UTM

UNIVERSITI TEKNOLOGI MALAYSIA

FACULTY OF ENGINEERING

SCHOOL OF COMPUTING

SECR/SCSR1213 - 03

NETWORK COMMUNICATION

PROJECT - TASK 2

GROUP G

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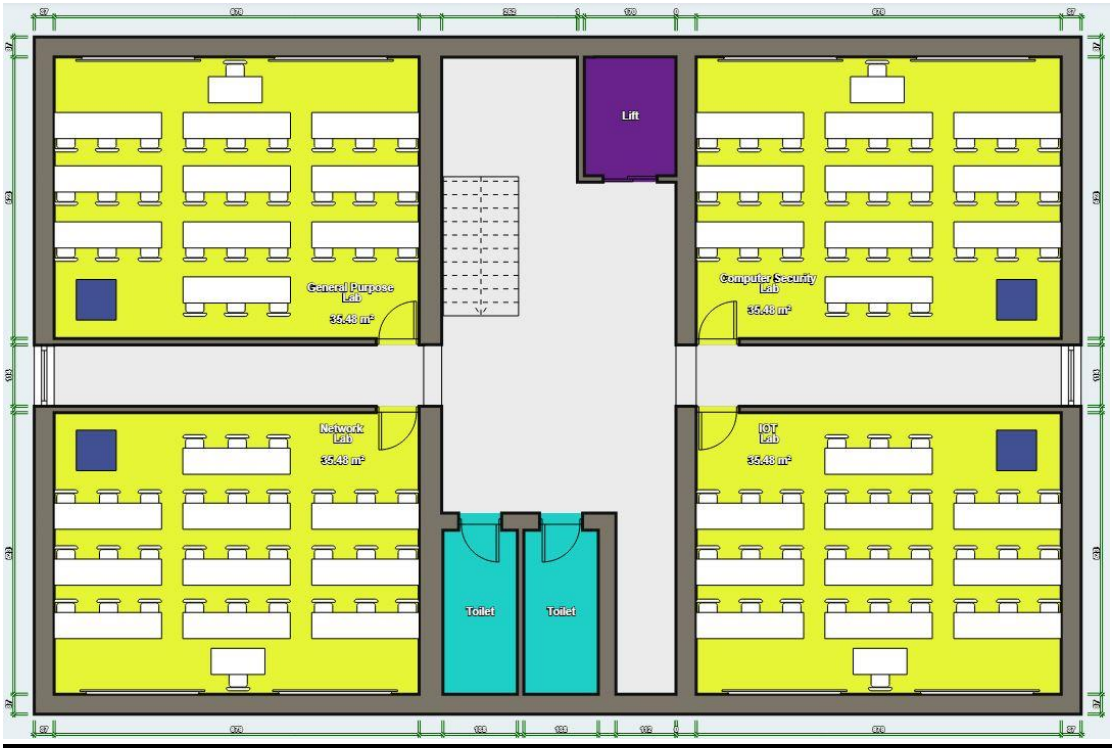
UPDATED FLOOR PLAN



Legends


Door

Sliding door


Window


Table


Round Table


Chair

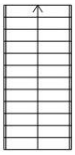

Stool

Projector Wall


Stove


Double Sink


Kitchen Sink


Stairs


Multi-terabyte storage server

Q&A

1. **What are the devices needed for setting up a network?**

   Those devices are router, modem, switch, and access point.

- A router a systems administration gadget that advances information bundles between computer networks. Router plays out the traffic coordinating capacities on the Internet. Information sent through the web, for example, a page or email, is as information bundles.
- Modem is short for "Modulator-Demodulator." It is a hardware part that allows a computer or another device, such as a router or switch, to connect to the Internet. It converts an analogue signal from a telephone or cable wire to binary (1s and 0s) that a computer can understand.
- A network switch is a networking tool that connects devices on a computer network by using packet switching to obtain and transmit data to the target device. A network switch is a multiport network connection that uses MAC addresses to deliver data at the data link layer of the OSI model.
- An access point is a device that generates a wireless local area network(WLAN) usually in an office or large building. An access point connects to a wired router, switch, or hub via an Ethernet cable, and projects a Wi-Fi signal to a designated area. For example, if you want to enable Wi-Fi access in your company's reception area but don't have a router within range, you can install an access point near the front desk and run an Ethernet cable through the ceiling back to the server room.

2. **How to set up a Local Area Network (LAN)?**

   Create Network:

   a) Identify the local services that you want available on the network. Identify network-attached printers, network disk drives, any server that will share printers or disks.

   b) Identify how many devices will have to connect to the network. Each device, server or workstation will require a unique address.

   c) Run cables to workstations where possible. A wired LAN will always get better performance and be more secure than a wireless LAN. Wherever possible, run a cable to servers, printers, IP phones or work locations. Run a cable to any area where you are likely to work. Use standard Ethernet cables or building wiring as installed according to the TIA-568 standard. Select and

purchase a switch or cable router. The simple secure way to connect to the Internet is to use a cable router. Many makes and models are available. If the model you choose does not have enough ports to connect all of your computers, then you will need to purchase a switch as well.

d) Configure the WAN port of the cable router. Configuration details will vary from vendor to vendor. Your internet service provider will supply essential information you will need to configure the WAN port.

e) Configure the LAN ports of your cable router. Most cable routers will act as a Dynamic Host Configuration Server or DHCP server. This means that the router will give addresses to workstations automatically. Be sure that the address pool has enough addresses for all of the workstations. Make certain that there are enough addresses outside of the range for any hosts that need static addresses. For example, a network address with a mask of 255.255.255.0 has a total of 254 hosts. If the dynamic pool has 200 addresses available, that means the remaining 54 addresses are available to give printers or servers static addresses.

f) Connect the wires for the network. Workstations and servers can be connected with standard Ethernet cables. Connect the switch to the cable router LAN ports by using the up-link or straight port on the switch. If the switch does not have an uplink port, connect any standard port of the switch to a LAN port on the cable router with an Ethernet crossover cable. Ethernet crossover cables can be purchased at any electronics store.

g) Test the services and Internet connectivity. Test each of the workstations to ensure they can connect to the Internet and test any local servers and printers. Print test pages on the shared printers. Tests read and write permissions on shared file servers by copying files to the servers and copying files from the server to a workstation.

3. What kind of network topology is suggested?

There are 5 topology that is bus, ring, mesh, star and hybrid topology. In bus topology there is a main cable and all the devices are connected to this main cable through drop lines. In ring topology each device is connected with the two devices on either side of it. In mesh topology each device is connected to every other device on the network through a dedicated point-to-point link. In star topology each device in the network is connected to a central device called hub. A

combination of two or more topology is known as hybrid topology. So the suggested topology is hybrid topology that combined mesh and star topology. Star topology is used in every lab and room to connect all device to a central device(hub) and mesh is used to connect all hub to each other.

4. **How to make sure that the wireless coverage is enough for a particular area?**
   Put wireless access point in every lab and room.
5. **What is the communication medium that we will use in this project?**
   Communication medium are one of the important things we need to consider in planning this project. The speed of transferring data in the labs will depends on the communication medium that we will use. If the communication medium is not working properly, the rate of data transfer will be slow, delayed or even lost during transmission. The type of communication medium that we will set-up in our lab is wired network, coaxial cable and Ethernet cable for indoor connection. Coaxial cable can achieve high data transmission rates and suitable for our project. The Ethernet cable that we want to use is CAT5.
6. **Which storage server will we be using?**
   Storage server is also known as file server. Generally there are 3 types of storage server: Direct Attached Storage, Cloud Data Storage and Storage Area Network. Direct Attached Storage is basically an on-site storage in which it will directly connected to servers, computers etc.; Cloud Data Storage on the other hand is as its name implies it's a remote server which will store the data in a cloud storage; Storage Area Network is another on-site storage but what it does it that it's able to deliver a high-performance and expandable storage. On paper Storage Area Network would sounds like the best out of all 3 but in reality this kind of storage server is very expensive for both setup and maintain. Cloud storage server need a fairly low cost to maintain and setup but it mostly required monthly rental server. Hence, we decided to stick with Direct Attached Storage as it's very affordable.
7. **What are the security concerns for the workstations and servers?**
   - Data breach : The possibility of permanent data loss is quite high as the cloud storage
   - Data loss : It can happen when there are problems on could provider's side, the system has no backup to restore, the information of the data has changed and it cannot be reverted back or when it is unavailable due to lack of personal account data and other credentials such as encryption keys.

- Insecure API: Application Programming Interface (API) allows to operate system within the cloud infrastructure. Most common problem that leads the availability of API to cloud security risk are unauthorized access, lack of access monitoring, clear text authentication and many more.
- Cybersecurity Attack : Not having good protection could lead to damage such as malware and Denial of Service (DoS)

8. What kind of protection measures need to be taken for ICT devices?

- Data breach: a cloud security system must have a perimeter firewall and multilayer approach that covers every steps of the users activity. For example, multifactor authentication where the user provides two or more evidence or factors for authentication (if the user is UTM student they can provide their student ID).
- Data loss: create a backup using a data loss prevention software such as Google Cloud Data Loss Prevention and McAfee DLP Endpoint.
- Insecure API : Apply multifactor authentication, Secure Socket Layer (SSL) or Transport Layer Security (TSL) for data transmission and
- Host/Platform configuration: Use a secure by default configuration. For example, build a custom Virtual Machine Manager (VMM) that only provides necessary services to support application stack (set of application programs that help in performing tasks such as Microsoft Word, Spreadsheet, Database, etc). Limiting capabilities reduce the number of patches needed to keep the application stack secure.
- Cybersecurity Attack : Block of IP address that is considered as threat, limit source rate, use up to date intrusion detection system and place a firewall such as firewall traffic type of inspection features to check the source and destination of incoming traffic.

9. What is the maintenance‘s frequency for those equipment?

- Regularly scheduled check the computer hardware and software to ensure it operates properly. Once a year should be enough for each hardware but updating the software need to be done at least once per month. Every hardware is encouraged to be replaced every 5 to 8 years. Meanwhile for a server, regular maintenance will help the server runs efficiently
- Preventive maintenance should be applied where it requires :
  - Cleaning the computer hardware

- Download the latest drivers for the hardware
- Download the latest updates for the software
- Ensure to have the latest antivirus protection updates
- Run disk software utilities (Defrag and ScanDisk)

- Server maintenance requires :
  - Ensure backups are working
  - Check disk usage
  - Monitor RAID alarms
  - Update operating system (OS)
  - Update control panel
  - Check system security
  - Check application updates
  - Check remote management control

10. What is the long-term goal for this project?

To build a system that is easy to manage and scalable, great improvement for overall performance even after changing from old to new equipment, provide protection from network breaches, Denial of Services (DOS) and e-business application attacks, capability to support high performance to the core backbone, ability to support features and security in hardware via access control list (ACLs) and securable VPN connections from remote locations.

11. What kind of lab upgradability is expected?

In terms of upgradability, the four new lab needs to be flexible to changes. It will be used daily by the staff and students of computer science, so the lab needs to keep up with the current technology as it should not be obsolete. Then, if the computers or any electronic devices in the lab becomes outdated in future, it should be easy and accessible to change to new ones. For the performance, it is important that the lab must be equipped with high-speed internet connection in preparation for education in line with 4IR (4th Industrial Revolution). The security also needed to be top-notch and maintenance work in the lab should be done regularly to get the best performance.

FEASIBILITY

After our group has gathered enough information needed to fulfil the requirements of the project, it's time for us to determine the feasibility of our project. We will be focusing on 3 main elements in determining feasibility, that is: Technical, Operational and Economical.

First and foremost, the technical part. In order to handle the increasing number of students, the floor plan that we design is definitely enough to provide space and facilities for them. Our floor plan included what was requested such as 4 new labs (General purpose lab, Computer security lab, Network lab and IOT lab) and 2 video conferencing rooms. On top of that, we also provide cafe and lounge for students. To make sure the high-speed Internet connectivity, we decided to use coaxial cable on the outside and Ethernet cable to directly connect to workstation and other devices that required fastest and reliable Internet connectivity. Meanwhile wireless connectivity is also prepared for mobile devices. Combination of mesh and star topology will be used to reduce networking error consequences. The workstations will also be equipped with latest hardware that can meet the users' need in terms of performance.

Besides, we have also studied and identified the equipment needed to set up a working LAN and Wireless-LAN which are router, switches etc.

About the operational part, those facilities like labs and video conferencing room will definitely be made use of. Especially in this covid pandemic period, people are relying on online meetings. A new workstations and learning environment will definitely motivate students who learn inside those rooms. In case of security of the building, we will also be installing an air-conditioner in the room and taking care of the air condition in the room, especially the area where the server sits. The building structure is also simple where the emergency escape route is clear and straightforward. And of course, things like fire extinguishers will be mounted.

Last but not least, the economical part. The budget assigned to us is RM 1.3M which is pretty sufficient and viable. Our building structure is simple and the size is moderate, which is fairly manageable. Besides, in order to save the cost of equipment and cabling, we put video conferencing rooms and labs in respective clusters where 2 video conferencing rooms are on the ground floor whereas the labs are all on the first

floor. The cable we choose are coaxial and Ethernet cable (Cat5) which are both good value for money. For the multi-terabyte storage server, Direct Attached Storage was chosen for it affordable price and easy maintenance Precautions will also be made to reduce the cost of maintenance such as installing air-conditioners to keep the optimum temperature for servers and workstations which will properly be used for full office hours or even 24 hours. Anti-virus software will also be installed to avoid malware attack to the workstation as well as the server.

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