standard ‘ping’ test on a domain name was carried out from a PC client in order to test the DNS server. Status -* ***unsuccessful***

In conclusion, this experiment aimed to demonstrate an understanding of the implementation of communication at Layer 2 of the Network Layer Model. This task successfully addressed the objectives of analysing and implementing packet sniffing and network diagnostic techniques. The results were in line with expectations, and by exploring the potential of such practises, further optimisation of packet-level communication for optimal network performance can be considered.

To further reflect on this experiment, by engaging in practise of these networking methodologies, I was able to develop a stronger understanding of the key concepts as well as utilise key skills such as logical problem solving and deductive reasoning in order to correctly cohere all configurations in alignment with one another. By putting my theory into practise, I gained a valuable insight into the wide scope of versatile possibilities available from possessing a viable foundation.

Discussion aka pros and cons

Conclusion