FACULTY OF COMPUTING
UTM Johor Bahru

NETWORK COMMUNICATIONS

(SECR 1213)

PROJECT

TASK 6: Network Design for Faculty of Computing Block N28B

Submitted To:

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By:

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Abstract

This is the report for a project given in course SECR1213 Network Communications, which is about the network design from floor planning to IP addressing for a new 2-storey building for the Faculty of Computing, UTM, named N28B. This report will be a compilation of all the tasks done by our team which include Task 1 which we are required to draw a floor plan for the building until Task 5 where we need to do IP assignment to each lab and room. In summary, our team manages to complete this project together and learn a lot of new skills and knowledge throughout the journey. We want to take this opportunity to thank our beloved lecturer, Dr Raja Zahilah Binti Raja Mohd Radzi who gives valuable suggestions and lectures for us to improve our project. We also feel grateful to have this chance to do such a project so that we get the opportunity to apply the knowledge we learn during the lecture in a real life situation.

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1.0 INTRODUCTION

In this Network Communications project we were assigned to design a building with a small network together with all its appropriate components. In order to proceed with the project, first we need to understand our customer needs and need to plan the design according to the budget allocated to our group. The process of designing a network infrastructure should fulfil the requirement of the customer and design according to the current and future needs. Moreover, we did a lot of research on the application of network devices available, its usability, cost and its services to determine the appropriate network devices for our project. After we identify the devices, we have to plan the network cabling structure and at last, the subnetting and IP address were assigned for each end device.

The aim of the overall project is:

- to design a system that is easy to manage and a scalable network for the future growth which includes wireless connectivity.
- to design a reliable and secure network which is easy to manage.
- to improve overall performances by supporting high-performance to the core backbone.

2.0 PROJECT BACKGROUND AND OVERVIEW

The growing number of students and academic staff urge the need for a new building in the Faculty of Computing (FC), UTM. The building needs to be ready for anything, which is future proof, a network which is secure, reliable and easy to manage and the whole project should be cost effective. This building includes 4 labs (2 general purpose labs, 1 Network lab and 1 IOT lab) which consists of a total of 30 workstations for each lab. Besides, there should be 1 video conferencing room for virtual project meetings. The budget given to us in this project is RM1.3M and the IP address assigned to us is 192.21.0.0/8.

3.0 TASK 1 - SUGGESTED FLOOR PLAN

3.1 FIRST FLOOR

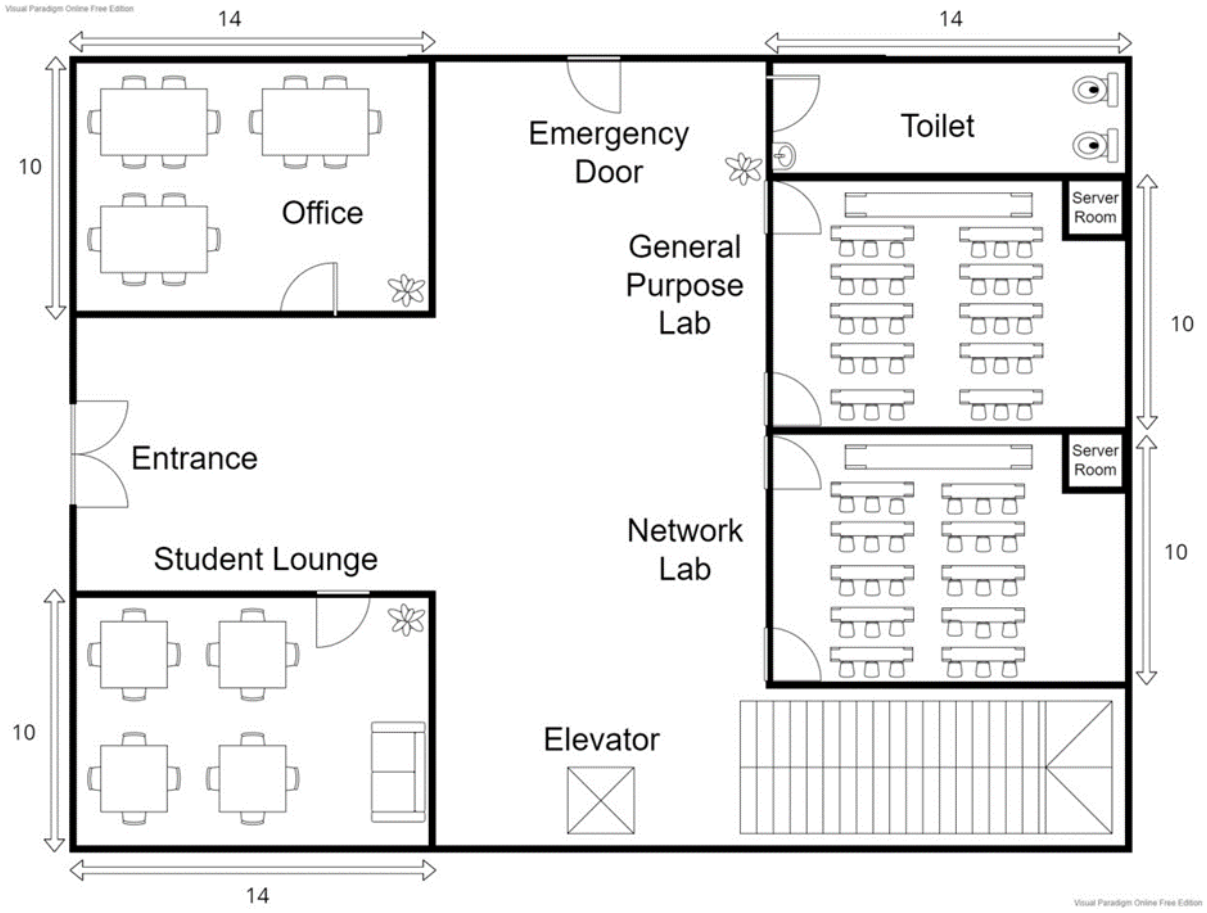


Figure 3.1.1: Floor plan for first floor

3.2 SECOND FLOOR

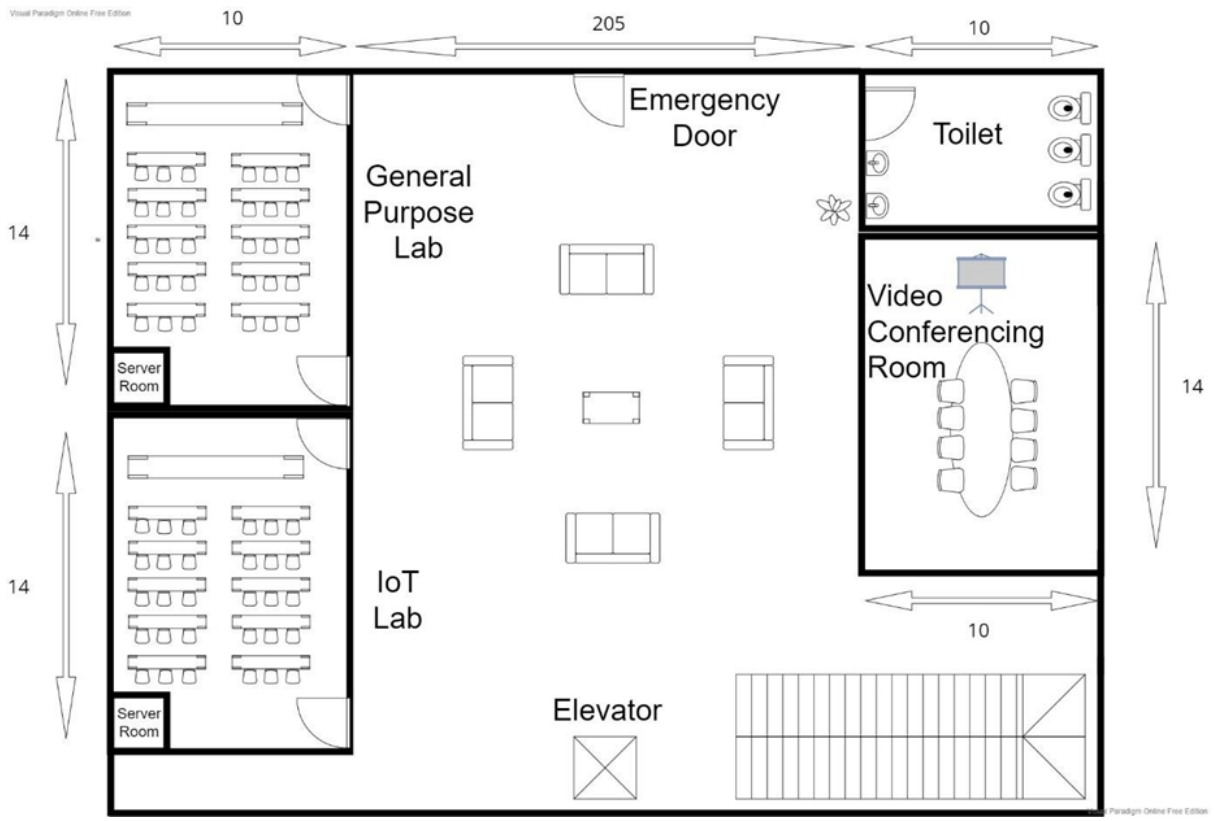


Figure 3.2.1: Floor plan for second floor

3.3 REFLECTION OF TASK 1

For task 1, we need to design the building layout based on the requirements. We need to draw a floor plan. Our group did a lot of discussion in order to understand the case study and the requirements so that we do not miss out on anything and it will also be easier for us to complete each task. Our first meeting was more on the discussion of how to design the layout for our building. First we discussed where to locate the labs which are the 2 general purpose labs, 1 network lab, 1 IOT lab and also the office, video conferencing room and student lounge. In our discussion we asked many questions to each other and came up with many solutions in order to design a reliable, efficient and secure network that can be easily managed. This task was quite fun because designing the layout needs our creativity. All our teammates were very cooperative while doing the task which makes everyone's work easier to be done. This task was not as heavy as the other following tasks but it was the foundation to the entire project. This task provides the opportunity to study more about the project and have discussions together.

4.0 TASK 2

4.1 QUESTION AND ANSWERS

1. Which of the Internet Service Provider (ISP) is the best for you to use in the building?

● Unifi. This is because it has a download speed of up to 30Mbps to 800Mbps. Besides, it has an upload speed of up to 10Mbps to 200Mbps. Therefore, there would be no problem in the sense of Internet speed for the users.

2. What type of network architecture would be suitable for the building?

● Local Area Networks (LANs). It is one of the most common types of networks and it is more typically used in buildings.

3. What are the types of servers that will be used together in the labs?

● There are 2 types of servers that will be used, they are web servers and file servers.

● Web servers – It is very important that the web server performs well so it can deliver website content to the users as quickly as possible.

● File servers – It can easily access all the files from one central location.

4. For every workstation, what is the standard software that will be needed?

● For browsing purposes, Microsoft Edge, Google Chrome and Mozilla Firefox will be used.

● For basic documentation purposes, Microsoft Office 2019 – Word, Excel and PowerPoint will be used.

● For source code editing purposes, Visual Studio Code will be used.

● For editing and reading PDF files, Adobe Acrobat DC Pro will be used.

5. What devices are needed to construct the network infrastructure?

● Routers to connect to the switches or hubs that will be used.

● Switches/Hubs to connect with all the computers in each lab.

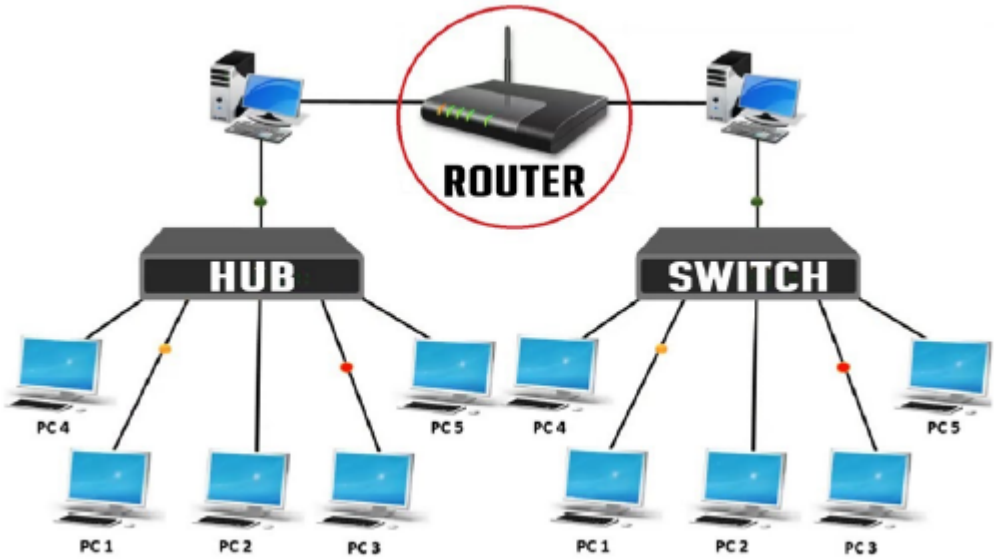


Figure 4.1.1 Illustration of router, switch and hub in action

6. What are the factors that must be considered when building a network that is reliable, secure and runs smoothly?

● Embedded security measures

● Standardisation of software and hardware

● Network resiliency

● Redundancy

7. What type of physical media is used for the network plan?

● Wireless because wireless networks enable multiple devices to use the same internet connection remotely, as well as share files and other resources.

● Increase mobility by allowing users to roam around the place without getting disconnected from the network.

8. What type of antivirus needs to be installed on each PC?

● Norton 360 with LifeLock

● PC protections including firewall and backup

● Excellent malware protection

● Password manager

● LifeLock identity theft protection with most 360 packages

9. Which network topology do you use to connect computers in a building?

● A star topology is the one in which each peripheral node is connected to a central hub or switch.

● It is probably the most commonly used network topology for LAN because it is considered the easiest topology to design and implement.

● The central hub functions as the server for the peripheral nodes or clients

10. Are there any CLOUD services used in computers?

● Yes

● With cloud computing, we're enabled to host data on the cloud, freeing up space that would've gone into storing hardware and machines space.

● Cloud computing can save money, space and time for a laboratory.

11. What are the main specifications of computers in every lab?

● Operating System: Microsoft Windows 10 x64

● Processor (CPU): Intel Core i5 (6th generation or newer)

● Memory: 16GB RAM

● Storage: 500GB internal hard drive

● Display: 15" LCD monitor

● Network Adapter: 802.11ac 2.4/5 GHz wireless adapter

● Others: Webcam, lock, external drive for backups

12. What type of protocol is used in computer networks?

● TCP

● It organises data in a way that ensures the secure transmission between the server and client.

● It guarantees the integrity of data sent over the network, regardless of the amount.

● For this reason, it is used to transmit data from other higher-level protocols that require all transmitted data to arrive.

4.2 FEASIBILITY

Nowadays, the Internet continues to play an important role in society and the nation. With the current rate of growth, the internet infrastructure must also be updated to keep up with these developments. Therefore, this proposal paper suggests a network architecture and an overall floor plan to accommodate the new building to be built at the Faculty of Computing, which will include several high-tech workspaces that will be supported by this infrastructure. The proposed project's goals are to facilitate this early planning by providing secured network services, better information processing systems, regular maintenance, future scalability, and a high-speed network. Moreover, the physical safety and security of the structure are built to satisfy the previously stated operating goals.

Focusing on the project's goal one by one, we aim to deliver secured network services that are available to all building users. This involves providing a protected professional computing environment to the Faculty of Computing building through the implementation of trusted security software. It is meant to be completely functional and largely inaccessible to anyone who does not possess the system's identification. In addition, it defends against network intrusions caused by e-business application attacks, denial-of-service attacks, and Internet Worms. This approach may reduce the risk of unapproved ingestion by outsiders, which can compromise network security.

Furthermore, in order to support education in accordance with the 4th industrial revolution, we want to improve information processing systems by utilising the core network to transport network traffic at high speeds. Since there are huge numbers of device users in the building, the network may become slower and more congested. This can allow for the separation of multiple users, which simplifies traffic management, access control, and security monitoring.

Meanwhile, maintenance should be done at regular intervals, plus a main system admin and IT support in charge of the whole system and structure on a daily basis. Network and system failure are inevitable but the casualty and inconvenience can be minimised through fast report and action. The building itself is set up based on Local Area Network connection. Thus cables, routers and modems must be ensured to always be in a good condition. The components have to be designed so that they can be easily replaced in any case of unexpected failure or downturn during an emergency.

Scalability is one of the major concerns in a project especially since technology is improving at a very fast pace, so the building has to be modular enough to be able to support the changes easily. Hence, during our initial planning we have been trying to design the building and system structure in a modular way so that the structures can sustain for a long period of time while still supporting new technology units.

Considering this is an academic building for the Faculty of Computing which requires high collaboration either physically or remotely, it must have a high speed network. This is because computing subjects highly require hands-on and practicality on computational software and network structure in which using laptop and computer is a routine in every subject. Therefore, it also goes without saying that the building network has to be able to support high amounts of data and resource sharing and connectivity happening at the same time.

Last but not least, physical safety and security is also a must in this project. Other than the usual door lock security, fire prevention system, elevator emergency system, emergency lighting is also essential for a building. For this Faculty of Computing building which has high focus and high dependency on electronic devices, an automatic cut-off system for devices and electricity is also needed to minimise the casualty in case of any faulty device. The server must only be accessible through controlled doors as part of physical access controls.

4.3 REFLECTION ON TASK 2

In this task, our team has done brainstorming for the ideas on our initial planning of the project, which we should go through a lot of studies to really understand what we are going to do in the next phase. We need to come up with the questions and find the answers by ourselves from the Internet. Since this task requires knowledge from the later syllabus at the moment, it means that we need to study ahead to know what we are doing. This gives us an early exposure to the topics that we are going to learn later in the lecture and we can have a better understanding of them.

5.0 TASK 3

5.1 LIST OF NETWORK DEVICES NEEDED AND DESCRIPTIONS

Type of Device	Usage	Description	Quantity	Price/unit (RM)	Total (RM)
Asus RT-AX58U Dual Band Wi-Fi Router 	Providing Internet access in the entire building.	• Supporting the latest Wi-Fi standard 802.11AX (Wi-Fi 6). • Supporting 160MHz bandwidth and 1024-QAM for better capacity and efficiency as well as dramatically faster wireless connections with a total networking speed of about 3000Mbps – 574Mbps on the 2.4GHz band and 2402Mbps on the 5GHz band. • Supporting not only MU-MIMO but also OFDMA technique to efficiently allocate the channels and communicate with multiple devices simultaneously. • Lifetime free AiProtection, powered by Trend Micro ™, blocks Internet security threats for all connected devices.	2	614.49	1228.98
D-Link 48-Port 10/100/1000 Gigabit Smart Switch 	Connecting devices in a network to each other and allows them to communicate as well as share information.	• Network Technology: 10/100/1000Base-T • Ethernet Technology: Gigabit Ethernet • Power Description • Input Voltage: 110V AC • 220V AC • Power Source: Power Supply	8	1845.49	14763.92

NetGear WAX214 Wireless Access Point 	Granting devices to connect to the Internet wirelessly if they cannot connect via wired media.	• Delivers 802.11ax high performance wireless connectivity • Supports dual-band concurrent WiFi 6 operations at 2.4GHz and 5GHz with a combined throughput of 1.8Gbps (600Mbps at 2.4GHz and 1200Mbps at 5GHz) • Powered by Power-over-Ethernet (PoE) or a DC power adapter	6	699	4194
Dell PowerEdge R650XS Rack Server 	Storing data and supply access to data in each computer lab.	• 3rd Generation Intel® Xeon® Scalable processors • Supports up to 32 cores per CPU, and up to 16x DDR4 RDIMMs at up to 3200 MT/s • Built for fast growing solutions with an optimal footprint and Multi Vector Cooling 2.0 • Manage with iDRAC9 Enterprise, OpenManage Enterprise and Plugins, iDRAC Direct, and Quick Sync 2.0 • Full-stack management integration with Microsoft, VMware, ServiceNow, Ansible and many other tools for multiple operating environments, from on-premises to cloud to edge	4	20166.91	80667.64

Cat6 Snagless Unshielded (UTP) PVC CM Ethernet Network Patch Cable 10.7m 	Providing bigger bandwidth for better Internet connections and reliability in data transfer.	• Features 24AWG unshielded twisted pair stranded copper cable with a high performance modular plug at each end. • Snagless design protects the locking clips on the RJ45 connectors from being damaged or snapped off during installation. • Exceeds the performance of the Cat6 Ethernet network cable standard and offers the cost-effective solution for indoor Gigabit Ethernet data center applications, supporting up to 1000Mbps and 550MHz within 100 meters of cable.	120	39	4680
MTP®-12 (Female) to MTP®-12 (Female) OM4 Multimode Elite Trunk Cable 10m 	Providing medium for simultaneous and bi-directional data transfer.	• Designed for high-density fiber patching in data centers which need space saving and reduce cable management troubles. • With US Conec MTP® connectors and Corning ClearCurve® fiber, it is optimized for 10G/40G/100G high-density data center applications.	8	505	4040
CAT5E/CAT6 2 Ports Faceplate 	Preventing the entry of dust and ID labels to facilitate documentation of the cable structure in the network.	• Suitable for installing socket modules such as RJ45 and coaxial cable, and can be freely combined into components of various multimedia applications. • Embedded face frame, easy to install; panel surface with embedded chart and label location, easy to identify data and voice ports. • High quality new PC flame retardant raw materials.	60	3.38	202.80

Cat6 48-Port Patch Panel 	Connecting various devices together	• Category 6 performance • Unique color coded saddles • Industry standard IDC • High performance • Individually QA tested	8	155	1240
PC Desktop 	Support learning	• Lenovo ThinkCentre Neo 30a • Operating System: Microsoft Windows 10 x64 • Processor: Intel Core i5 (6th generation or newer) • Memory: 16GB RAM • Storage: 500GB internal hard drive • Display: 15" LCD monitor • Network Adapter: 802.11ac 2.4/5 GHz wireless adapter • Others: Webcam, lock, external drive for backups	120	3444	413280
SonicWall TZ300 Firewall 	Monitors and filters incoming and outgoing network traffic.	• Data Link Protocol: Ethernet, Fast Ethernet, Giga Ethernet • Firewall throughput: 750Mbps • Full Deep Packet Inspection (DPI): 100Mbps • IPS throughput: 300Mbps • Anti-malware throughput: 100Mbps • VPN throughput: 300Mbps • Connection rate: 5000 connections per second	1	1900	1900

Budget provided: RM1,300,000

Total price of required devices: RM526,197.34

Remaining budget: RM773,802.66

5.2 REFLECTION

1. Are you surprised by the prices? How were you surprised?

As we began researching the costs of the devices we required, we were pleasantly surprised to discover that the price for a switch per unit may range from RM RM1500 to RM 4500 and even more than that, especially for Cisco products that are quite expensive. We were shocked since before initiating the research we felt the pricing for the switch per unit was fairly affordable for this component. It implies that we did not fully grasp the purpose of each component of the server and were unaware of the functionality of the equipment.

2. Have you ever considered cost as a factor for choosing networking devices?

Yes, we have considered cost as a factor for choosing networking devices, but it wasn't the major factor because we are more concerned with the device's performance. Upon collecting the data and information for this research, we noticed that certain devices with the same specifications might have vastly different prices. At this point, we consider the pricing factor and try to choose the most affordable option and decent device performance for the components.

3. What are the major differences between the same devices from different brands? For example, Cisco and Huawei Routers.

Cisco Systems is an IT and networking brand that specialises in switches, routers, cybersecurity, and IoT and whose logo seems to be on every office telephone or conference hardware. Huawei is an information and communications technology (ICT) specialising in telecommunications equipment.

Cisco routers are said to be the best and secure routers. They're built to last, are easy to use, and have a user-friendly interface so you can set up the router quickly. Besides, Cisco products meet the needs of corporations and offices of all dimensions and sorts. Huawei has some product line-ups that are like Cisco devices but have their specific network hardware line-ups and IT solutions for various network requirements.

5.3 REFLECTION ON TASK 3

For Task 3, we can reflect on our achievement by considering the objectives set out for the task. Our research efforts were thorough and comprehensive, as we gathered all the necessary information on different network devices available to make informed decisions. Our choice of LAN devices was based on the organisation's requirements and needs, as outlined in the case study, and met their expectations. Even though we are quite surprised with the prices of the devices, we also made sure to consider the budget constraints and only requested a budget increase if it was deemed absolutely necessary and justified. Our teamwork and collaboration skills were evident in the way we effectively shared ideas, discussed options, and made decisions together to achieve a successful outcome. The end result of our efforts was a comprehensive list of devices needed and a reflective report on the prices and major differences between brands. Overall, we can say that we successfully accomplished the objectives of Task 3.

6.0 TASK 4

6.1 IDENTIFYING WORK AREAS

Floor 1

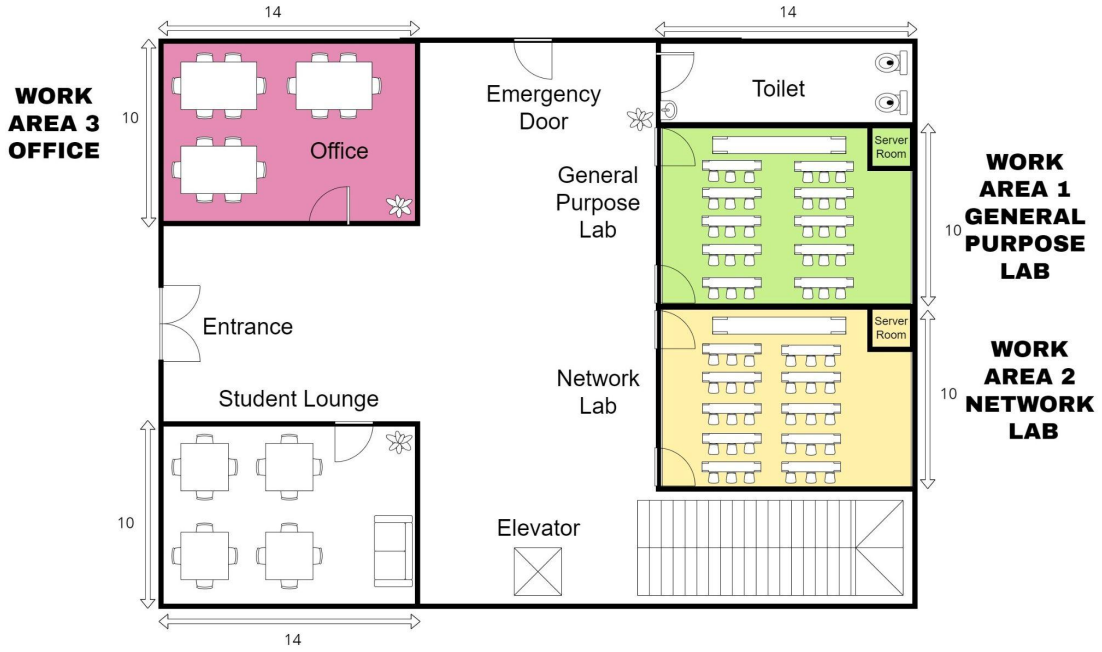


Figure 6.1.1 shows a labelled floor plan for level 1

Floor 2

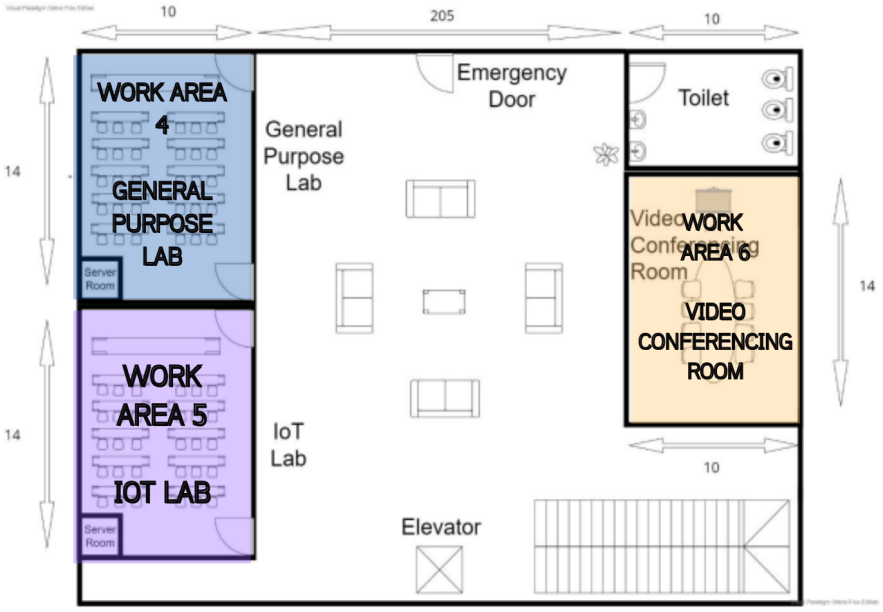


Figure 6.1.2 shows a labelled floor plan for level 2

6.2 OVERALL NETWORK DIAGRAM OF THE BUILDING

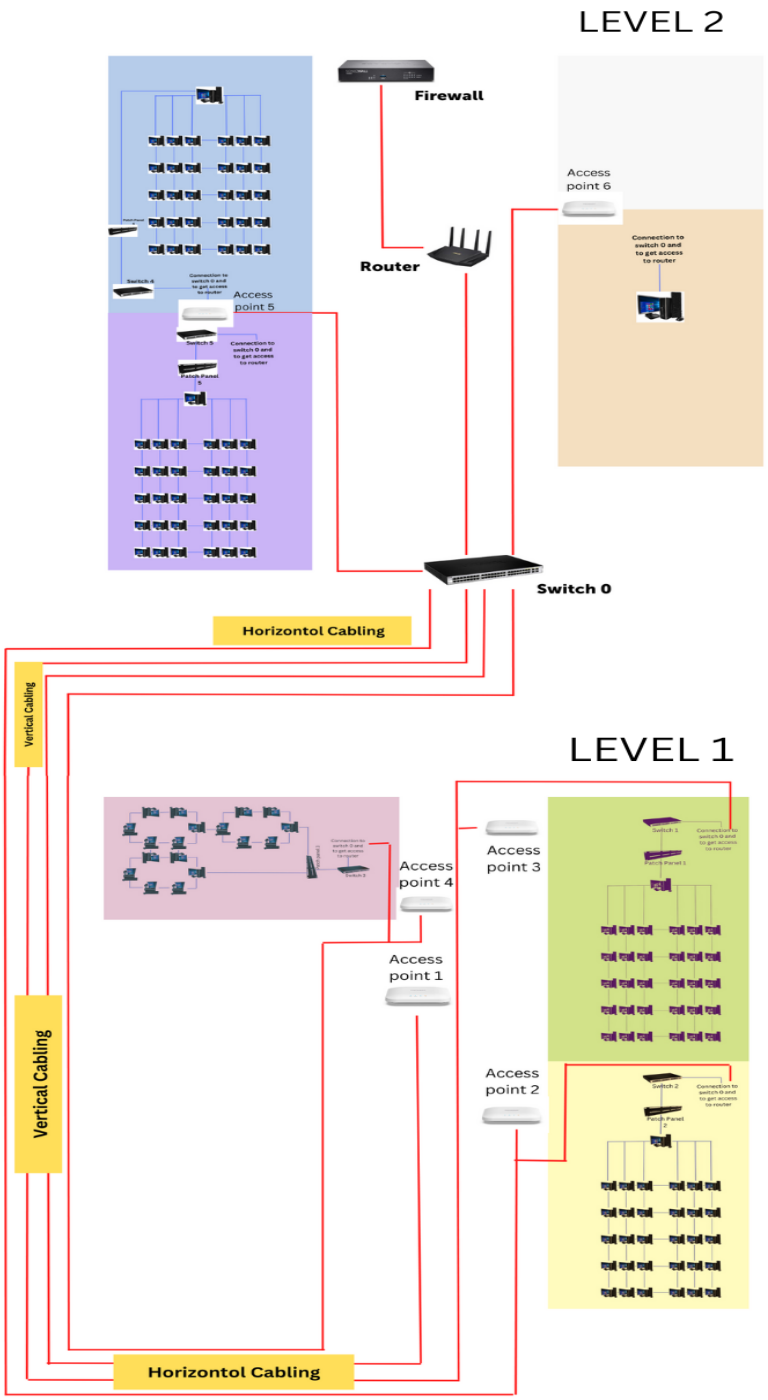


Figure 6.2.1 shows an overall network diagram of the building

6.3 CLOSED-UP NETWORK DIAGRAM

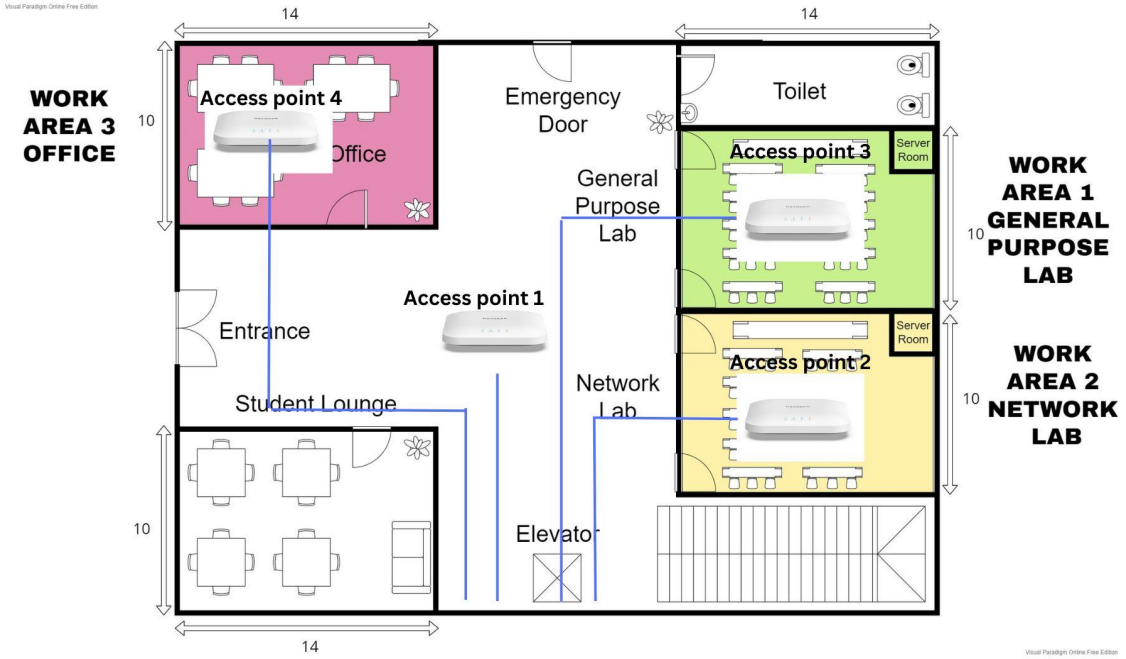


Figure 6.3.1 shows the closed-up diagram for floor 1

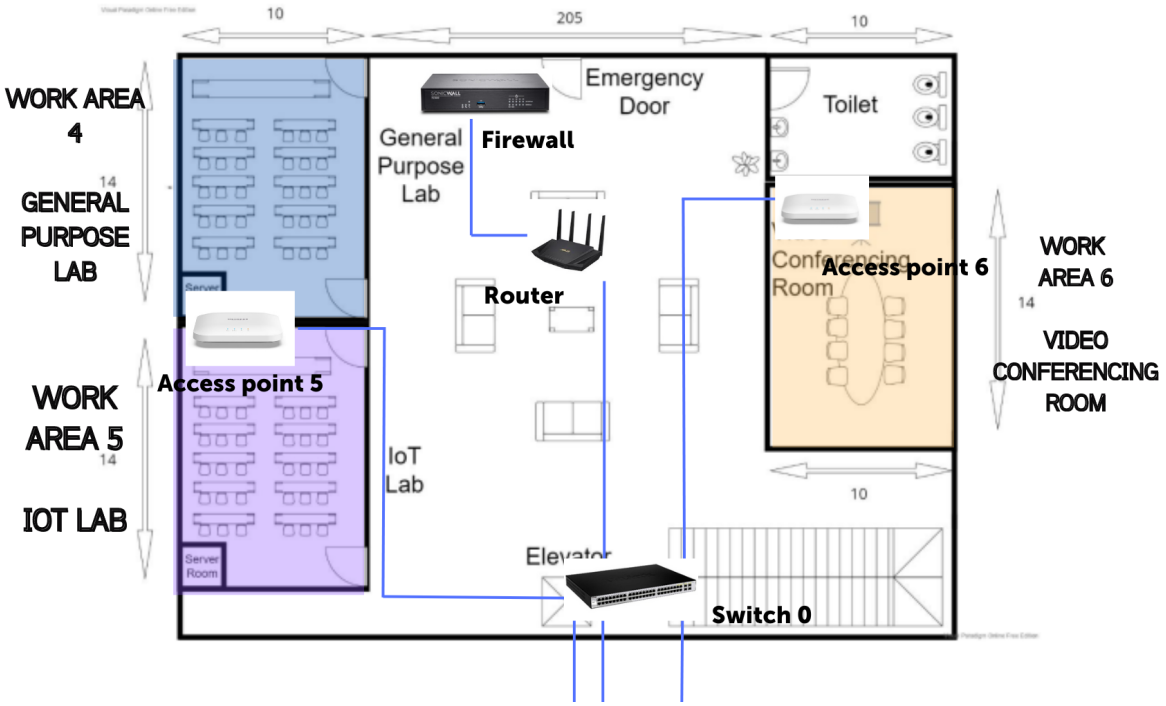
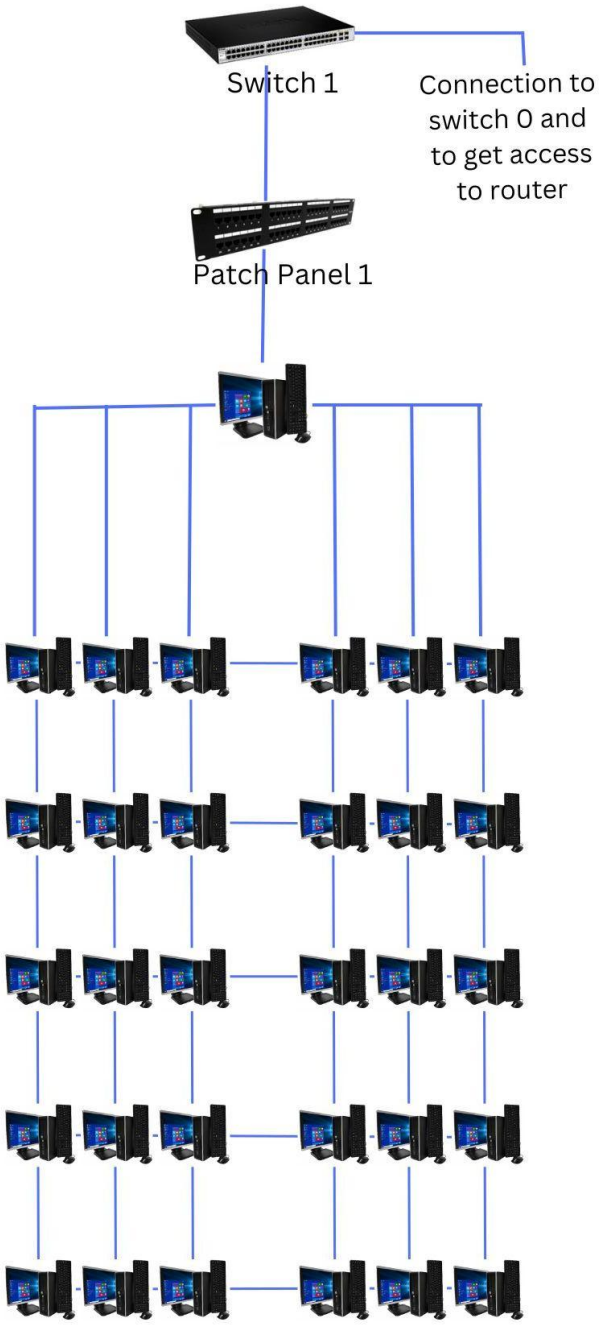


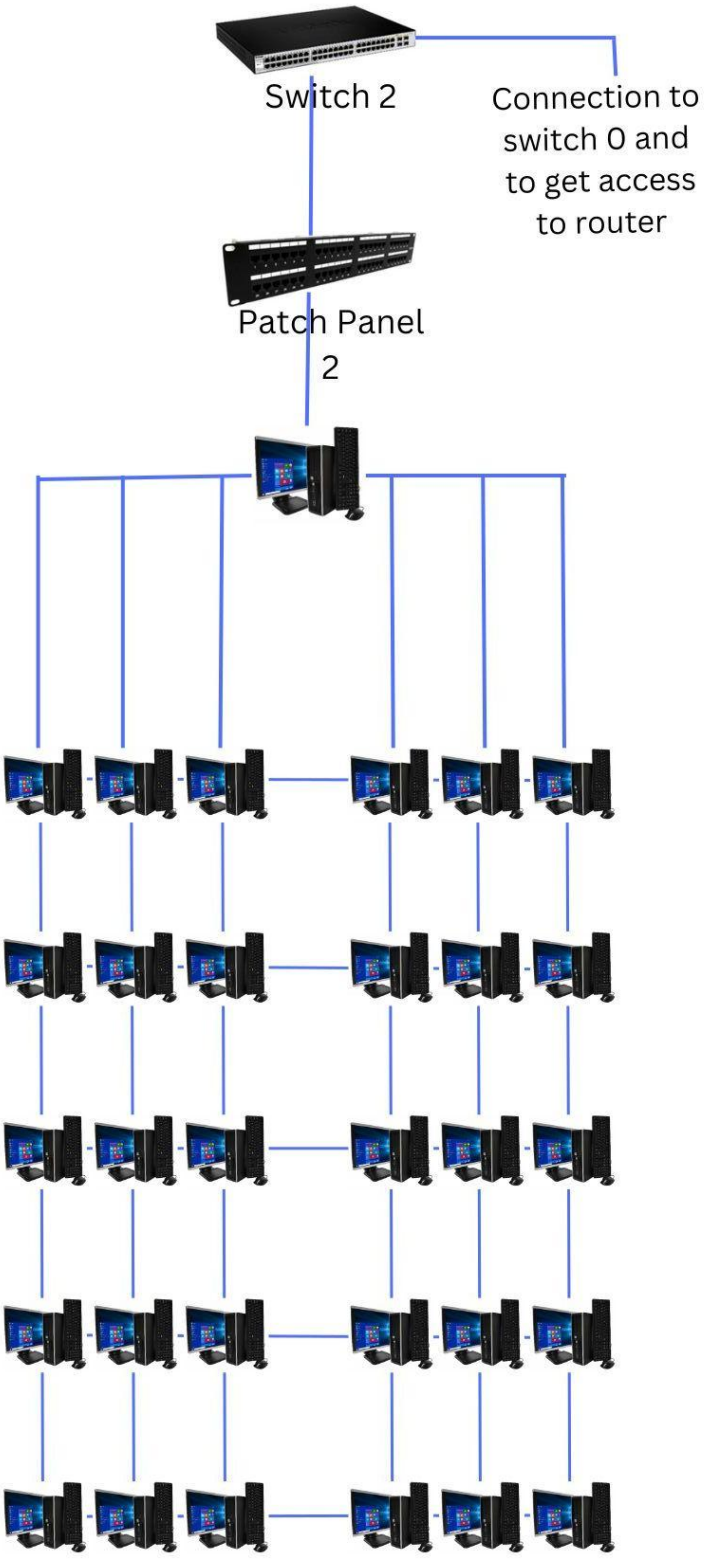
Figure 6.3.2 shows the closed-up diagram for floor 2

6.4 NETWORK DISTRIBUTION OF LEVEL 1

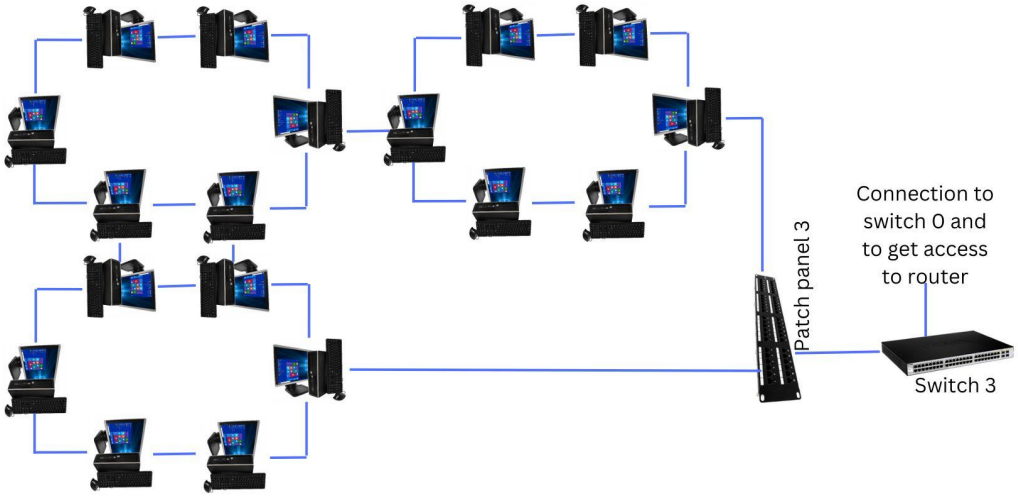
Work Area 1: General Purpose Lab



Work Area 2: Network Lab

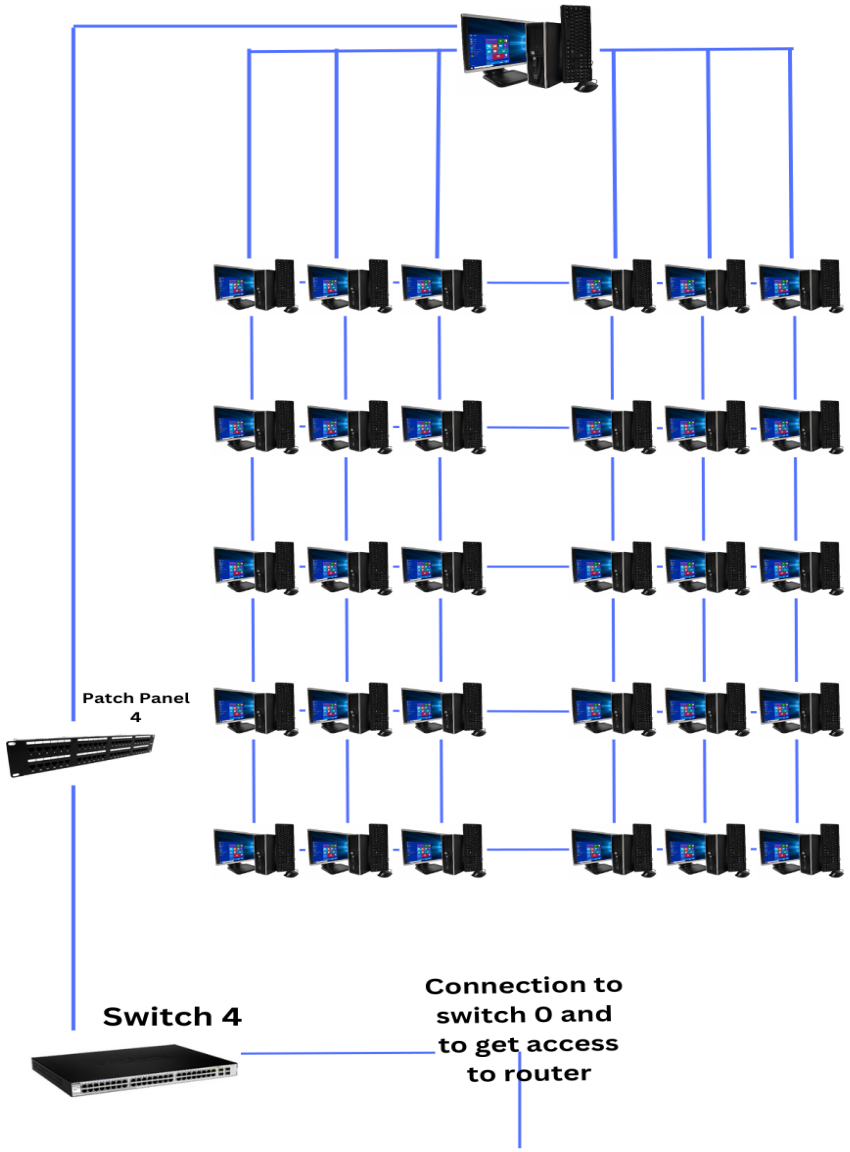


Work Area 3: Office

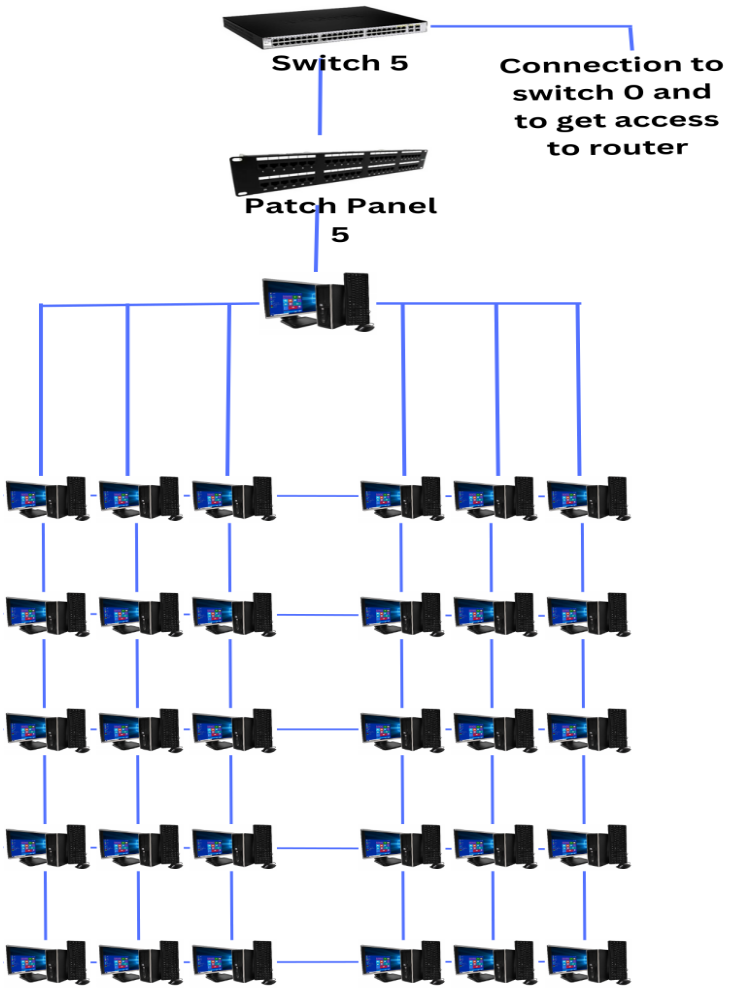


6.5 NETWORK DISTRIBUTION OF LEVEL 2

Work Area 4: General Purpose Lab



Work Area 5 : IOT Lab



Work Area 6 : Video Conferencing Room

6.6 CABLES AND CONNECTIONS

Level 1

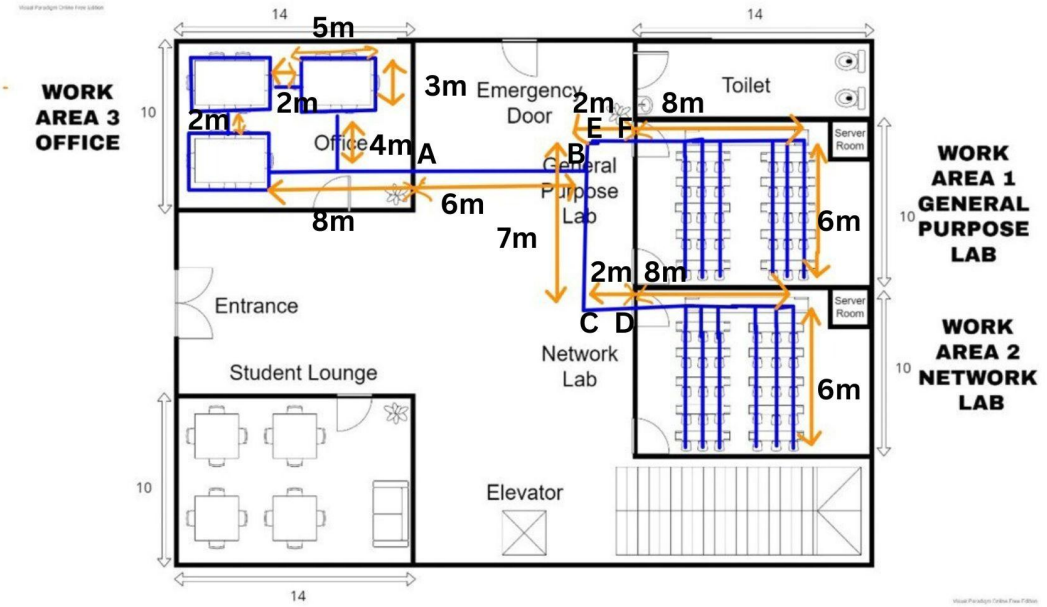


Figure 6.6.1 Length of cables and connections for level 1

Level 2

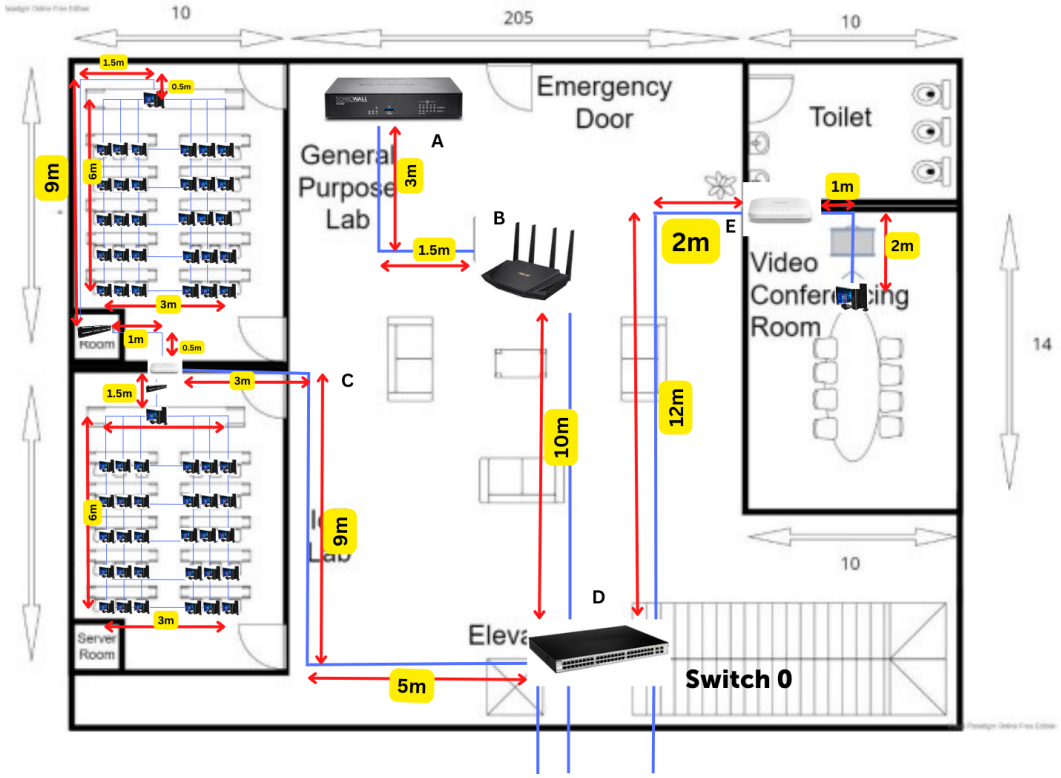


Figure 6.6.2 Length of cables and connections for level 2

In this project, CAT 6 cables were used. The CAT 6 cables were used in both floor 1 and floor 2. The cable is used throughout the whole building in every lab and its function is to connect each server.

Cable Lengths

Description	Cable Type	Length
First Floor		
General Purpose Lab 1	CAT 6 Cable	44m
Network Lab	CAT 6 Cable	44m
Office	CAT 6 Cable	64m
Point A to B	CAT 6 Cable	6m
Point C to D	CAT 6 Cable	2m
Point C to E	CAT 6 Cable	7m
Point E to F	CAT 6 Cable	2m
Peripheral Connections	CAT 6 Cable	150 m
Total Length - First Floor (m)		319 m
Second Floor		
IOT Lab	CAT 6 Cable	58.5 m
General Purpose Lab 2	CAT 6 Cable	66.5 m
Video Conferencing Room	CAT 6 Cable	3 m
Point A to B to D	CAT 6 Cable	14.5 m
Point C to D	CAT 6 Cable	14 m
Point E to D	CAT 6 Cable	14 m
Peripheral Connections	CAT 6 Cable	150 m
Total Length - Second Floor (m)		320.5 m
Total Length (distribution cabling) - All Floor (m)		579.5 m
Fiber optic cable	Fiber optic cable	60m
Total Length (backbone cabling) - All Floor (m)		60m
Total Length (ALL)		639.5 m

Switches : D-Link 48-Port 10/100/1000 Gigabit Smart Switch

Quantity : 6

Ports : 288

On the entire floor design, the total length of cables is 639.5m, and the number of ports for deployed switches are 288.

A patch cable or patch cord is an optical or electrical wire used to connect ("patched in") another electronics or optical component to a different one for signal transmission. It is a thick insulated twisted pair of copper cables with an RJ45 connection at either end and capable of connecting various devices together such as the router switch or hub to PCs and other peripheral devices in the workplace. For our network connection, we use 579.5 meters of patch cord.

Switch ports are Layer-2 Gigabit switch interfaces related to physical ports. A switch port can be an access port, trunk port, or a tunnel port.Some switches can also forward data at the network layer (layer 3) by additionally incorporating routing functionality. This network makes use of 6 switch ports, each having 52 ports.

6.7 IDENTIFYING CABLE LENGTHS AND TYPE

CAT 6 Cable

For distribution cabling, we had chosen to add CAT 6 twisted copper cable. The CAT 6 is a twisted copper wire that can handle up to 100 meters supporting up to 1000Mbps and 550MHz ethernet data speeds bandwidth for a single cable. We can guarantee that this cable can still provide high data transfer rates and high Ethernet efficiency for the building network, and the access layer and network closets are less than 100 meters. In addition, it can also support most of the building's Ethernet applications.

Therefore, we concluded that the unshielded cable for the installation is effective, with this 24AWG unshielded twisted pair stranded copper cable including a high performance modular plug at either end, making it easy to terminate modular connections.This is due to the building's location in a region with low Electromagnetic Interference (EMI) and distance from an airport or medical centre, both of which have a significant possibility of interfering with cable efficiency. Additionally, the twisted wire itself might reduce the EMI influence on the cable. As a result of the unshielded cable's capabilities, it can be certain that the CAT 6 cable will continue to perform well for at least the next ten years.

Fiber Optic Cable

A fibre-optic cable contains anywhere from a few to hundreds of optical fibres within a plastic casing. Also known as optic cables or optical fibre cables, they transfer data signals in the form of light and travel hundreds of miles significantly faster than those used in traditional electrical cables. And because fibre-optic cables are non-metallic, they are not affected by electromagnetic interference (i.e. lightening) that can reduce speed of transmission. Fibre cables are also safer as they do not carry a current and therefore cannot generate a spark.

Wireless

Wireless networks are computer networks that are not connected by cables of any kind. The Wi-Fi signals are amplified by access points, so a computer can be far from a router but still be network connected.

6.8 REFLECTION ON TASK 4

In task 4, our team was tasked with putting all the network infrastructure and devices in place. This involved consideration of four physical areas of planning: the work area, telecommunications room, backbone cabling, and distribution cabling. Our team was also responsible for determining the type of media needed, its capabilities and limitations, and the required cable length and type. We had to create a sketch or drawing of the PC and network device arrangement, showing the cable length in the identified work areas, with appropriate scale and labelling. Through the process of this task, we improved our knowledge of cabling structure, cable lengths and types, and the arrangement of PC and network devices. Our teamwork and collaboration skills were evident as we worked together to meet the deliverables and achieve a successful outcome.

7.0 TASK 5

7.1 INTRODUCTION

The IP that is assigned to our group is 192.21.0.0/8. Which means the netmask is 255.0.0.0.

The network address is 192.0.0.0/8 whereas the broadcast address is 192.255.255.255.

Usable IP addresses to assign to the end host are from 192.21.0.1 until 192.21.255.254.

7.2 IP Assignation: First Floor

Room	End Devices	Subnet Mask	IP Address Range	Broadcast Address	Network Address
General Purpose Lab	30	255.255.255.200	192.21.2.1 - 192.21.2.31	192.21.2.32	192.21.2.0
Network Lab	30		192.21.2.34 - 192.21.2.64	192.21.2.65	192.21.2.33

7.3 IP Assignation: Second Floor

Room	End Devices	Subnet Mask	IP Address Range	Broadcast Address	Network Address
General Purpose Lab	30	255.255.255.180	192.21.3.1 - 192.21.3.31	192.21.3.32	192.21.3.0
IoT Lab	30		192.21.3.34 - 192.21.3.64	192.21.3.65	192.21.3.33
Video Conferencing Room	8		192.21.3.67 - 192.21.3.97	192.21.3.98	192.21.3.66

For the rest of the subnet and network was not used since the one that we put was enough. Therefore, the unused subnet could be reserved in the future since this project was worth 20 years of product.

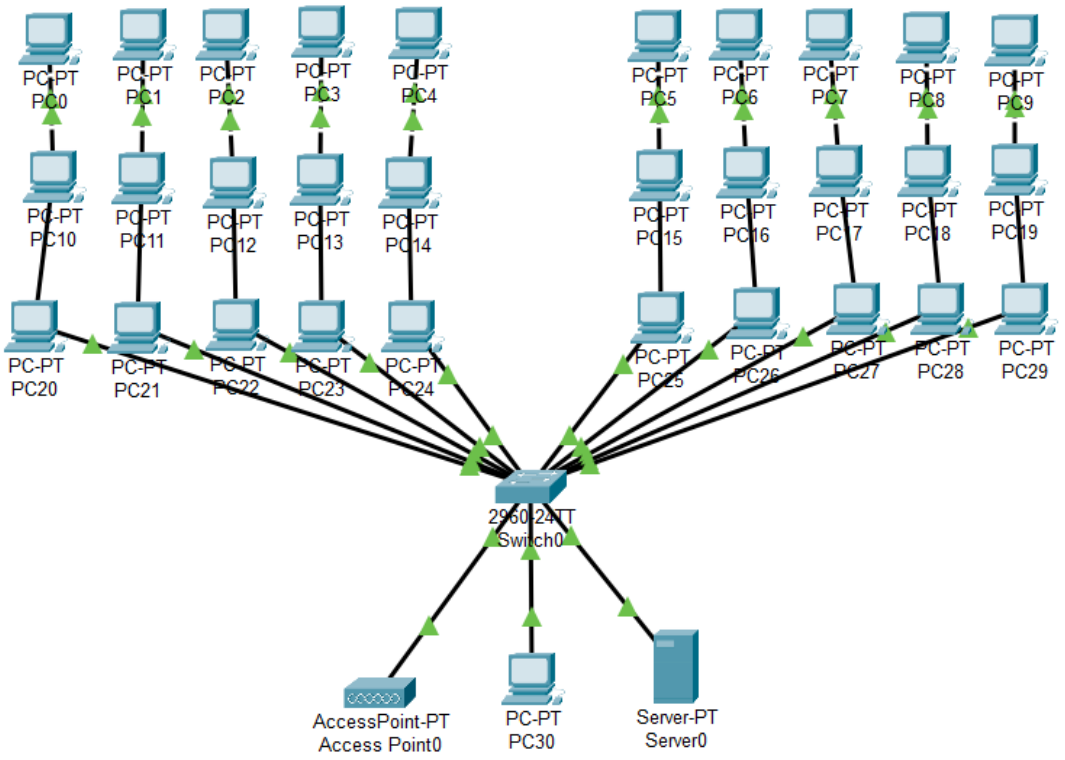


Figure 7.3.1 Illustration For General Purpose Labs, Network Lab and IoT Lab

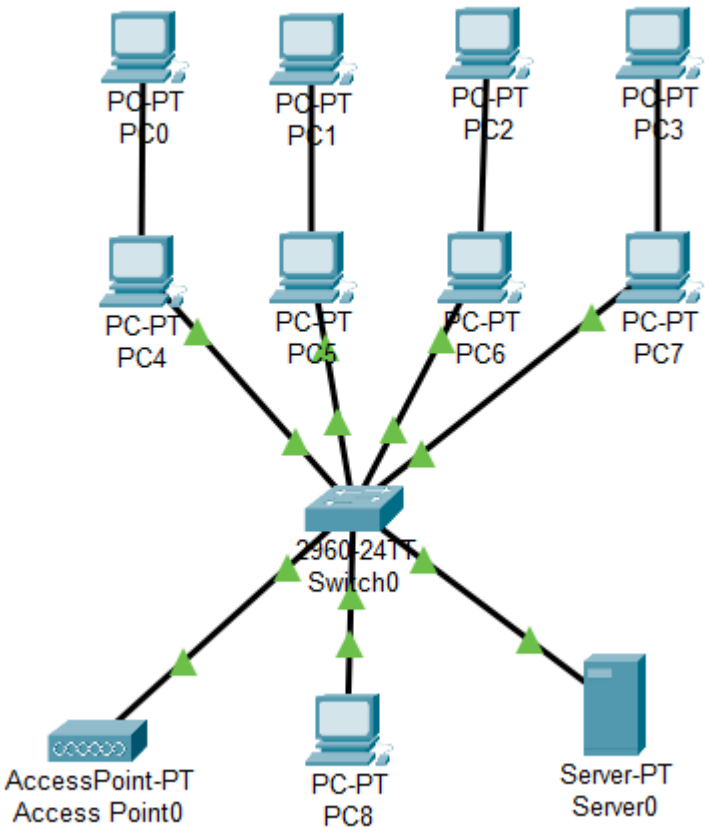


Figure 7.3.2 Illustration for Video Conferencing Room

7.4 REFLECTION ON TASK 5

Task 5 is relatively challenging in terms of fundamentals in IP addresses and subnets. It's really a test for us to apply the lecture concepts into practice. Gratefully, some of us are more keen on this topic and are willing to teach. Hence we learned from each other in between the discussions and meetings on the steps to start solving by breaking the problem into smaller pieces. It's a great learning curve for some of us that are weaker in this topic and the sense of accomplishment when we finish the task is unforgettable. It's also a great opportunity for those that are teaching to strengthen their knowledge on the topic. We've even encountered some questions that neither of us know how to solve, and the process of gathering information, discussing which is the better solution, is really amazing.

8.0 CONCLUSION

In conclusion, we managed to complete all the tasks that were assigned to us. We were happy with the output of this project. It's a result of our group's hardwork and the effort we put together to complete all the tasks. In this project, we did our own layout of the floorplan, did research about networking devices and chose the ones that are suitable, prearranged the network structure, planned the cabling and at last assigned IP addresses for the labs and other areas such as office, student lounge and video conferencing room. We managed to finish the project within the budget allocated.

Next is our strength that we encountered during the project. During the tasks, all the team members gave their best to come up with the output for each task. They were cooperative throughout the entire project. We allocated the tasks fairly to each member so that the work could be done faster and efficiently. We gave each other the opportunity to ask questions so that all the other members could get to know the problems that we are facing and come up with a solution.

We also encountered some weakness throughout the project. For some of the tasks, we couldn't communicate much and that leads to the task to be submitted after the due date. Next, for some parts of the task, we faced difficulties in understanding the requirement and all members came up with different solutions in which we couldn't decide the best solution.

In order to improve the project, we as a team need to communicate well to avoid any problems regarding the tasks. It is better to have face-to-face meetings for a better outcome. Moreover, we should always consult our lecturer for better understanding and improvement in our project.

9.0 TEAM MEMBERS AND RESPONSIBILITIES

GROUP 7 LAB RATS

No.	Name	Responsibility
1	JELIZA JUSTINE A/P SEBASTIN	Team leader for Task 4 and 6 Did meeting minutes for task 1
2	LIM JIE HAN	Team leader for Task 2 and 3 Did meeting minutes for task 2
3	MALLEYLENE PENEH	Team leader for Task 5 Meeting minutes recorder for Task 1 Did meeting minutes for task 4
4	LOKE RUI KEE	Team leader for Task 1 Did meeting minutes for task 3 and 5

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11.0 APPENDICES

11.1 MEETING MINUTE TASK 1

TASK 1 1ST MEETING

DATE : 26/10/2022
DAY : WEDNESDAY
TIME : 3.00 PM – 4.00 PM

ATTENDEES : JELIZA JUSTINE A/P SEBASTIN

: LOKE RUI KEE

: LIM JIE HAN

: MALLEYLENE PENEH

LOCATION : ONLINE – GOOGLE MEET
GOAL : PRIMARY FOCUS ON COMPLETING THE FLOOR PLAN OF THE TASK 1.

DISCUSSION NOTES

1) Firstly, each member of the group introduced themselves to break the ice between them. It is very important to know each other for team building and it will be easy for the teammates to cooperate well in the future.
2) Secondly, each member gave their suggestion on the group name. From the suggestion, the team has come up with the name Lab Rats.
3) Thirdly, the team goes through the project task list and rubric. Looking through the project task list and case study gives better understanding on the project.
4) Then, the team brainstormed and figured out the floor plan for the project.
5) The meeting continued with task allocation. Each pair was given 2 days to complete the floor plan.

Task allocation

Level 1 (2 labs: 1 general purpose, 1 network), student lounge	Lim Jie Han Jeliza Justine A/P Sebastin
Level 2 (2 labs: 1 general purpose, 1 IOT), video conferencing room	MalleylenePeneh Loke Rui Kee

Adjournment at 4 p.m.

Next meeting is scheduled for 10 p.m. on 28/10/2022.

TASK 1 2ND MEETING

DATE : 28/10/2022

DAY : FRIDAY

TIME : 10.00 PM – 11.00 PM

ATTENDEES : JELIZA JUSTINE A/P SEBASTIN

: LOKE RUI KEE

: LIM JIE HAN

: MALLEYLENE PENEH

LOCATION : ONLINE – GOOGLE MEET

GOAL : PRIMARY FOCUS ON COMPLETING THE FLOOR PLAN OF THE TASK 1.

DISCUSSION NOTES

1) Firstly, each member of the group reviewed their own and other member's floor plans for improvement.
2) Secondly, the team members had discussions on the problem which arose which was the measurement of the building and room.
3) Thirdly, the team found a solution on how to do the scaling for the floor plan on the Online Visual Paradigm website.
4) The team has decided to complete the remaining work and review it before the submission.

Adjournment at 11 p.m.

11.2 MEETING MINUTES FOR TASK 2

TASK 2 1ST MEETING

DATE: 7/11/2022 (MONDAY)

TIME: 6:00 PM - 7:00 PM

ATTENDEES: LIM JIE HAN
LOKE RUI KEE
MALLEYLENE PENEH
JELIZA JUSTINE A/P SEBASTIN

LOCATION: ONLINE - GOOGLE MEET

GOAL: FOCUS ON COMPLETING TASK 2

DISCUSSION NOTES:

1. Firstly, the task leader (Lim Jie Han) gave a briefing for Task 2, what the task was about, and the deliverables that need to be obtained.
2. Then, the meeting continued with task allocation. Each pair was given a day to complete their part.

TASK ALLOCATION:

Questions and Answers (6 Q&A/person)	Lim Jie Han Jeliza Justine A/P Sebastin
Feasibility and Reasoning	Loke Rui Kee Malleylene Peneh

Adjournment at 7:00pm.

Next meeting is scheduled on 8/11/2022 (Tuesday) at 10:00pm.

TASK 2 2ND MEETING

DATE: 8/11/2022 (TUESDAY)

TIME: 10:00 PM - 10:45 PM

ATTENDEES: LIM JIE HAN
LOKE RUI KEE
MALLEYLENE PENEH
JELIZA JUSTINE A/P SEBASTIN

LOCATION: ONLINE - GOOGLE MEET

GOAL: FOCUS ON COMPLETING TASK 2

DISCUSSION NOTES :

1. Firstly, each member updated their progress. Then, they reviewed their own part and others' parts.
2. Then, the members had a discussion to improve their respective tasks.
3. After that, the team has decided to complete the remaining tasks and set a time for all of us to review it before the submission.

Adjournment at 10.45pm.

11.3 MEETING MINUTES FOR TASK 3

TASK 3 1ST MEETING

DATE : 21/11/2022 (MONDAY)

TIME : 6.00 PM - 7.00 PM

ATTENDEES: LIM JIE HAN

: LOKE RUI KEE

: MALLEYLENE PENEH

: JELIZA JUSTINE A/P SEBASTIN

LOCATION : ONLINE - GOOGLE MEET

GOAL : FOCUS ON COMPLETING THE TASK 3

DISCUSSION NOTES :

1). Firstly, the task leader, Lim Jie Han, gave a briefing for task 3, what the task was about, and the deliverables that need to be obtained.

2). Then, the meeting continued with task allocation. Each task is allocated to finish in one week respectively.

Task allocation

Research on different network devices	Lim Jie Han
Discussion & Decide which LAN device to choose	Lim Jie Han, Jeliza Justine A/P Sebastin, Malleylene Peneh, Loke Rui Kee
Reflection	Jeliza Justine A/P Sebastin, Malleylene Peneh

Meeting Minutes	Loke Rui Kee

Adjournment at 7.00pm.

Next meeting is scheduled on 19/11/2022 (MONDAY) at 7.00pm.

TASK 3 2ND MEETING

DATE : 19/12/2022 (MONDAY)

TIME : 7.00 PM – 8.00 PM

ATTENDEES: LIM JIE HAN

: LOKE RUI KEE

: MALLEYLENE PENEH

: JELIZA JUSTINE A/P SEBASTIN

LOCATION : ONLINE - GOOGLE MEET

GOAL : FOCUS ON COMPLETING THE TASK 3

DISCUSSION NOTES :

1). Firstly, each member updated their progress. Then, they reviewed their own part and others' parts.

2). Then, the members had a discussion to improve their respective tasks.

3). After that, the team has decided to complete the remaining tasks and set a time for all of us to review it before the submission.

Adjournment at 8.00pm.

11.4 MEETING MINUTES FOR TASK 4

TASK 4 1ST MEETING

DATE : 15/01/2023 (SUNDAY)

TIME : 6.00 PM - 7.00 PM

ATTENDEES: LIM JIE HAN

: LOKE RUI KEE

: MALLEYLENE PENEH

: JELIZA JUSTINE A/P SEBASTIN

LOCATION : ONLINE - GOOGLE MEET

GOAL : FOCUS ON COMPLETING THE TASK 4

DISCUSSION NOTES :

1). Firstly, the task leader, Jeliza, gave a briefing for task 4, what the task was about, and the deliverables that need to be obtained.

2). Then, the meeting continued with task allocation. Each task is allocated to finish in a week respectively.

Task allocation

Sketch/drawing of your PC & network devices arrangement.	Jeliza Justine A/P Sebastin, Malleylene Peneh
The cable length in the identified work areas.	Lim Jie Han
Connections, patch cord, switchport identified.	Loke Rui Kee

Meeting Minutes.	Malleylene Peneh

Adjournment at 7.00pm.

Next meeting is scheduled on 23/01/2023 (MONDAY) at 7.00pm

TASK 4 2ND MEETING

DATE : 23/01/2023 (MONDAY)

TIME : 7.00 PM – 8.00 PM

ATTENDEES: LIM JIE HAN

: LOKE RUI KEE

: MALLEYLENE PENEH

: JELIZA JUSTINE A/P SEBASTIN

LOCATION : ONLINE - GOOGLE MEET

GOAL : FOCUS ON COMPLETING THE TASK 4

DISCUSSION NOTES :

1). Firstly, each member updated their progress. Then, they reviewed their own part and others' parts.

2). Then, the members had a discussion to improve their respective tasks.

3). After that, the team has decided to complete the remaining tasks on the spot and review it before the submission.

Adjournment at 8.00pm.

11.5 MEETING MINUTES FOR TASK 5

TASK 5 1ST MEETING

DATE : 23/1/2023

DAY : MONDAY

TIME : 8.00 PM – 9.00 PM

ATTENDEES : JELIZA JUSTINE A/P SEBASTIN

: LOKE RUI KEE

: LIM JIE HAN

: MALLEYLENE PENEH

LOCATION : ONLINE – GOOGLE MEET

GOAL : UNDERSTANDING TASK REQUIREMENT, BRAINSTORMING SOLUTION, AND TASK DISTRIBUTION

DISCUSSION NOTES

1) Went through all the task instructions and submission requirements.
2) Brainstorm opinions and ideas to solve the IP subnet mask problem.
3) Distribute the task for the first floor and second floor.

Adjournment at 9 p.m.

TASK 5 2ND MEETING

DATE : 25/1/2023

DAY : WEDNESDAY

TIME : 8.00 PM – 9.00 PM

ATTENDEES : JELIZA JUSTINE A/P SEBASTIN

: LOKE RUI KEE

: LIM JIE HAN

: MALLEYLENE PENEH

LOCATION : ONLINE – GOOGLE MEET

GOAL : UPDATE PROGRESS, FINAL REVIEW

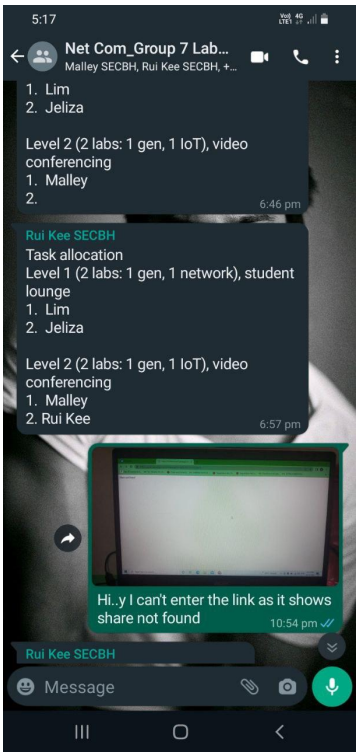
DISCUSSION NOTES

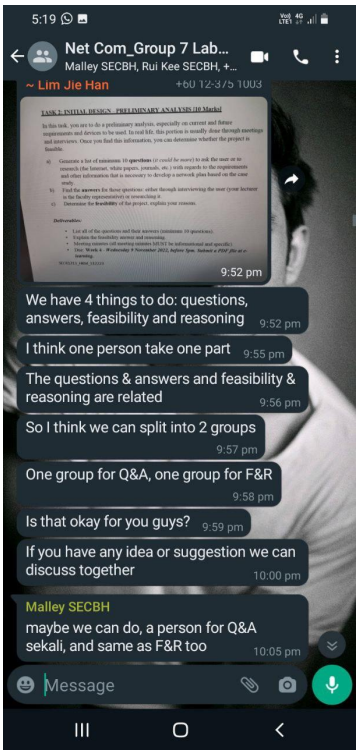
1) Each team member has updated their respective progress.

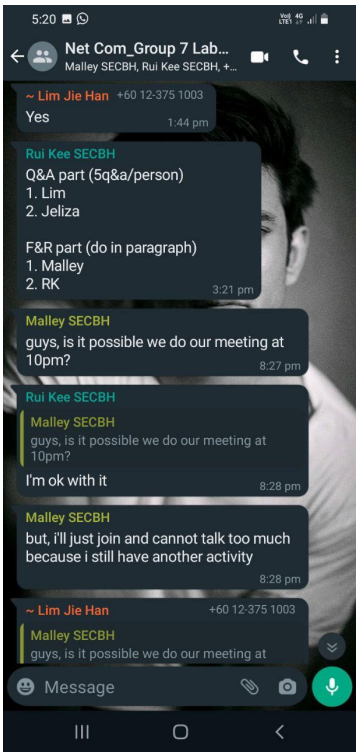
2) Discussion on distribution of subnet range and IP addresses. Some necessary corrections are done.

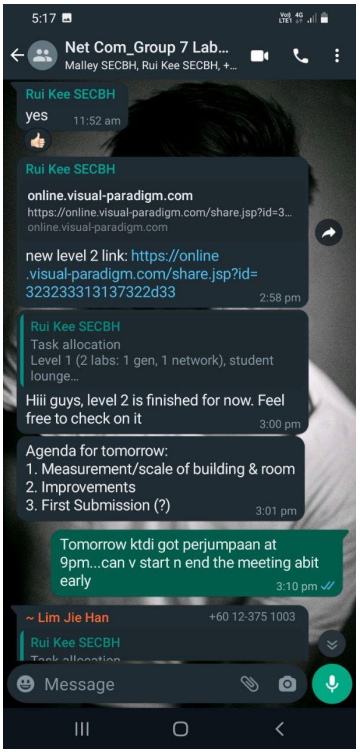
3) Went through the final documents together as a final review.

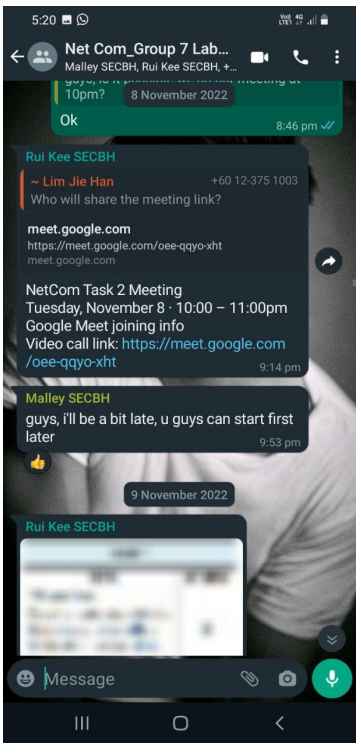
Adjournment at 9 p.m.

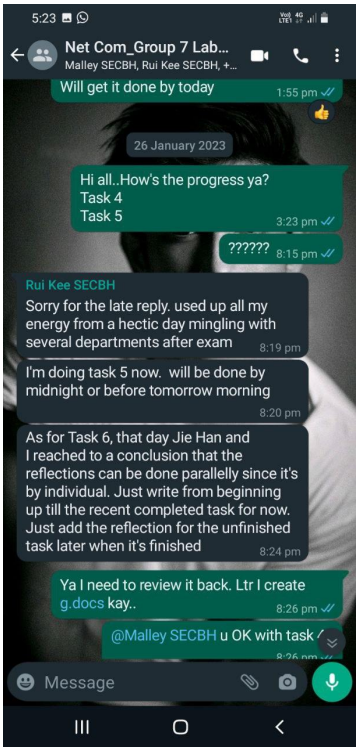

5:17
Net Com_Group 7 Lab...
Malley SECBH, Rui Kee SECBH, +...
1. Lim
2. Jeliza
Level 2 (2 labs: 1 gen, 1 IoT), video conferencing
1. Malley
2.
6:46 pm
Rui Kee SECBH
Task allocation
Level 1 (2 labs: 1 gen, 1 network), student lounge
1. Lim
2. Jeliza
Level 2 (2 labs: 1 gen, 1 IoT), video conferencing
1. Malley
2. Rui Kee
6:57 pm
Hi..y I can't enter the link as it shows share not found
10:54 pm
Rui Kee SECBH
Message

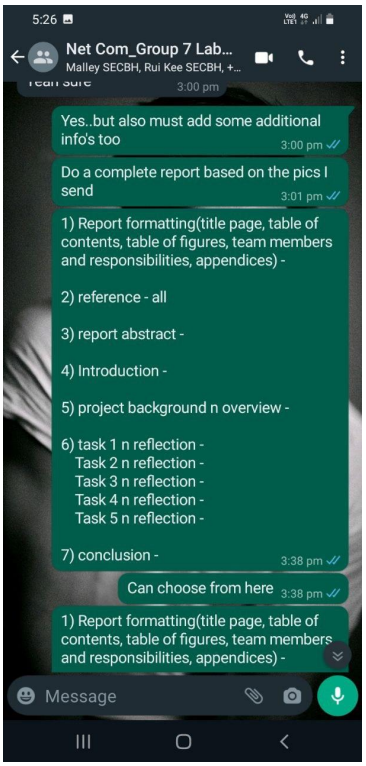

5:19
Net Com_Group 7 Lab...
Malley SECBH, Rui Kee SECBH, +...
~ Lim Jie Han
9:52 pm
We have 4 things to do: questions, answers, feasibility and reasoning
9:52 pm
I think one person take one part
9:55 pm
The questions & answers and feasibility & reasoning are related
9:56 pm
So I think we can split into 2 groups
9:57 pm
One group for Q&A, one group for F&R
9:58 pm
Is that okay for you guys?
9:59 pm
If you have any idea or suggestion we can discuss together
10:00 pm
Malley SECBH
maybe we can do, a person for Q&A sekali, and same as F&R too
10:05 pm
Message

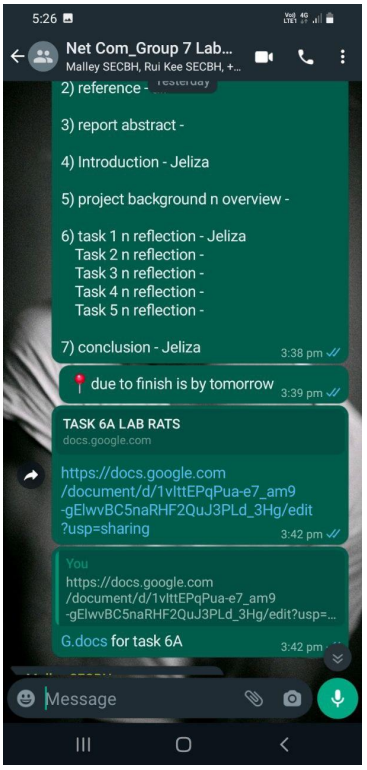

5:20
Net Com_Group 7 Lab...
Malley SECBH, Rui Kee SECBH, +...
~ Lim Jie Han +60 12-375 1003
Yes
1:44 pm
Rui Kee SECBH
Q&A part (5q&a/person)
1. Lim
2. Jeliza
F&R part (do in paragraph)
1. Malley
2. RK
3:21 pm
Malley SECBH
guys, is it possible we do our meeting at 10pm?
8:27 pm
Rui Kee SECBH
Malley SECBH
guys, is it possible we do our meeting at 10pm?
I'm ok with it
8:28 pm
Malley SECBH
but, i'll just join and cannot talk too much because i still have another activity
8:28 pm
~ Lim Jie Han +60 12-375 1003
Malley SECBH
guys, is it possible we do our meeting at
Message


5:17
Net Com_Group 7 Lab...
Malley SECBH, Rui Kee SECBH, +...
Rui Kee SECBH
yes
11:52 am
Rui Kee SECBH
online.visual-paradigm.com
https://online.visual-paradigm.com/share.jsp?id=3...
online.visual-paradigm.com
new level 2 link: https://online.visual-paradigm.com/share.jsp?id=323233313137322d33
2:58 pm
Rui Kee SECBH
Task allocation
Level 1 (2 labs: 1 gen, 1 network), student lounge...
Hiii guys, level 2 is finished for now. Feel free to check on it
3:00 pm
Agenda for tomorrow:
1. Measurement/scale of building & room
2. Improvements
3. First Submission (?)
3:01 pm
Tomorrow ktdi got perjumpaan at 9pm...can v start n end the meeting abit early
3:10 pm
~ Lim Jie Han +60 12-375 1003
Rui Kee SECBH
Message


5:20
Net Com_Group 7 Lab...
Malley SECBH, Rui Kee SECBH, +...
10pm?
8 November 2022
Ok
8:46 pm
Rui Kee SECBH
~ Lim Jie Han +60 12-375 1003
Who will share the meeting link?
meet.google.com
https://meet.google.com/oee-qqyo-xht
meet.google.com
NetCom Task 2 Meeting
Tuesday, November 8 · 10:00 – 11:00pm
Google Meet joining info
Video call link: https://meet.google.com/oee-qqyo-xht
9:14 pm
Malley SECBH
guys, i'll be a bit late, u guys can start first later
9:53 pm
9 November 2022
Rui Kee SECBH
Message


5:23
Net Com_Group 7 Lab...
Malley SECBH, Rui Kee SECBH, +...
Will get it done by today
1:55 pm
26 January 2023
Hi all..How's the progress ya?
Task 4
Task 5
3:23 pm
?????? 8:15 pm
Rui Kee SECBH
Sorry for the late reply. used up all my energy from a hectic day mingling with several departments after exam
8:19 pm
I'm doing task 5 now. will be done by midnight or before tomorrow morning
8:20 pm
As for Task 6, that day Jie Han and I reached to a conclusion that the reflections can be done parallelly since it's by individual. Just write from beginning up till the recent completed task for now. Just add the reflection for the unfinished task later when it's finished
8:24 pm
Ya I need to review it back. Ltr I create g.docs kay..
8:26 pm
@Malley SECBH u OK with task
Message


5:26
Net Com_Group 7 Lab...
Malley SECBH, Rui Kee SECBH, +...
3:00 pm
Yes..but also must add some additional info's too
3:00 pm
Do a complete report based on the pics I send
3:01 pm
1) Report formatting(title page, table of contents, table of figures, team members and responsibilities, appendices) -
2) reference - all
3) report abstract -
4) Introduction -
5) project background n overview -
6) task 1 n reflection -
Task 2 n reflection -
Task 3 n reflection -
Task 4 n reflection -
Task 5 n reflection -
7) conclusion -
3:38 pm
Can choose from here
3:38 pm
1) Report formatting(title page, table of contents, table of figures, team members and responsibilities, appendices) -
Message


5:26
Net Com_Group 7 Lab...
Malley SECBH, Rui Kee SECBH, +...
2) reference -
3) report abstract -
4) Introduction - Jeliza
5) project background n overview -
6) task 1 n reflection - Jeliza
Task 2 n reflection -
Task 3 n reflection -
Task 4 n reflection -
Task 5 n reflection -
7) conclusion - Jeliza
3:38 pm
due to finish is by tomorrow
3:39 pm
TASK 6A LAB RATS
docs.google.com
https://docs.google.com/document/d/1vlttEPqPua-e7_am9-gElwvBC5naRHF2QuJ3PLd_3Hg/edit?usp=sharing
3:42 pm
You
https://docs.google.com/document/d/1vlttEPqPua-e7_am9-gElwvBC5naRHF2QuJ3PLd_3Hg/edit?usp=...
G.docs for task 6A
3:42 pm
Message