

Exercise 1: TCP/IP Model

Question: Draw and explain the TCP/IP model consisting of 4 layers. What are the functions of each layer?

Exercise 2: IP Address and Subnetting

Question: Given the IP address 192.168.1.0/24, please:

- a) Identify the network address, broadcast address, and the range of usable IP addresses.
- b) Subdivide this network into 4 smaller subnets. Determine the network address, broadcast address, and the range of usable IP addresses for each subnet.

Exercise 3: TCP Protocol

Question: Describe the TCP three-way handshake process. Why is this process important?

Exercise 4: UDP Protocol

Question: Compare TCP and UDP. In which scenarios should you use UDP instead of TCP and vice versa?

Exercise 5: Packet Analysis

Question: Using a packet analysis tool like Wireshark, capture and analyze a TCP packet. Identify the main components in that packet (e.g., source IP address, destination IP address, source port number, destination port number, TCP control flags).

Exercise 6: ARP Protocol

Question: Explain the role of the ARP protocol in a TCP/IP network. How does a device find out the MAC address of another device on the same local network?

Exercise 7: NAT (Network Address Translation)

Question: Explain how NAT works. Why is NAT necessary in TCP/IP networks? Provide an example illustrating the use of NAT.

Exercise 8: DNS (Domain Name System)

Question: Explain how DNS works in a TCP/IP network. How is a domain name (e.g., www.example.com) translated into an IP address?

Exercise 9: Transport Layer

Question: Describe the functions of the transport layer in the TCP/IP model. Compare and provide examples of the two main protocols at this layer: TCP and UDP.

Exercise 10: TCP/IP Configuration on a Computer

Question: On your operating system (Windows, macOS, Linux), perform the following steps:

- a) Configure a static IP address for your computer.
- b) Test the network connection by using the ping command to another IP address in your network.
- c) View the current network configuration (IP address, subnet mask, gateway) and explain the meaning of each parameter.