UTM
UNIVERSITI TEKNOLOGI MALAYSIA

SECR1213 NETWORK COMMUNICATIONS
SECTION 08
20242025/1

TASK 2

LECTURER'S NAME: DR. MUHAMMAD ZAFRAN BIN MUHAMMAD ZALY SHAH

GROUP NAME: 4G
GROUP MEMBERS :

NAME	MATIRC NO.
CHANG WEN XUEN	A23CS5012
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1.0 List of Question and Answer

1. **What is the function of the server room, how important is this server room?**

   A server room is a specialized room built for a centralized data management system of an organization. It functions as a computing, storage and networking center while providing resources and services towards the clients. It is important for organizations to have a dedicated server room in their building to ensure seamless operation, effective services, maximize resource utilization, as well as provide security systems for the organization.[2]

2. **What are the specific environmental requirements for equipment in the labs and server room?**

   For a server room, it is essential to maintain low temperature and low humidity to control the heat generated by the servers due to its high performance processes. Air conditioners are important to make sure all computers are not overheating and able to perform to their best potential. Ventilation system is also a notable environment requirement for all rooms in the building to accommodate students, lecturers and staff are comfortable during their teaching and learning activities, as well as avoid dust and contaminants on our hardwares, which could easily be fire hazards.[2]

3. **What are the minimum speed and bandwidth requirements in the building for your applications to function effectively?**

   As this building is composed of multiple labs, meeting rooms, video conferencing rooms and lounge area, it is determined there will be different requirements for each room. For the student lounge and video conferencing room, minimum bandwidth needed is around 3Mbps for a high definition video quality, to stream videos of lectures or entertainment, live video streaming and calls.[14] However, for the labs, it needs much higher bandwidth to accommodate different activities for a great quantity of computers simultaneously.

4. **What user authentication methods will be used to access the network? Will we have different levels of access?**

   For network access, a one-step authentication method, with username and password can be used to simplify the access process. This will also help to ensure only authorized users get access to the network. We will also have different levels of access based on users' roles within the faculty, such as students, lecturers, staff and administrators. For example, students will have access to the internet and academic resources, faculties and staff will have additional access to administrative tools and resources and administrators will have full access to manage and troubleshoot the network infrastructure.[13]

5. **Will each lab have unique network requirements based on its function, such as dedicated bandwidth for the Cisco Network Lab?**

   Yes, each lab will have unique network requirements based on its function. Their unique requirements will be addressed by allocating specific bandwidth quotas and network segments (such as VLANs) to each lab and classroom, ensuring optimal performance based on their individual needs. For example,

   -The Cisco Network Lab will require dedicated and high-speed bandwidth due to the nature of its networking simulations and data-intensive activities.[10]

   -Hybrid Classrooms will require a stable and robust connection to ensure high-quality video streaming capabilities for remote students, as well as sufficient bandwidth to handle multiple devices for interactive activities.[11]

   -Embedded labs may require higher bandwidth and low-latency connections to handle the demands of real-time data processing and machine learning tasks.[12]

   -General-purpose labs may require moderate bandwidth, sufficient for standard student activities such as browsing, coding, and assignments.

6. **Are there specific areas within the building where higher network bandwidth is essential?**

   Yes, some specific areas within the building will need higher network bandwidth:

   -The Cisco Network Lab and the embedded lab will require higher bandwidth to support data-intensive tasks, simulations, and real-time applications.[10]

   - The hybrid classroom will need higher bandwidth to support live streaming and online meetings without any interruptions.[11]

   - The server room and administration offices may also require higher bandwidth, particularly for managing data backups, remote access, and handling administrative tasks efficiently.

   By prioritizing bandwidth in these areas, we can ensure smooth operations, reduce the risk of network congestion, and enhance the user experience for both staff and students.

7. **How will we manage network traffic to prevent bottlenecks, especially during peak usage times?**

   We can have network segmentation where the network is split into separate segments for students, staff, and specialized labs. We can isolate traffic by creating virtual LANs(VLANs) to reduce congestion in one area [6]. For example, areas like Cisco Network Lab can be assigned their own VLAN, reducing load on the main network. Secondly, we can set up the network with scalable bandwidth to support high-speed internet, as planned, and monitor usage patterns over time [7].If consistent congestion existed during a certain period, we can upgrade bandwidth capacity in key areas, especially in labs where data-intensive tasks like IoT labs. We can also apply high quality, efficient switches and routers to ensure redundancy in critical network paths which will help to maintain performance even when the network is high load.

8. **What criteria should we decide between wired and wireless connections in different areas of the building ?**

   Deciding between wired and wireless connections in the Faculty of Computing building will be based on each area's specific needs. Wired connections are ideal in high-data, high-security zones, like the Cisco Network Lab and server room, where stable, fast, and secure connections are crucial. Wireless connections, however, suit areas requiring mobility and flexibility, such as student lounges and common spaces, allowing easy access without physical restrictions [8].If the layout is fixed, using wired connections in high-density areas like general-purpose labs is ideal, as it ensures stable connections and prevents overcrowding on the wireless network. Wired connections can be more expensive and rigid, while wireless networks are cost-effective, easier to expand, and adapt well to changing layouts.

9. **What type of firewalls would be needed to protect the network, where should they be installed?**

   To protect the Faculty of Computing building's network, we would use a mix of network firewalls, application firewalls, and internal segmentation firewalls. A strong network firewall would be installed at the main entry point where the building's network connects to the internet, blocking unauthorized external access. Additional firewalls could be placed between critical areas, like the server room and labs, to protect internal traffic. Application firewalls would be installed on servers hosting sensitive applications, adding protection against specific attacks on student or staff portals. Finally, segmentation firewalls within the building would separate network sections for students, staff, and labs, securing sensitive data and resources [9]. This setup provides multiple layers of defense, safeguarding the network from both external and internal threats.

10. **Which equipment requires protection and what kind of security is needed in the building?**

    Servers, routers, switches, firewalls, and wireless access points should be prioritized. Any device housing sensitive data, such as departmental databases or research servers, also requires robust protection. Install and use antivirus software. Installing an antivirus software program and keeping it up-to-date is a critical step in protecting your computer. Many types of antivirus software can detect the presence of malware by searching for patterns in your computer's files or memory. Antivirus software uses signatures provided by software vendors to identify malware[3]. Use encryption for data in transit and at rest, along with regular backups and access controls. Implement multi-factor authentication (MFA) for network and resource access, particularly for high-privilege users.

11. **Should we implement a centralized management system for all connected devices within the building?**

    Yes, implementing a centralized management system is recommended. A centralized system will simplify monitoring, maintenance, and troubleshooting of the network. Centralized access control works by consolidating access control management into a central system.[4] It allows for real-time monitoring of all network devices from a single console helps quickly detect issues. Central management can enforce security policies, manage access rights, and log network activity centrally, improving the overall security posture. As your network grows, a centralized system makes expansion simpler by managing all new devices through a unified platform.

12. **How frequently do you expect to update or upgrade the network infrastructure to meet future needs?**

    It is ideal to conduct a major review and upgrade every 3-5 years. Enhanced performance, improved security, scalability, reliability, and support for remote work are all compelling reasons to consider making the move.[5] Rapid technological changes may require more frequent updates to stay current with best practices. Expansions in the number of users or bandwidth-intensive applications might necessitate upgrades sooner. Cybersecurity threats are evolving at an alarming rate. Older network infrastructure may lack the robust security features necessary to protect your business from today's sophisticated threats.[5] To address evolving cybersecurity threats, regular updates to firewalls, antivirus, and encryption protocols are essential.

2.0 Project Feasibility

Technical Feasibility

Our project is going to incorporate different devices and hardwares such as routers, switches, connection cables, computers, IP microphones/speakers and cameras, smart TVs, and projectors. These devices are essential to fulfill the requirements of our project to ensure seamless integration with existing network systems in UTM.

Through our research study, it is found that these devices can be found and bought by trusted vendors recommended by UTM, ensuring quality and reliability of the products. Referencing multiple different trusted vendors also allows us to survey for better functionality to price balance to optimize our budget without sacrificing the performance of the devices.

Our labs will also be equipped with provided Microsoft services for students to support the learning and teaching of the faculty students, as well as implementing firewalls to secure and safeguard the data of the faculty members. Thus, it is determined that this project is feasible technically as all devices are able to be obtained, used and integrated into FC's system.

Economic Feasibility

For this project, economic feasibility plays a crucial role, especially given the RM2.2M budget constraints and the necessity for high-quality infrastructure. Purchasing network hardware (such as routers, switches, and access points), installing software tools for centralized management and network security, and safeguarding the server room with the required environmental controls are all included in the anticipated expenditures. Through our research study, it is found that these devices can be found and bought by several trusted vendors recommended by UTM to ensure a cost-effective solution without compromising on quality.

To ensure sustainability, We will take into account devices that can be upgraded in the future to prevent frequent replacements and equipment with warranties. According to our financial analysis, the initial investment for this setup would be justifiable given the benefits of enhanced network performance, security, and support for teaching and learning activities within the faculty.We also plan to allocate a portion of the budget for regular maintenance, upgrades, and contingencies to handle unforeseen expenses. This approach ensures that the project remains economically viable in the long term.

Legal Feasibility

All hardware and software used will be original and in full fulfillment with intellectual property (IP) laws. Routers and other network devices will be legally obtained, and software licenses for programs such as Microsoft products, antivirus tools, and other necessary applications will be obtained through authorized channels, primarily managed by the UTM Digital Department. Additionally, firewalls and web filtering will be implemented to prevent access to illegal websites, ensuring the building’s network follows legal standards.

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3.0 Meeting Minute

Date/Time	31/10/2024 8:00 p.m.
Agenda	Network Communications 4G Meeting
Minutes prepared by:	Lim Chen Xi
Location	Google Meet
1. Meeting Objectives	
Task 2 Discussion Meeting	
2. Attendance	
1. Chang Wen Xuen	A23CS5012
2. Lim Chen Xi	A23CS0103
3. Farah Nabila Binti Wan Ismail	A23CS0077
4. Anisa Chowdhury	A23CS0288
3. Minutes	
Introduction to the Task 2	Chang Wen Xuen explains the task that needs to be done for Task 2 and discusses assigning the task.
Discussion of Questions Collected	Chang proposes 6 questions, Farah proposes 4 questions, Lim proposes 4 questions, Anisa proposes 2 questions and Chang ask for opinions on analysing and filtering questions.
Interview	We discuss where, when, who and how to interview
Assignation of task	1. Chang Wen Xuen Filter the question, Question 7-9, Legal feasibility 2. Lim Chen Xi Question 10-12, Meeting minute 3. Farah Nabila Binti Wan Ismail Question 1-3, Technical feasibility 4. Anisa Chowdhury Question 4-6, Economic feasibility
Due date to finish	7/11/2024