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UTM
UNIVERSITI TEKNOLOGI MALAYSIA

**Faculty of
Computing**

SCSR2213 NETWORK COMMUNICATIONS

Task 4: Making the Connection - LAN and WAN

Network Design for Faculty of Computing

Group Name: NoConnexion

Section: 03

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1.0 Introduction

This report is prepared as part of Task 4 for the SCSR2213 Network Communications course, focusing on the topic "Making the Connection – LAN and WAN." The objective of this assignment is to design a complete network infrastructure for the Faculty of Computing. Our group, NoConnexion, has developed a detailed plan that includes the layout of network devices, cabling arrangements, and the identification of cable types and lengths needed. The design covers both floors of the faculty building and aims to ensure reliable and efficient connectivity across all key areas, including laboratories, a hybrid classroom, and a video conferencing room. Through this project, we aim to apply our understanding of network planning in a practical and structured way.

2.0 Work Area

The diagram below is a topology that has been created by our team to illustrate the network of end devices, how data flows and the arrangement of LAN devices. We optimize the use of routers, switches and wireless APs for each laboratory, video conferencing room and hybrid classroom to ensure that this new faculty has a good network. On the left, it indicates a network connection on the lower floor while on the right side represents network connection on the upper floor. With this topology, it helped us give a visual on LAN devices requirement for each room and also gave us a big picture on cabling connection arrangement for our floor plan.

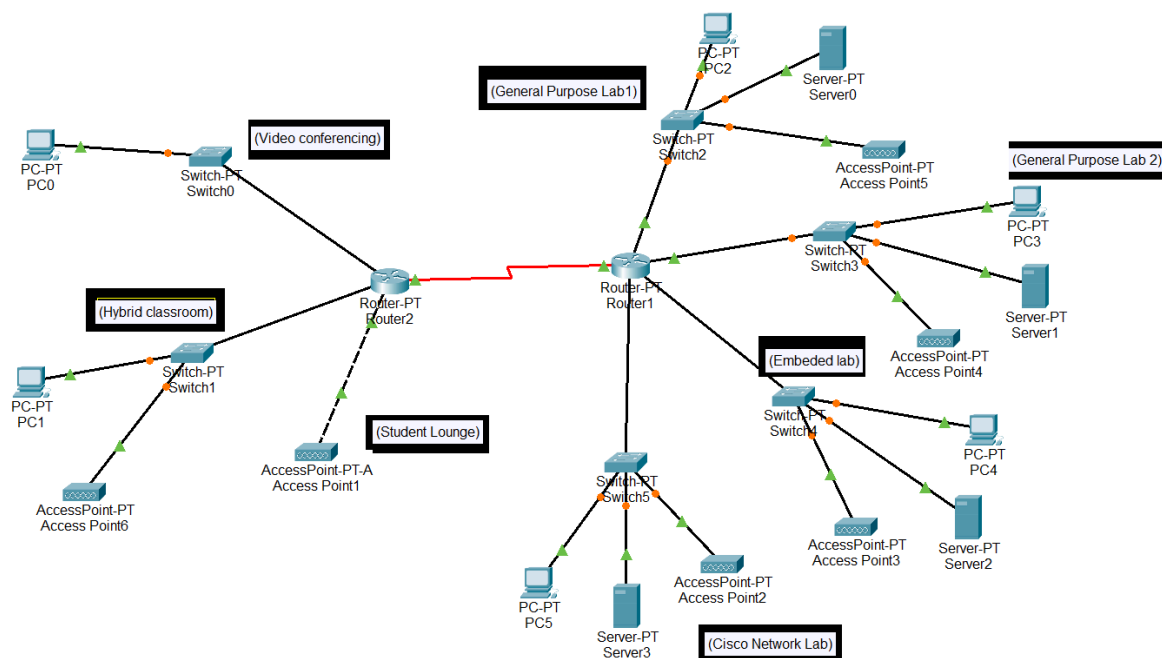


Figure 1.0 Network Topology

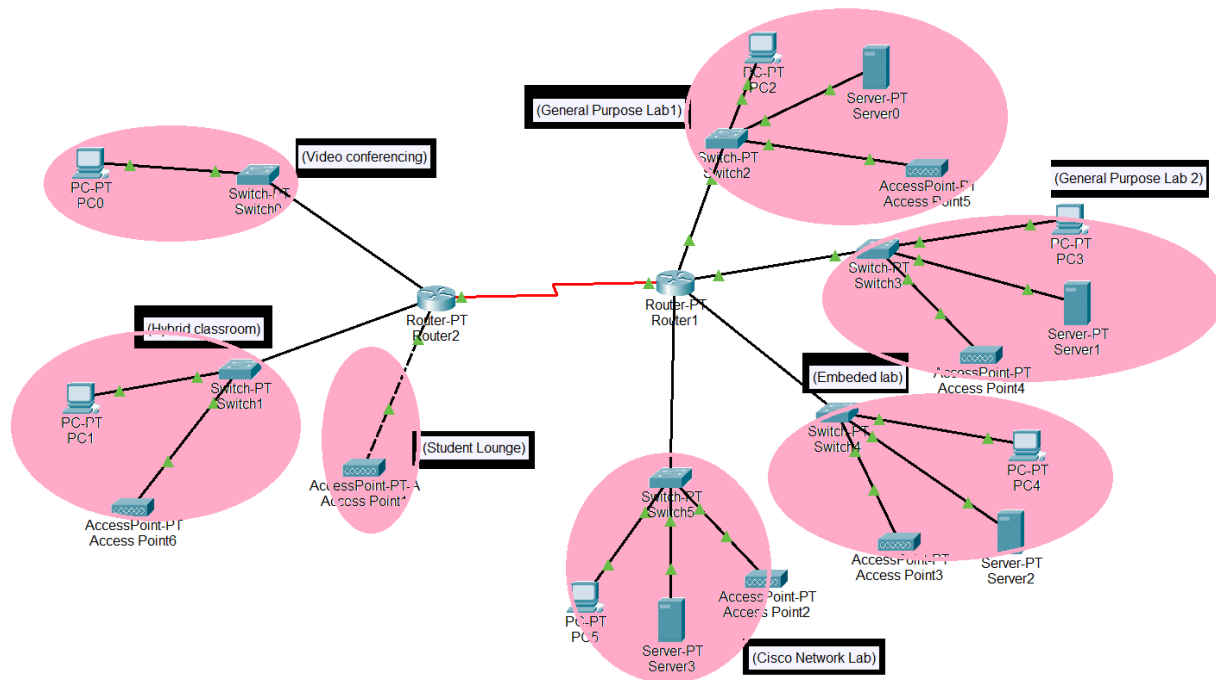


Figure 1.1 Work Area in Topology

From the topology above, we determined that we needed 7 connections in the building. The 3 connections on the left were contained in floor 1 while the next 4 connections were on floor 2.

Connection 1 - The network connection in the Video Conferencing room.

Connection 2 - The network connection in the Hybrid classroom.

Connection 3 - The network connection in the Student Lounge.

Connection 4 - The network connection in the General Purpose Lab 1.

Connection 5 - The network connection in the General Purpose Lab 2.

Connection 6 - The network connection in the Embedded Lab.

Connection 7 - The network connection in the Cisco Networking Lab.

3.0 Connections, Patch Cords, and Switch Ports

From the previous sub-topic, we have already determined the sum of the connections in this network, which we got 7 main connections. Each of the connections represents the arrangement of the network that happens in each room including the computer lab, hybrid classroom and video conferencing room.

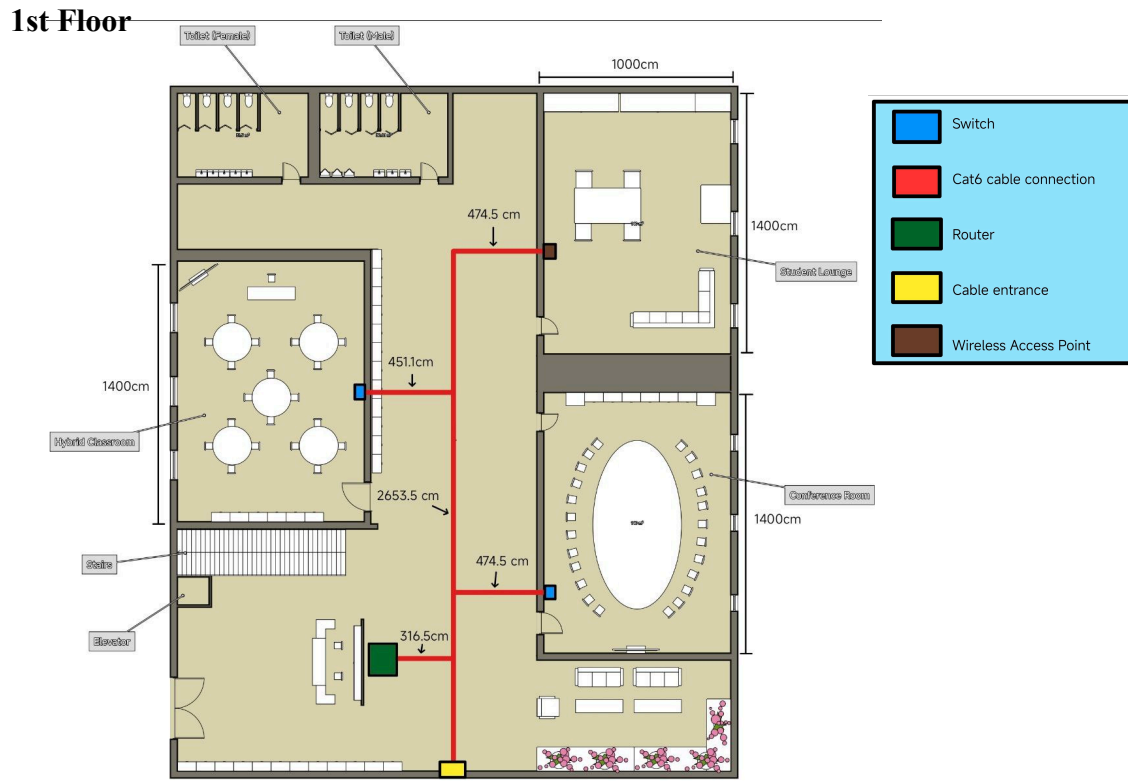
Next, we have to determine how many patch cord and also patch panel needed so that we have enough tools to connect all of the end devices. For patch cord, there will be 2 places where this patch cord will be used. Among them are from PC to communication outlet and from patch panel to switch. Therefore, each PC will have 2 patch cords needed to complete 1 connection from PC to switch. Each lab will have 31 PCs, which $31 \times 2 = 62$ patch cords and 1 patch panel per lab. For video conferencing and hybrid classroom, there will be only 1 connection from PC to switch, therefore the total of patch cords for both rooms is 4. Hence, with 4 labs, 1 video conferencing room and 1 hybrid classroom, there will be a total of 250 patch cords and 6 patch panels required for cabling.

Lastly, we have to determine how many switch ports are needed for this cabling. As for now, we have decided each room will have its own switch except for the student lounge. Therefore, there will be a total of 6 switches in this faculty. For this network, we will be using a 48-port switch that usually uses RJ45 because each lab has 31 connections and 48 ports is sufficient enough. As a result, there are a total of 288 switch ports available for this cabling.

In summary, for the entire building, this faculty requires 250 patch cords, 10 main connections and 288 switch ports available with additional ports for future improvement.

4.0 PC & Network Devices Arrangement

4.1 Vertical Cabling

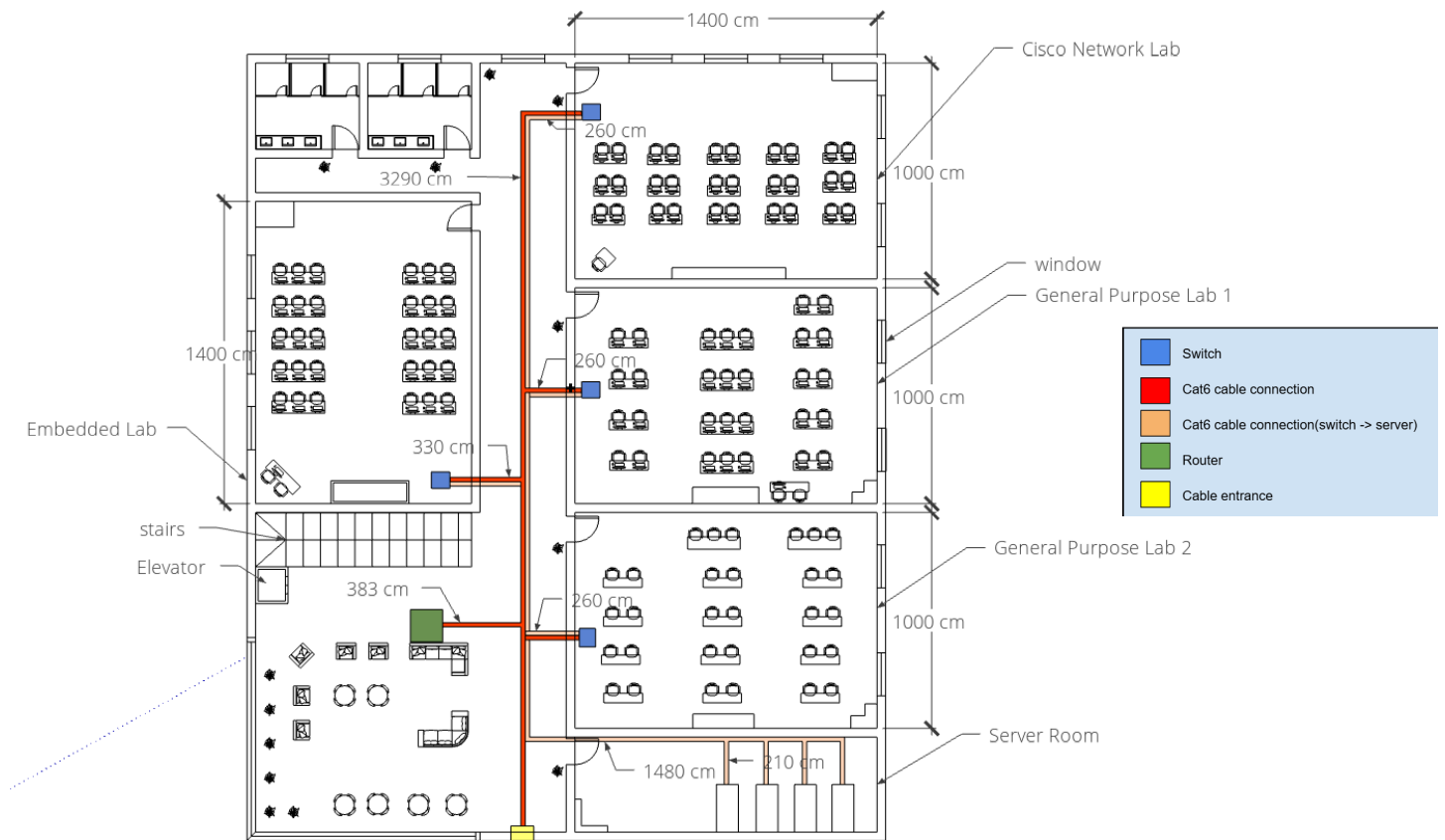


Total cable Cat6 for 1st Floor:

$$2655.5\text{cm} + 2(474.5\text{cm}) + 452.1\text{cm} + 316.5\text{cm} = 4372.1\text{ cm} / 43.721\text{ m}$$

The diagram above shows the cabling arrangement for the 1st floor corridor. In this floor, there will be 1 router and 2 switches, where each room has 1 switch except for the student lounge, which will take about 35.81 m to connect between all switches to the router. The yellow highlight indicates the connection between the lower floor and upper floor. Furthermore, the peach cable indicates connection between switches to the server. This connection is estimated to take 43.72 m of Cat6 cable.

2nd Floor



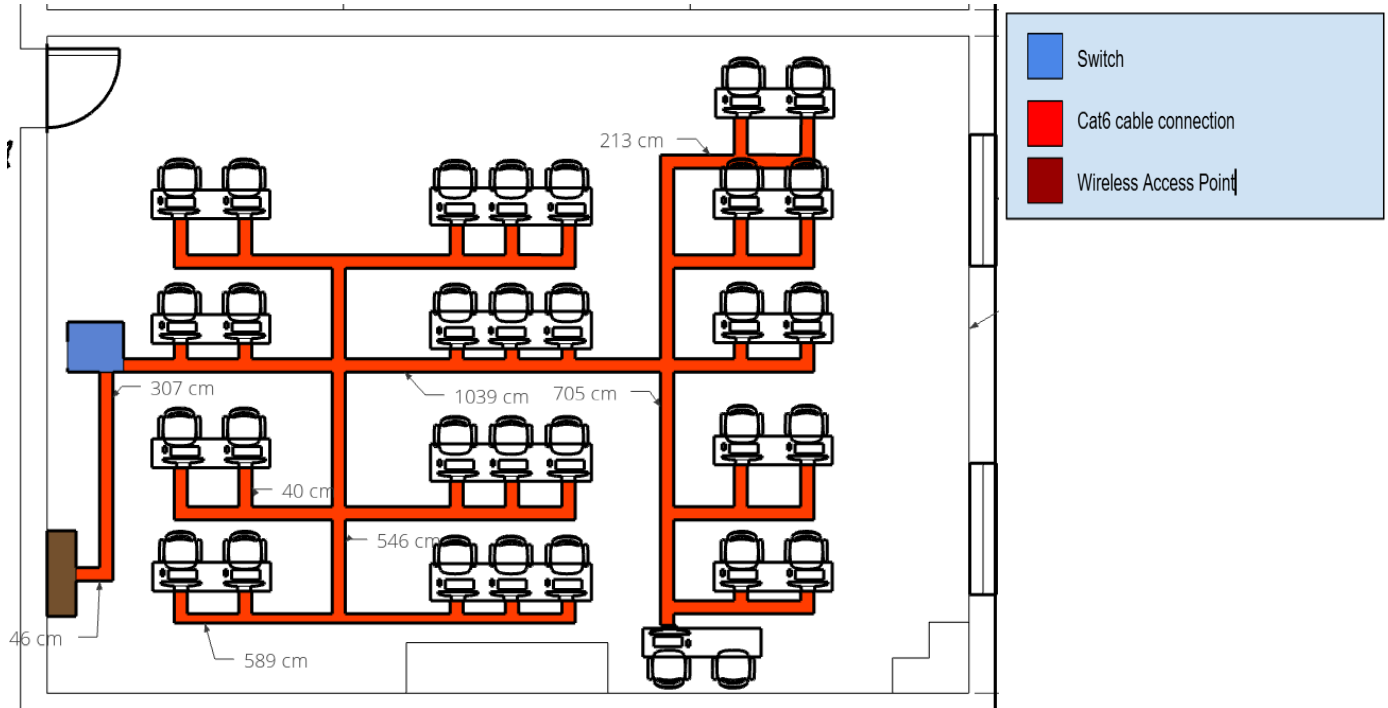
Total cable Cat6 for 2nd Floor:

$$3(260 \text{ cm}) + 3290 \text{ cm} + 330 \text{ cm} + 383 \text{ cm} + 1480 \text{ cm} + 4(210 \text{ cm}) + 2888 \text{ cm} + 330 \text{ cm} + 3(260 \text{ cm}) = 11101 \text{ cm} / 111.01 \text{ m}$$

The diagram above shows the cabling arrangement for the 2nd floor corridor. In this floor, there will be 1 router and 4 switches, where each room has 1 switch, which will take about 47.83 m to connect between all switches to the router. The yellow highlight indicates the connection between the upper floor and lower floor. Furthermore, the peach cable indicates connection between switches to the server. This connection is estimated to take 68.18 m of Cat6 cable.

4.2 Horizontal Cabling

General Purpose Lab 1

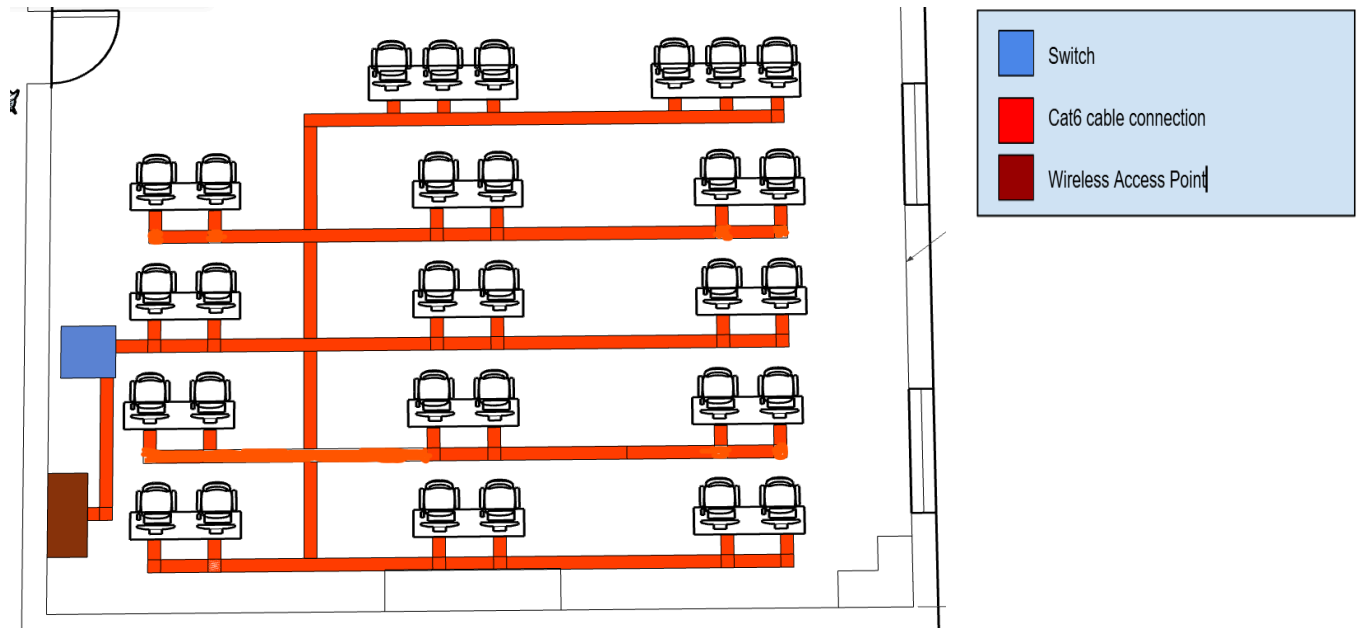


Total cable Cat6 for General Purpose Lab 1:

$$46 \text{ m} + 307 \text{ cm} + 1039 \text{ cm} + 546 \text{ cm} + 705 \text{ cm} + 4(213 \text{ cm}) + 3(589 \text{ cm}) + 30(40 \text{ cm}) = 6462 \text{ cm} / 64.62 \text{ m}$$

The diagram above shows the cabling connection arrangement for General Purpose Lab 1. As you can see, the connection from switch to access point is estimated to take about 3.53m. In this lab, there are a total of about 31 PCs including a lecturer PC. To make all the PCs connect to the patch panel, it will take any necessary amount of cable, where it is estimated to be about 61.02 m.

General Purpose Lab 2

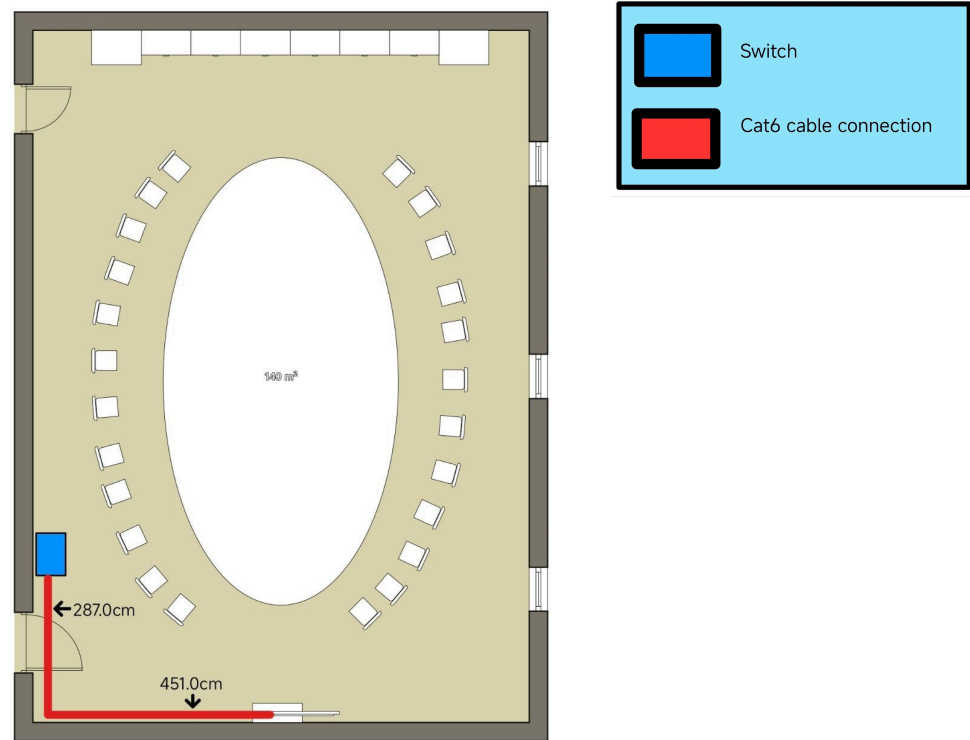


Total cable Cat6 for General Purpose Lab 2:

$$4(1100 \text{ cm}) + 30 (32 \text{ cm}) + 4(209 \text{ cm}) + 743 \text{ cm} = \\ \mathbf{6939 \text{ cm} / 69.39 \text{ m}}$$

The diagram above shows the cabling connection arrangement for General Purpose Lab 2. As you can see, the connection from switch to access point is estimated to take about 7.43m. In this lab, there are a total of about 30 PCs including a lecturer PC. To make all the PCs connect to the patch panel, it will take any necessary amount of cable, where it is estimated to be about 69.39 m.

Video Conferencing Room

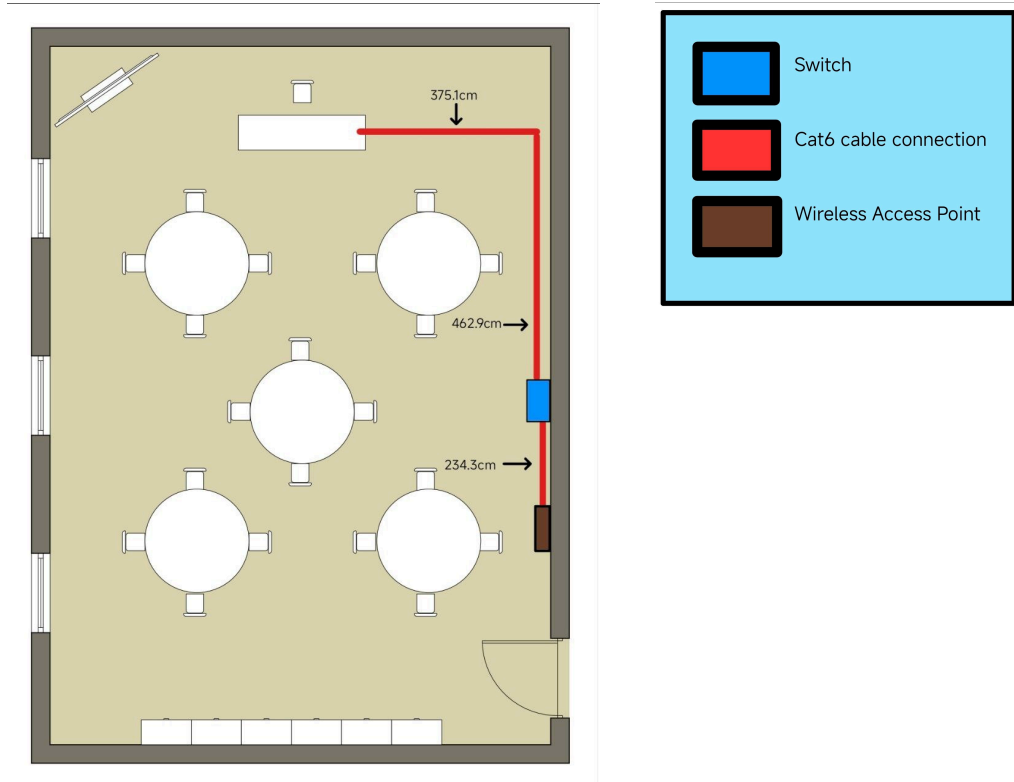


Total cable Cat6 for Video Conferencing Room:

$$451.0\text{cm} + 287.0\text{cm} = 739 \text{ cm} / 7.39 \text{ m}$$

The diagram above shows the cabling connection arrangement for the Video Conferencing Room. As you can see, in this room there is no access point present. In this room, there is a giant Wall Screen at one end of the room. To make the wallscreen connect to the patch panel, it will take any necessary amount of cable, where it is estimated to be about 7.39 m.

Hybrid Classroom

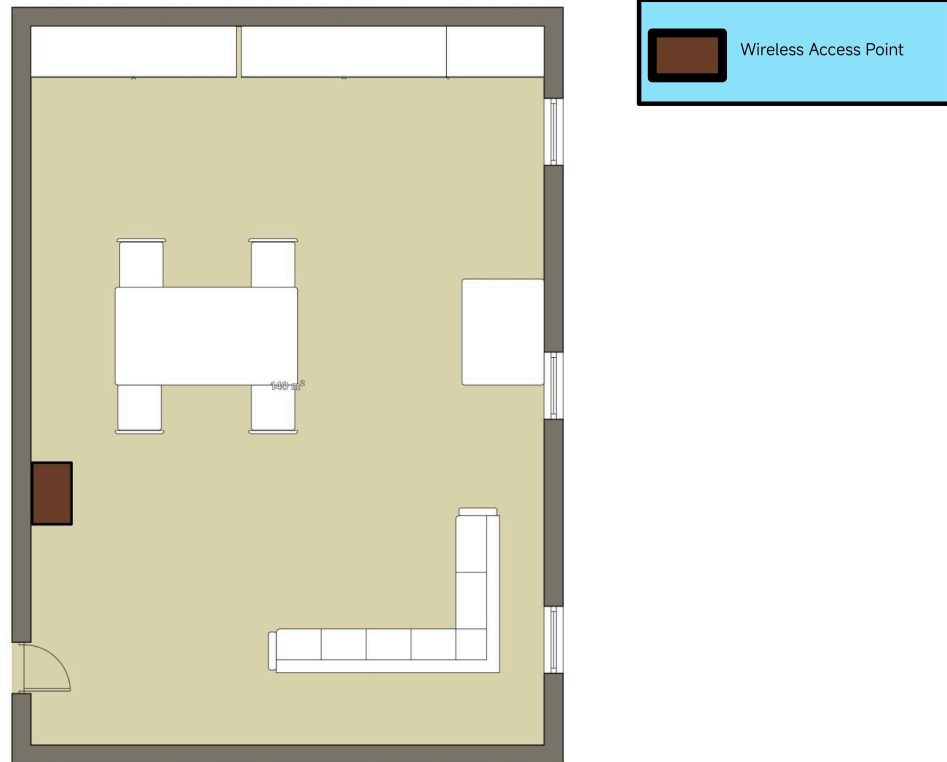


Total cable Cat6 for Hybrid Room:

$$462.9\text{cm} + 375.1\text{cm} + 234.5\text{ cm} = 1072.5\text{ cm} / 10.725\text{ m}$$

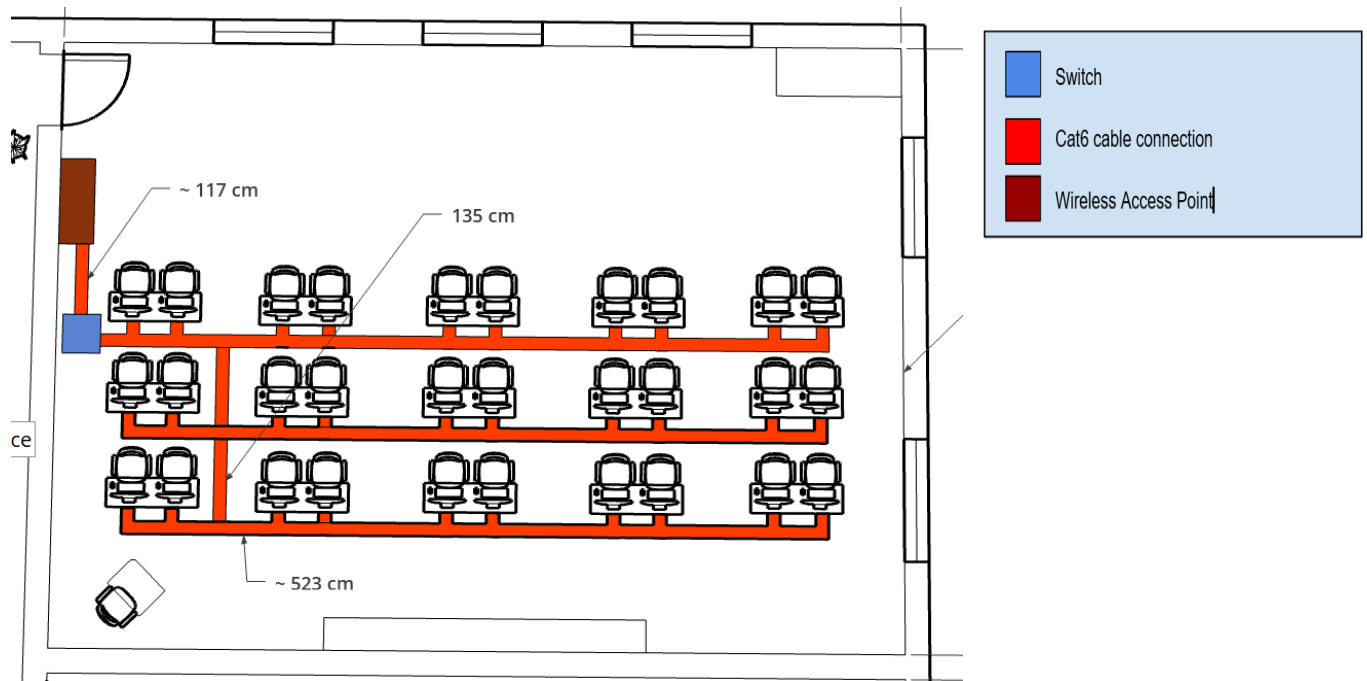
The diagram above shows the cabling connection arrangement for the Hybrid Room. As you can see, the connection from switch to access point is estimated to take about 2.35m. In this room, there is only the Lecturer PC present and a TV. To make the Lecturer PC connect to the patch panel, it will take any necessary amount of cable, where it is estimated to be about 10.73 m.

Student Lounge



The diagram above shows the student lounge. As you can see, there is no switch in this room and only a single wireless Access point is installed in this room. Therefore there is no cabling connection requirement in this room.

Cisco Network Lab

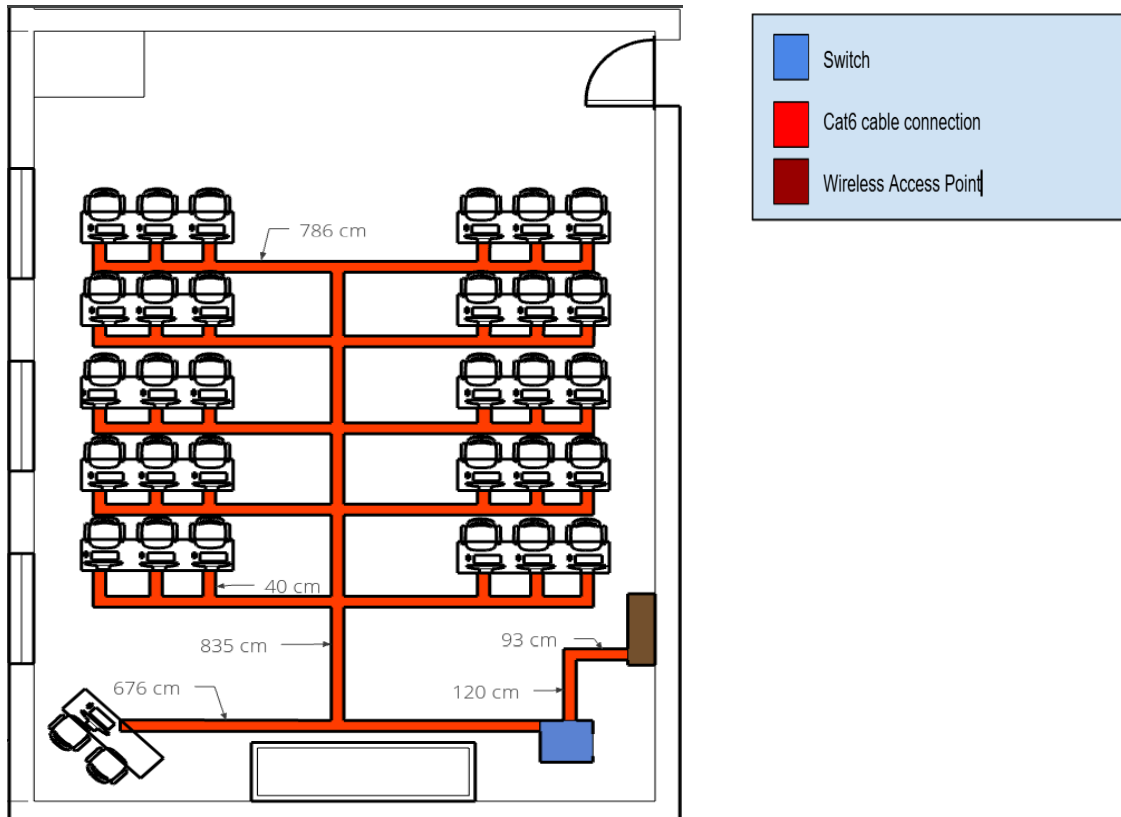


Total cable Cat6 for Cisco Network Lab

$$3(523 \text{ cm}) + 2(135 \text{ cm}) + 117 \text{ cm} = \\ 1956 \text{ cm} / 19.56 \text{ m}$$

The diagram above shows the cabling connection arrangement for Cisco Network Lab. As you can see, the connection from switch to access point is estimated to take about 1.17m. In this lab, there are a total of about 31 PCs including a lecturer PC. To make all the PCs connect to the patch panel, it will take any necessary amount of cable, where it is estimated to be about 19.56m.

Embedded Lab



Total cable Cat6 for Embedded Lab:

$$676 \text{ cm} + 120 \text{ cm} + 93 \text{ cm} + 835 \text{ cm} + 5(786 \text{ cm}) + 30(40 \text{ cm}) = \mathbf{6854 \text{ cm} / 68.54 \text{ m}}$$

The diagram above shows the cabling arrangement for Embedded Lab. From the diagram, it will take about 2.13 m to connect between switch and wireless access point. Other than that, there are 31 PCs in this PC, where it is estimated to take about 66.41m to connect all the PCs.

5.0 Identify Cable Types and Length

5.1 Cable Type

For our cabling connection we have decided to use cat6 and copper as our main choice. This is because due to its properties, for example cat6 cables offer a high performance rate that can reach up to 10Gps at a short distance and can reach speeds about 1Gps at long distance which is suitable for demanding tasks such as video conferencing and cloud computing. Cat6 has a range of about 100 m radius which ensures the strong signal quality it can provide. This also includes bandwidth rates up to 250 Mhz that reduces signal interference and crosstalk, This results in a more stable and reliable network connection, which is critical in environments with multiple devices and heavy network usage.. Another reason is that cat6 is a future proof which means it can last up to a long time before needing to be replaced again. Finally, cat6 is more cost effective and easier to install since it generally uses UTP or STP. As for our reason for choosing copper wire instead of other types, Copper allows signals to travel efficiently with minimal resistance which means better performance and lower signal loss over distance, this also means it provides a more consistent and durable connection to the nearby device. In addition, it is more cost efficient due to its balance of performance and affordability.

5.2 Cable Length

Description	Cable	Length(m)
<i>First Floor</i>		
1st Floor	Cat 6 cable	43.72
Video Conferencing Room	Cat 6 cable	7.39
Hybrid Classroom	Cat 6 cable	10.73
The total length of the 1st floor		62.84
<i>Second Floor</i>		
2nd Floor	Cat 6 cable	111.01
General Purpose Lab 1	Cat 6 cable	64.62
General Purpose Lab 2	Cat 6 cable	69.39
Cisco Network Lab	Cat 6 cable	19.56
Embedded Lab	Cat 6 cable	68.54
The total length of the 2nd floor		371.73
Total Length of all used cable		434.57

6.0 Team Member Task

No	Team Member	Task
1	Irfan Syahmi bin Azman	<ul style="list-style-type: none">● Construct topology of work area● Construct cabling:<ul style="list-style-type: none">○ Vertical cabling for 2nd floor○ Embedded Lab○ General purpose Lab 1● Generate table for cable length● Identify number of connection and patch cords require● Reporting
2	Ezmir Harris Bin Edeyhely	<ul style="list-style-type: none">● Construct cabling:<ul style="list-style-type: none">○ General purpose Lab 2○ Cisco Networking Lab● Calculate total of cable length● Reporting
3	Muhammad Amirul Hady Bin Zainol Hady	<ul style="list-style-type: none">● Identified the Cable type● Construct cabling;<ul style="list-style-type: none">○ Vertical cabling for 1st floor○ Conference room○ Hybrid room○ Student lounge● Calculate 1st floor cable length● Reporting
4	Aqil Dzarfan bin Asrul Sharaff	<ul style="list-style-type: none">● Identify number of switch port require● Calculate 2nd floor cable length● Make introduction● Reporting

MEETING MINUTES

DATE/TIME		18 May 2025/10:00 AM	
LOCATION		Online (Google Meet)	
AGENDA		Making the Connection - LAN and WAN	
Meeting MC		Irfan Syahmi bin Azman	
ATTENDANCE			
NAME		TIME	REASON FOR ABSENCE
Aqil Dzarfan bin Asrul Sharaff		10:00 am	-
Muhammad Amirul Hady Bin Zainol Hady		10:00 am	-
Ezmir Harris Bin Edeyhely		10:00 am	-
Irfan Syahmi bin Azman		10:00 am	-
MINUTES			
NO.	ITEM DISCUSSED	IDEAS/SUGGESTIONS AND THE PERSON GIVING IT	PERSON IN CHARGE & DATE
1	The Task 4 main objective	breaking it into smaller objectives	All Members (18/5/2025)
2	Discussing about our network topology and its connection	illustrate the network of end devices and finding all the connections	Irfan (18/5/2025)
3	Cable layout and type	Laying out the best cabling connection for each rooms and what cable type is the best to use in our building	Ezmir, Irfan, Hady (18/5/2025)
4	Next Meeting	-	-
5	Meeting Ended	11:00 pm	-