

# Assignment

## CSE 4295 (Multimedia Communication) Instructions

---

- I. *Deadline : 10 August, 2023 (Thursday) within 11:59 PM (no extension will be considered)*
- II. *The full marks of the assignment is 40 (weights of 2 class tests).*
- III. *All the assignments will be checked with the plagiarism checker. Therefore, copying and pasting will lead you to the poor marks.*
- IV. *All problems are to be done in a group of maximum 05 (five) students.*
- V. *All the figures in the assignment should be clear and crisp.*
- VI. *No handwritten submission will be accepted. You must type the whole assignment.*
- VII. *Assignment MUST be submitted with a cover page; where you MUST indicate all the group member's names, student rolls, year, semester, department and section.*
- VIII. *One group must submit the assignment in 01 (one) PDF file in **TurnitIn**. The name of the PDF file will be as below:*

*CSE4295\_Group#\_Fall22.pdf*

Get your group number (group#) from the following spreadsheet entry made by you.

Group # Link:

[https://docs.google.com/spreadsheets/d/1304oBmv\\_SyctDeXqWSHLWGJF31HWkSX0xc4nyFbhtV0/edit?usp=sharing](https://docs.google.com/spreadsheets/d/1304oBmv_SyctDeXqWSHLWGJF31HWkSX0xc4nyFbhtV0/edit?usp=sharing)

### TurnitIn Info

- **Class ID: 39354922**
- **Enrollment key 123456**

## **Project Title: Design a Computer Network capable of Multimedia communication for the EEE Department at Ahsanullah University of Science and Technology (Part 1)**

**Project Objective:** The objective of this project is to design a reliable and efficient computer network for the Electrical and Electronic Engineering (EEE) Department at Ahsanullah University of Science and Technology. The network should facilitate seamless communication, resource sharing, and internet connectivity for students and faculty members. Try to justify any assumption made during the design process.

### **Project Phases:**

#### **1. Network Planning and Requirements Gathering:**

- **Estimate** the network requirements of the EEE Department, including the number of users, devices, and expected network traffic.
- **Indicate** the goals and objectives of the network deployment project.
- **Describe** the desired network services, such as internet connectivity, file sharing, and printing.

**Prepare a Table like follows (Through literature review, case study, field survey, interview etc.)**

Table 1: Network Planning and Requirements Gathering

Zone	Total PC	Software Required	Network service required	Comment
DSP lab	30	Matlab/Octave Pspice/LTspice etc.	1. Roaming user profile. 2. File/ Task submission to teacher. etc.	Internet connectivity in selected PCs only

#### **2. Network Design and Topology:**

- **Build** a network topology that meets the department's requirements.
- **Prepare** the logical layout of the network, including the placement of routers, switches, access points, and servers.
- Consider scalability, redundancy, and network segmentation to accommodate future growth economically.

An example of a logical layout of infrastructure may be as follows:

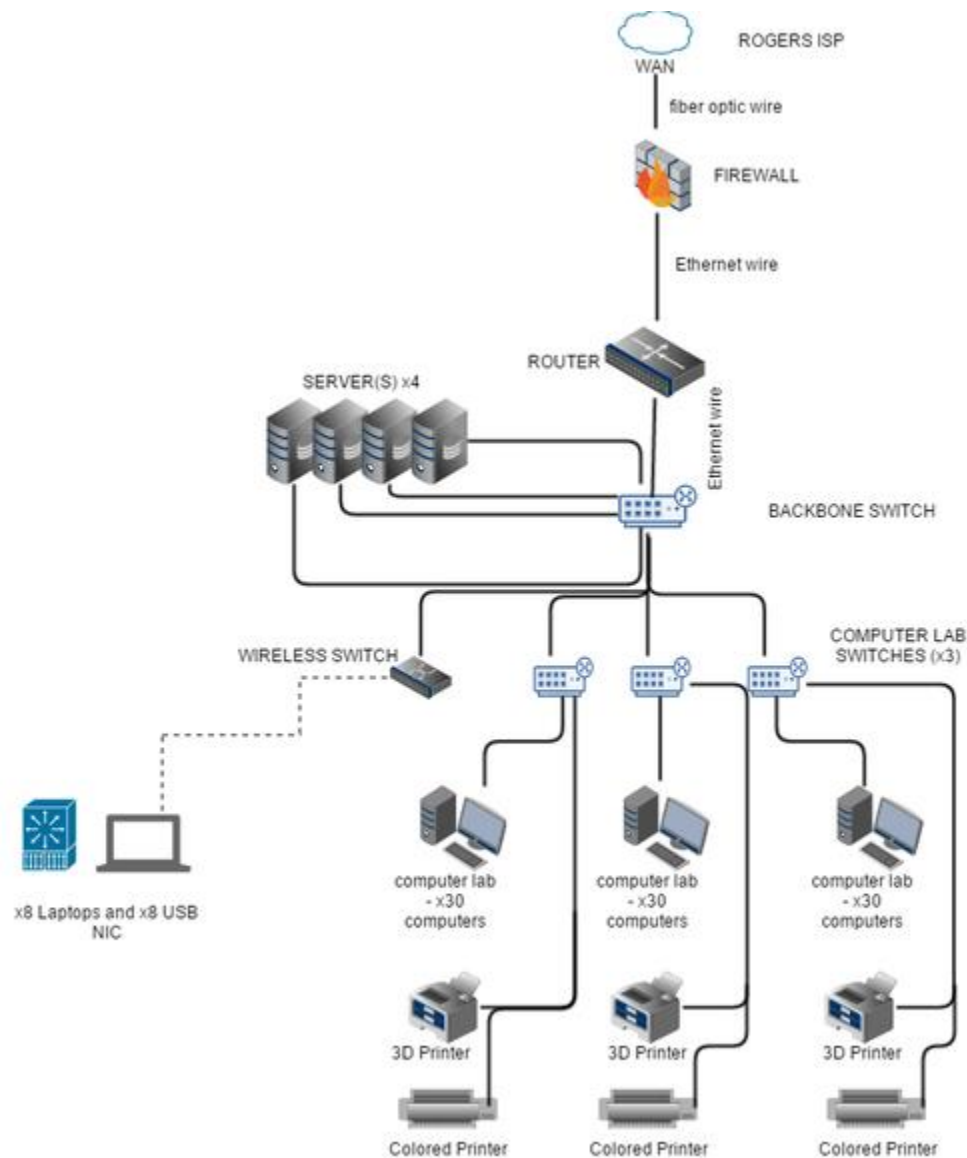


Figure 1: An example of network infrastructure. Use block diagram with label (instead of symbols of equipment) in your diagram. Give diagram of the complete network along with other representative subnet diagrams.

### 3. Selection of Networking Equipment and estimated cost:

- *Assess* and *prepare* a list of appropriate networking equipment, such as **routers, switches, access points, and network cables** etc. based on the network design and requirements.
- Consider factors like cost, performance, capacity, security features, and compatibility with existing infrastructure.

Prepare a Table like follows (Through literature review, case study, field survey interview etc.)

Table 2: Selection of Networking Equipment

Device	Zone wise	Specification	Unit Price	Quantity Required	Comment
1.Router					
2.Switches	#Dsp Lab 1 (32 port) #Simulation Lab 1( 32 port)	8/16/24/32/48 port etc.			

4. **IP Addressing and Subnetting:** [Cleverly assume/choose a base IPV4 address with subnet mask]
- *Prepare* an IP addressing scheme for the EEE Department network.
  - *Manage* IP address allocation for different subnets, including faculty, staff, and student networks.
  - *Use* proper subnetting and consider future expansion.

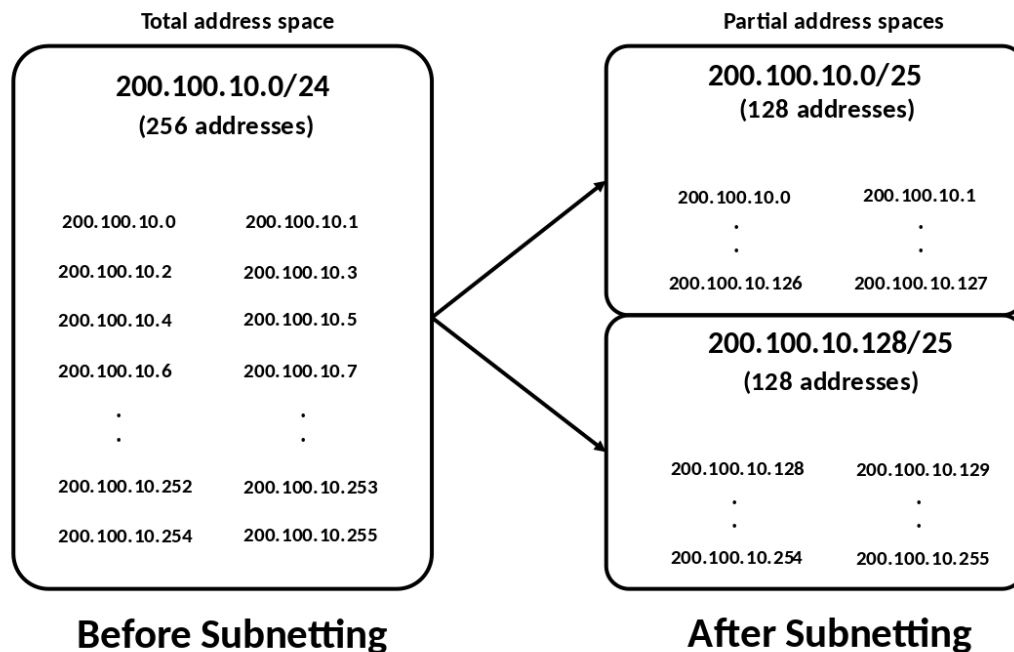
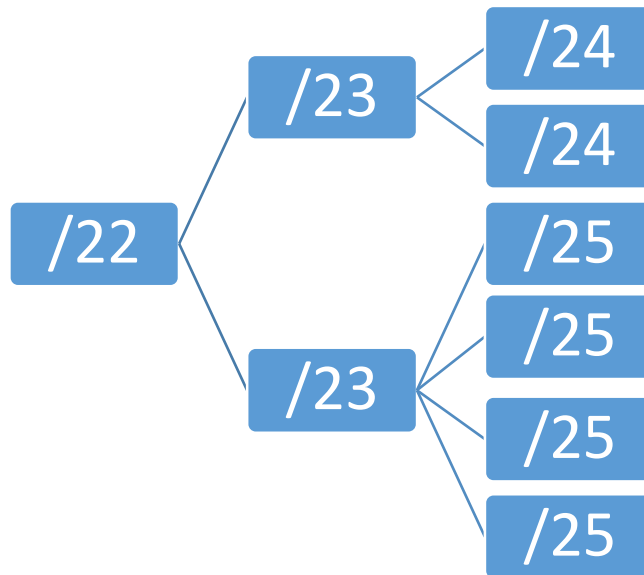


Figure 2. Introduction to subnetting.



Prefix Length	Subnet Mask	Subnet in Binary Network = N, Host = H, Borrowed = n Total IP addresses in /16 Network = 65536.	Available Network	Usable Host Per Network
/17	255.255.128.0	NNNNNNNN.NNNNNNNN.nHHHHHHH.HHHHHHHH 11111111.11111111.10000000.00000000	$2^1=2$	$2^{15}-2=32766$
/18	255.255.192.0	NNNNNNNN.NNNNNNNN.nnHHHHHH.HHHHHHHH 11111111.11111111.11000000.00000000	$2^2=4$	$2^{14}-2=16382$
/19	255.255.224.0	NNNNNNNN.NNNNNNNN.nnnHHHHH.HHHHHHHH 11111111.11111111.11100000.00000000	$2^3=8$	$2^{13}-2=8190$
/20	255.255.240.0	NNNNNNNN.NNNNNNNN.nnnnHHHH.HHHHHHHH 11111111.11111111.11110000.00000000	$2^4=16$	$2^{12}-2=4094$
/21	255.255.248.0	NNNNNNNN.NNNNNNNN.nnnnnHHH.HHHHHHHH 11111111.11111111.11111000.00000000	$2^5=32$	$2^{11}-2=2046$
/22	255.255.252.0	NNNNNNNN.NNNNNNNN.nnnnnnHH.HHHHHHHH 11111111.11111111.11111100.00000000	$2^6=64$	$2^{10}-2=1022$
/23	255.255.254.0	NNNNNNNN.NNNNNNNN.nnnnnnnH.HHHHHHHH 11111111.11111111.11111110.00000000	$2^7=128$	$2^9-2=510$

Figure 3. Concept of breaking a network into smaller subnet

IP address in decimal notation	192	168	5	50
Binary Equivalent of IP address	11000000	10101000	00000101	00110010
Subnet Mask	11111111	11111111	11111111	11110000
Result of Anding	11000000	10101000	00000101	00110000
Network Address	192	168	5	48

IP address in decimal notation	192	168	5	50
Binary Equivalent of IP address	11000000	10101000	00000101	00110010
Inverse of Subnet Mask	00000000	00000000	00000000	00001111
Result of ORing	11000000	10101000	00000101	00111111
Broadcast Address	192	168	5	63

Figure 4. Subnetting : Network and Broad cast Addressing.

### Subnetting Successful

Major Network: **192.168.0.0/19**  
Available IP addresses in major network: **8190**  
Number of IP addresses needed: **5075**  
Available IP addresses in allocated subnets: **7142**  
About **88%** of available major network address space is used  
About **71%** of subnetted network address space is used

Subnet Name	Needed Size	Allocated Size	Address	Mask	Dec Mask	Assignable Range	Broadcast
College of Engineering	700	1022	192.168.0.0	/22	255.255.252.0	192.168.0.1 - 192.168.3.254	192.168.3.255
library	700	1022	192.168.4.0	/22	255.255.252.0	192.168.4.1 - 192.168.7.254	192.168.7.255
College of Basic Education	450	510	192.168.8.0	/23	255.255.254.0	192.168.8.1 - 192.168.9.254	192.168.9.255
College of Arts	400	510	192.168.10.0	/23	255.255.254.0	192.168.10.1 - 192.168.11.254	192.168.11.255
College of Medicine	400	510	192.168.12.0	/23	255.255.254.0	192.168.12.1 - 192.168.13.254	192.168.13.255
College of Science	400	510	192.168.14.0	/23	255.255.254.0	192.168.14.1 - 192.168.15.254	192.168.15.255
College of Pharmacy	375	510	192.168.16.0	/23	255.255.254.0	192.168.16.1 - 192.168.17.254	192.168.17.255
College of Humanities	350	510	192.168.18.0	/23	255.255.254.0	192.168.18.1 - 192.168.19.254	192.168.19.255
College of Administration and Economics	300	510	192.168.20.0	/23	255.255.254.0	192.168.20.1 - 192.168.21.254	192.168.21.255
College of Nursing	300	510	192.168.22.0	/23	255.255.254.0	192.168.22.1 - 192.168.23.254	192.168.23.255
Union	300	510	192.168.24.0	/23	255.255.254.0	192.168.24.1 - 192.168.25.254	192.168.25.255
College of Education	200	254	192.168.26.0	/24	255.255.255.0	192.168.26.1 - 192.168.26.254	192.168.26.255
College of Law and Political Sciences	200	254	192.168.27.0	/24	255.255.255.0	192.168.27.1 - 192.168.27.254	192.168.27.255

Figure 5. Example of IP Addressing after subnetting.



## 5. Network Device Configuration:

- *Give example* of configuration steps required for client PC, routers, switches, and wireless access points according to the network design.

## 6. Documentation :

- *Prepare* comprehensive documentation detailing network configurations, IP assignments, and device configurations.
- *Illustrate* network diagrams, including the network topology and IP addressing scheme.

Note: It is important to **consider the specific requirements and infrastructure** of the EEE Department at Ahsanullah University of Science and Technology while implementing this project while providing **best performance yet budget friendly**.

## Helpful Resources:

1. The complete Guide : <https://www.softwaretestinghelp.com/computer-networking-basics>.
2. Lab Manual: [http://iotmumbai.bharativedyapeeth.edu/media/pdf/lab\\_manuals/22417\\_Computer\\_Network\\_120421.pdf](http://iotmumbai.bharativedyapeeth.edu/media/pdf/lab_manuals/22417_Computer_Network_120421.pdf)
3. Choose a Server: [https://www.pcworld.com/article/469157/how\\_to\\_choose\\_a\\_server\\_for\\_your\\_small\\_business.html](https://www.pcworld.com/article/469157/how_to_choose_a_server_for_your_small_business.html)
4. Subnetting: <https://ipccisco.com/lesson/subnetting-examples/>
5. Subnetting: <https://www.connecteddots.online/resources/blog/how-to-master-ip-subnetting-part-one>
6. Subnetting: [https://www.youtube.com/watch?v=s\\_Ntt6eTn94](https://www.youtube.com/watch?v=s_Ntt6eTn94)
7. Documenting: <https://www.networkworld.com/article/2176692/step-by-step-guide-to-documenting-your-network.html>
8. Report ( Especially Chapter 4): <https://scholar.valpo.edu/cgi/viewcontent.cgi?article=1002&context=itcrpr>

Group Link:

[https://docs.google.com/spreadsheets/d/1304oBmv\\_SyctDeXqWSHLWGJF31HWkSX0xc4nyFbhtV0/edit?usp=sharing](https://docs.google.com/spreadsheets/d/1304oBmv_SyctDeXqWSHLWGJF31HWkSX0xc4nyFbhtV0/edit?usp=sharing)