# Network Design Paper

The University has recently leased a building in Adelphi, Maryland. The building will house some offices, classrooms, library, and computer labs.

Building dimensions:

Length: 240 Feet, Width: 95 Feet, Height: 30 Feet

The 50-year-old two-story building has the following layout:

Classroom #5

Office #5(Admission)

Office #4(Dean)

Classroom #3

Office #1

Library

Classroom #4

Office #3(IT)

240 Feet

First Floor Layout

 Closet

Closet

Classroom # 2

40 Feet

40 Feet

Classroom #1

Server

Room

Classroom #4

Classroom #3

Office #1

240 Feet

Second Floor Layout

Classroom #6

Office #3(Faculty)

Student Computer Lab

 Closet

U Closet

U Closet

Server

Room

Classroom #1

Classroom #5

Classroom #2

 Closet

Office #2(HR)

40 Feet

40 Feet

There will be **five computer labs** that will be used for instruction. Each of these labs will have **23** computers (22 student computers and 1 instructor computer). Each of these labs will also have **a server** in the closet located inside the lab.

In addition to the six computer labs, there will also be a **Student Computer Lab** that will provide computer access to students to do their homework. There will be **30 computers** in this lab and **a server** in the closet.

The library will also have some computers to allow students access to the library resources. There will be **10 computers** for student’s use in the library, and **5 computers** for Library staff.

There are **five lecture classrooms** in the building. Each of this room will have a computer for instructor’s use.

Finally, there are various offices in the building. Each of these offices will have **one computer** for the staff use, with the exception of the Admission office that will have **5 computers** for staff use.

**Equipment Inventory**

|  |  |  |  |
| --- | --- | --- | --- |
| **Workstation****Placement** | **Number of****Computers** | **Users** | **Total Computers** |
| 6 InstructionalComputer labs | 22 | Student andFaculty | 115 |
| Student Computer Lab | 31 | Student | 31 |
| 6 various offices | 6  | Staff/Faculty  | 6  |
| Admission office | 5  | Staff | 5  |
| Library | 10  | Student | 10  |
| Library | 5  | Staff | 5  |
| 5 classrooms | 1 | Faculty | 5 |
| Server |  | Staff | To be determined by students |
| Network Connecting Devices |  | IT Staff | To be determined by students |
| Printers |  |  | To be determined by student |

**Two server rooms** have been allocated, one on the first floor and one on the second floor.

Your task is to design the network for this new building with the following criteria:

* Student-accessed computers should be on separate network from the staff-accessed computers.
* The whole building will share one Internet access connection (T-1 link from Verizon). This connection will come into the Server Room on the first floor.
* Security is very important for UMUC as we have to protect students and employee’s data as well as any intellectual property that UMUC has on the servers and computers.
* The network has been assigned the 10.10.0.0/16 network address for all computers and devices. For Internet routing use 150.1.1.1 IP network address.
* The network should use physical cable (not wireless), but do provide wireless access in the Student Lobby area.

Submission should include (in **no more** than **ten pages**, excluding diagrams and references):

Network Addressing:

1. Define the subnet (based on: rooms, floor, department, or other criteria).
2. For each subnet, explain which devices/groups/users/rooms will be on this subnet, define the network address, subnet mask, and available IP addresses to be used by computers or devices.

Physical Network Design:

1. Define the topology that will be used.
2. Select the appropriate network media to use.
3. Select the appropriate network connecting devices to use.
4. Physical layout of the computers on the floor plan.
5. List of additional servers or network devices needed to implement the network.
6. Justifications for your network design (number 1 – 5 above)

You will be evaluated on your ability to

* Implement appropriate IP addressing scheme
* select and justify appropriate cable media that includes the length of each cable segment and number of nodes on each segment
* select and justify appropriate topology such as star, bus, or ring for your network
* select and justify of your selected network equipments
* select and justify appropriate network services to meet network requirements
* select and justify security implementation for the network
* use proper grammar, formatting, network terminology, and reference citations

Feel free to use any drawings or attachments, and assume any number of computers or users (not when provided here). You will be graded on the basis of right media, topology and knowledge of network concepts.