**School of Information Technologies and Engineering, ADA University**

**CSCI2303 – Intro to Computer Networks**

**Fall 2024 – 12/14/2024**

**Assignment 5 by Laman Panakhova 16882**

**Instruction & Solution:**

Subnetting.

Part1: Subnetting Calculation

You are given the network 192.168.10.0/24. Your task is to divide this network into multiple subnets.

1. What is the subnet mask if you want to create subnets that support **14** usable IP addresses each?

We are working with the network **192.168.10.0/24**, which means the first 24 bits are dedicated to the network portion, and the remaining 8 bits are available for hosts (devices). We want to divide this network into smaller subnets, and each subnet needs to support **14 usable IP addresses**. To make this work, we need to figure out how many IP addresses each subnet should have in total, which is 14 usable addresses plus 2 special addresses (one for the network address and one for the broadcast address). So, each subnet needs **16 IP addresses** in total.

The formula to calculate the number of hosts per subnet is 2n − 2, where n is the number of bits for the host portion. To get at least 16 IP addresses: 2n – 2 ≥ 14. From this 🡪 2n ≥ 16 🡪 so, n = 4 (since 24 = 16).

Since we need 4 bits for the hosts, this leaves **28 bits** for the network portion of the address because the original network had 24 bits, and now we borrow 4 bits to make subnets. So, with 28 bits for the network, the subnet mask becomes **/28**. We obtain: 11111111.11111111.11111111.11110000 (28 ones) 🡪 **255.255.255.240**

**b.** Provide the network address, first usable IP address, last usable IP address, and broadcast address for the first two subnets.

**First Subnet:**

Network Address: 192.168.10.0/28

First Usable IP Address: 192.168.10.1

Last Usable IP Address: 192.168.10.14

Broadcast Address: 192.168.10.15

**Second Subnet:**

Network Address: 192.168.10.16/28

First Usable IP Address: 192.168.10.17

Last Usable IP Address: 192.168.10.30

Broadcast Address: 192.168.10.31

In conclusion, these calculations ensure that each subnet will have enough IP addresses to accommodate 14 devices, with appropriate network and broadcast addresses to manage a smooth communication within the subnet.

Part 2: Packet Tracer Network Setup

 a. Use a router to connect two different subnets.

 b. Add one switch to each subnet.

 c. Connect at least two PCs to each switch and configure them with the appropriate IP addresses from the subnets.

 d. Ensure that PCs from different subnets can communicate by configuring the router correctly

***You will find the Packet Tracer File attached.***