**Activity 1**

**Question 1:**

****

1. 129.11.19.239
2. 193.131.67.255
3. 231.107.43.223
4. 249.75.107.31

**Question 2:**

****

1. 01101111.00111000.00101101.01001110
2. 11011101.00100010.00000111.01010010

**Question 3:**

**Networking Services and Utilities Command**

Every operating system contains numerous built-in command line networking utilities. These tools range from the obscure to the commonplace The following tasks aim to help you to familiarise yourselves with the concepts of IP addresses, networks, routing, and hostnames.

**Task 1:**

Network information about your network connection:

* If you have booted up with Windows, click the windows symbol on the bottom left corner and search for CMD (Command Prompt).
  + Then type **ipconfig /all** to find out information about your current network configuration for the adapter you are using.

Record bellow the following information:

|  |  |
| --- | --- |
| Parameters | Value |
| Physical (MAC) Address | c8:89:f3:eb:b2:64 |
| DHCP Enabled? | yes |
| IPv4 Address | 192.168.1.2 |
| Ipv6 Address | 240e:361:af59:f700:da:6e4b:abd0:549f |
| Subnet mask | 255.255.255.0 |
| Lease obtained | lease\_time (uint32) = 0x93a80 |
| Lease expires | 7 days |
| Default Gateway | 192.168.1.1 |
| DHCP Server(s) | 192.168.1.1 |
| DNS Server | 192.168.1.1 |

Can you check with the person next to you if you get any similar results? If yes, which parameters are common? Why do you think this is happening?

If you have a laptop that is connected to the university Wi-Fi network, try to collect the same information as above.

**ANSWER:** Usually, when two or more computers are on the same local network (e.g., sharing the same router or Wi-Fi), they end up with common parameters such as: Subnet mask/ Default Gateway (Router)/ DNS Server/ DHCP Server. All these settings are typically assigned by the same router (or DHCP server). Because everyone is connecting through the same network device, those network parameters are very likely to match.

**Task 2:**

All network communications take place with the of IP addresses. Humans find it easier to remember words than numbers so the Domain Name System (DNS) is a network service that allows the translation between IP addresses and domains. Every DNS server keep a register of several IP addresses and related domains.

Can you find the IP addresses (IPv4 & Ipv6) that correspond to the following domains? You can use the command prompt. Try to find them by using the **nslookup** command through the command prompt**.** For example, type: nslookup IP address or nslookup domain

|  |  |  |
| --- | --- | --- |
| Domain | Ipv4 format | Ipv6 format |
| www.google.com | 142.250.197.228 | 2404:6800:4005:815::2004 |
| www.bbc.co.uk | 151.101.64.81, 151.101.192.81, 151.101.128.81, 151.101.0.81 | None |
| www.bbc.com | 151.101.64.81, 151.101.192.81, 151.101.128.81, 151.101.0.81 | None |
| www.iana.org | 192.0.33.8 | 2620:0:2d0:200::b:8 |
| mail.port.ac.uk | 142.250.199.243 | 2404:6800:4005:817::2013 |
| www.port.ac.uk | 23.2.16.26 | None |
| www.fbi.com | 127.0.0.1 | None |
| www.fbi.gov | 104.16.148.244 | 2606:4700::6810:95f4 |

Try using the **nslookup** to identify the hostnames for the following IP addresses.

|  |  |
| --- | --- |
| IP address | Hostname |
| 8.8.4.4 | dns.google |
| 208.67.222.222 | resolver1.opendns.com. dns.umbrella.com.  dns.sse.cisco.com.  dns.opendns.com. |
| 208.67.220.220 | dns.sse.cisco.com.  resolver2.opendns.com.  dns.umbrella.com.  dns.opendns.com. |
| 157.240.1.35 | edge-star-mini-shv-01-ccu1.facebook.com. |
| 199.59.149.230 | www4.twitter.com. |
| 198.41.0.4 | a.root-servers.net. |
| 193.0.14.129 | k.root-servers.net. |
| 192.168.14.12 | server can't find 12.14.168.192.in-addr.arpa: NXDOMAIN |

Are you able to map all IP addresses to a hostname? If no, could you explain why?

**ANSWER: 1. No PTR Record**  
The “reverse resolution” (IP to hostname) depends on a DNS PTR record. If the owner of the IP address (an ISP or server operator) has not configured a PTR record, even for a public IP, you will see “Non-existent domain” or a similar result.

**2. Private Network (Intranet) Addresses**  
Addresses such as 192.168.x.x, 10.x.x.x, and 172.16.x.x – 172.31.x.x are reserved for internal networks and are typically not configured with PTR records on public DNS. They should not be resolvable from external networks, as they are used only within local (private) environments.

**3. CDN / Proxy Services**  
Some websites use CDNs (e.g., Cloudflare, Akamai), and the reverse lookup may show the CDN’s transit node or load balancing service domain instead of the actual website domain. It is also possible that the CDN’s configuration does not publicly provide a PTR record, resulting in no hostname being found.

**Task 3:**

The TRACERT utility determines the route to a destination by sending an Internet Control Message Protocol (ICMP) echo packets to the destination. TRACERT prints an ordered list of the intermediate routers (hops) a data packet needs to travel in order to get to the destination e.g. the Facebook web server.

Try to run the **tracert** command for the following IP addresses/hostnames and check how many hops (routers) exist between your computer and the destination.

|  |  |
| --- | --- |
| Destination | Number of hops |
| 8.8.8.8 | 12 |
| www.iana.org | 14 |
| 148.197.20.164 | 16 |
| 1.0.0.19 (Australia) | 24 |
| 85.88.39.169 (Belgium) | 18 |

Why the difference in the number of hops between the various destinations?

**ANSWER:** The number of hops varies because of differences in physical distance, network topology, and each ISP’s routing decisions. Even when two locations may seem equally distant, different peering agreements or traffic paths can lead to more or fewer intermediate routers.

Do you observe any commonalities in the produced results for the above destinations?

**ANSWER:** In all the traceroute results, you typically see initial hops in your local network, then transitions through one or more backbone networks, and finally, the target destination’s ISP. This pattern highlights a consistent three-stage journey: local, backbone, and destination.

Is Australia closer than Belgium?

**ANSWER:** From most regions, Belgium is generally closer than Australia, so you’ll often see fewer hops and lower latency when tracing routes to Belgium. However, efficient routing or direct peering might sometimes make routes to seemingly more distant locations appear shorter in terms of hop count.

**Task 4:**

IP networks use routing tables to direct packets from one network (subnet) to another. The Windows Route utility allows you to view the device’s routing tables. To identify the routing table of your devices you simply type **ROUTE PRINT** on Command Prompt. Take a screenshot of the produced table(s) and attach on this document. What information can you get from the produced routing table?

We will be revisiting the term routing table in the coming weeks.

A screenshot of a computer

Description automatically generated

**A screenshot of a computer

Description automatically generated**

**ANSWER:** From the routing table, you can see which networks your computer knows how to reach, what gateway (next hop) it should sendpackets to for each network, which local interface will be used (e.g., Ethernet, Wi-Fi, or virtual adapters), and the priority or “metric” for each route. This helps your system decide exactly where to send outgoing traffic based on the destination IP address.