Exercise 2: Subnetting and Routing

Your organization has a network structure based on the subnetting example (Figure 2.3 in the textbook). Let the address of the operator's router at the Internet interface of the left router be 140.100.50.50. Currently, the network consists of three active subnets. Your task is to determine the network settings for the devices in this network. This includes the network settings in the example (IP settings for workstations and router IP addresses), as well as the routing tables for both routers. You can present the settings with a diagram similar to the example or in a list format with text. In this example, we use the classless CIDR addressing practice, and your organization's address space is determined based on your student number as described below. Present the calculations related to determining this address space in your work.

The CIDR address you receive, and the number of subnets prepared for future needs, are determined based on your student number as follows (partially in parentheses and with an example student number 156791):

The address is 125.X.Y.0/Z

X: The last three digits of the student number are divided by 250, and X is obtained as the remainder (791-3250=41)

Y: The 3rd, 4th, and 5th digits of the student number form a number divided by 250, and Y is obtained as the remainder (679-2250=179)

Z, the subnet mask length, is between 12-20 and is calculated as: 12 + remainder from dividing the student number by 9 (so the remainder is 156791-17421*9=2, and Z=12+2=14).

Finally, unnecessary bits indicated by the mask are removed from the obtained address. In this example, Z is 14, so only the first 14 bits of the address have significance. In this example, Y is automatically 0. Only the first 6 bits of X are considered, and the rest are set to zero. So, the original X, 41 in binary is 00101001. When the last 2 bits are set to zero, it becomes binary 00101000, or decimal 40.

So, in the example case, the organization gets the address space 125.40.0.0/14

The required number of subnets is 4, 8, or 16. It is calculated by summing the last two digits of the student number and rounding the result to the nearest of the aforementioned numbers. Numbers 6 and 12 are rounded up (example: 9+1=10, so 8 subnets).

Note! Since this is CIDR, the first 14 bits in the example form the actual network ID, the next 3 bits form the subnet ID (8 subnets), and the remaining 15 bits are left for host IDs (theoretically, as such large subnets are not typically formed in practice). So, do not get stuck too much on the textbook example because it follows a purely classful approach. Therefore, do not automatically place the subnet ID at the beginning of the last decimal part, as in this exercise example, the subnet ID is formed by bits 15-17.

You can use any of the three resulting subnets. It is sufficient to provide the address spaces for only these three subnets in your work.

And remember to present the routing tables as well.