**Document 1**

**Project Name:** Hospital Network Design

**Group:** 1

**Module:** DMT2d

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**Table of contents**

Overview of chosen scenario ………………………………………………………………………………………………….3

Project charter …………………………………………………………………………………………………………………….….6

**Overview of chosen scenario:**

A network infrastructure must be designed and configured for a local hospital. The current network has the following: a main block and three wards in the hospital vicinity. The main block is the administrative block where registration of new patients take place. The main block has 5 floors. The hospital has identified hospital management software, which should be accessible by all the hospital employees. The hospital has close to 150 practitioners spread across different floors. The software is installed on a server at the administrative block. At the ground floor, there are 15 computers at the billing section. At other floors, there is one computer for each user. The farthest distance between the computer on the top-most floor and the ground floor is less than 70 meters. The wards have 5 floors each, with 10 computers and printers on the ground floor of each ward. The distance between the wards and the blocks are less than 80 Meters. The computers in the wards may be increased based on future expansion plans.

**Introduction:**

The future of healthcare infrastructure, where cutting-edge technology meets compassionate patient care. Our hospital network is designed to set a new standard in healthcare delivery, ensuring seamless communication and efficiency within our facility. With wards featuring five floors each, equipped with state-of-the-art technology, and a robust network connecting them all, we are committed to providing the best possible care for our patients.

In our hospital, each ward is a hub of innovation and connectivity. On the ground floor of every ward, you will find a technological oasis, housing ten computers and printers, ready to support our dedicated healthcare professionals in their mission to deliver exceptional care. This ensures that patient records, diagnostic reports, and other critical information are readily available to our medical teams, enhancing decision-making and reducing response times.

The future of healthcare infrastructure, where cutting-edge technology meets compassionate patient care. Our hospital network is designed to set a new standard in healthcare delivery, ensuring seamless communication and efficiency within our facility. With wards featuring five floors each, equipped with state-of-the-art technology, and a robust network connecting them all, we are committed to providing the best possible care for our patients.

The management of network infrastructure and information technology has grown to be an essential part of the healthcare sector. To increase the number of medical equipment that may be connected to the network and give doctors the ability to conveniently monitor patients online, medical professionals are collaborating with IT departments. Hospitals have also started using electronic health records, which are simple for doctors and the patient's family to access. There are various occasions when a doctor is unable to be present, but video communication has already solved this problem. Additionally, the hospital network needs to be made secure to prevent sensitive information like patient records and research data from getting into the wrong hands. Typically, when designing

Making a network capable of safely, and reliably supporting future expansion is crucial when designing networks for today. We must create a network topology that is simple to comprehend, maintain, debug, and is flexible enough to evolve in the future to accommodate new medical equipment. Hierarchical topology would best fulfil our needs among the numerous topologies, such as bus topology, ring topology, mesh topology, star topology, etc. We can create a network topology in various layers with the aid of the hierarchical network design paradigm. Because each layer focuses on a certain function, we can select the appropriate tools and features for each layer. The need for a fully mesh network with all network nodes connected is avoided by a hierarchical architecture.

But our commitment to technology doesn't stop there. Our hospital network extends beyond the wards, seamlessly connecting them to various medical blocks, all within less than 80 meters. This interconnected infrastructure ensures that our staff can collaborate effectively, share expertise, and respond swiftly to emergencies, ultimately benefiting our patients.

At the heart of our hospital network is a dedication to patient well-being. We strive to create an environment where medical professionals have the tools they need to excel, collaborate, and innovate, all while ensuring that our patients receive the highest quality care. Together, we are shaping the future of healthcare, one ward, one block, and one patient at a time. Welcome to our hospital network, where technology and compassion come together to make a difference in the lives of those we serve.

**How we are planning on doing the project:**

**Needs Assessment:**

We are going to identify the specific requirements of the hospital, including the number of users, types of devices, and the nature of applications used which is discussed in the overview. We need to have an understanding of the criticality of various network services such as electronic health records (EHR), imaging systems, communication systems, and so on. By doing all of the, we need to also be in compliance with the healthcare regulations and standards to safeguard patient information.

**Define Objectives:**

Objectives of the network design project should be clearly defined, such as improving efficiency, enhancing security, or supporting new technologies.

**Scope Definition:**

We need to clearly define the scope of the project, which includes the areas of the hospital that will be covered, the number of users, and the types of devices to be supported.

**Network Topology:**

The appropriate network topology should be determined, considering factors like scalability, redundancy, and fault tolerance. We are meant to choose between centralized or distributed architecture based on the hospital's specific needs.

**Bandwidth Requirements:**

Assess bandwidth requirements for different applications, especially bandwidth-intensive services like medical imaging and a plan for sufficient bandwidth to support real-time communication and data transfer.

**Security Considerations:**

Robust security measures will be implemented in order to protect patient data and ensure compliance with regulations, and measures like firewalls, intrusion detection systems, and secure access controls will be included.

**Wireless Networking:**

The need for a wireless network within the hospital should be considered to ensuring proper coverage for all critical areas and implement security protocols for the wireless network to prevent unauthorized access.

**Integration with Existing Systems:**

The integration of the new network with existing hospital systems will be considered, such as EHR, laboratory information systems, and medical devices.

**Scalability:**

The network will be designed to be scalable, allowing for future expansion and the addition of new devices and services.

**Redundancy and Disaster Recovery:**

We will implement redundancy to ensure continuous operation in case of hardware failures and develop a disaster recovery plan to quickly restore network functionality in case of unforeseen events.

**Implementation Plan:**

A phased implementation plan will be produced to minimize disruptions to hospital operations and the network will be tested thoroughly before full deployment to identify and resolve any issues.

**Training and Documentation:**

Training for hospital staff will be offered on the use of the new network and comprehensive documentation will be created to assist with ongoing maintenance and troubleshooting.

**Monitoring and Maintenance:**

We need to implement network monitoring tools to proactively identify and address issues and come up with a regular maintenance schedule to ensure the ongoing health and performance of the network.

**Feedback, optimization, and post-implementation support:**

Feedback from hospital staff should be gathered in order to identify areas for improvement. We should continue to continuously optimize the network based on feedback and changing technology requirements. Ongoing support should be provided to address any issues that arise after the initial implementation and consider implementing a helpdesk or support system for users to report and resolve network-related issues.

**Periodic Review:**

We should perform periodic reviews of the network design to make sure it continues to meet the hospital's evolving needs and update the design as necessary to incorporate new technologies and address emerging challenges. By following a systematic approach and considering the unique requirements of a hospital environment, we are able to effectively plan and execute a hospital network design project.

**Project Charter: Hospital Network Project**

**Description of Project Charter of our Hospital Network:**

The Hospital Network Design project aims to enhance the connectivity, security, and efficiency of the hospital's information technology infrastructure. This initiative is driven by the need to accommodate the growing demand for digital healthcare services, ensure data integrity and security, and streamline communication among various hospital departments.

**Project Title:** Hospital Network Enhancement

**Project Sponsor:** TM Letlalo

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**Project Manager**: G. Mogowe

**Title**: Project Secretary (Manager)

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**Project Purpose and Justification**:

The purpose of this project is to provide a secure, reliable, and efficient communication framework that supports various medical and administrative functions. This includes facilitating electronic health records, telemedicine, medical device connectivity, patient monitoring, and communication among healthcare professionals. Security is paramount to protect patient data and ensure the integrity of medical systems. By the end of this project, we want to enhance patient care, improve efficiency, ensure data security, and improve patient experience and overall engagement.

**Project Objectives**:

The project objectives are to improve the reliability and performance of the hospital's network infrastructure, enhance security measures to protect patient data and ensure regulatory compliance while facilitating seamless communication and information sharing among hospital departments, and providing a foundation for future technological advancements and innovations within the hospital.

**Project Scope**:

**In Scope**:

* Upgrade and optimize the hospital's network infrastructure.
* Implement advanced security measures, including firewalls and intrusion detection systems.
* Integrate electronic health records (EHR) and other healthcare systems.
* Establish a robust disaster recovery and business continuity plan for the network.
* Train staff on new network systems and security protocols.
* Conduct performance testing and monitoring to ensure network stability.

**Out of Scope**:

* Procurement of individual medical equipment or software systems.
* Non-network-related renovations or infrastructure changes to hospital buildings.
* Personnel changes unrelated to network administration.

**Stakeholders**:

1. Project Team
2. Hospital Administration
3. Medical Staff
4. IT Department
5. Patients
6. Vendors and Contractors
7. Regulatory Authorities

**Key Deliverables**:

The key deliverables of this project are an upgraded network infrastructure, enhanced security measures, integration of EHR and healthcare systems, a disaster recovery and business continuity plan, trained staff, and network performance reports.

**Milestones and Timeline**:

Phase 1 - Project Initiation and Planning (Weeks 1-2): Define project scope, objectives, and stakeholders. Develop a detailed project plan, including budget allocation.

Phase 2 - Network Design (Weeks 3-4): Engage in network design, including hardware and software selection, security measures, and IP addressing schemes.

Phase 3 - Implementation (Weeks 5-9): Execute hardware upgrades, configuration, and security enhancements.

Phase 4 - Testing and Verification (Weeks 10-11): Conduct thorough testing, including performance, security, and failover tests.

Phase 5 - Project Completion (Week 12): Document final network configuration, provide training as necessary, and prepare for handover to the hospital's IT team.

**Project Budget**:

The project budget is capped at R R1 164 049,24 , inclusive of hardware and software costs.

**Project Risks**:

The project risks are security breaches, data privacy and compliance, infrastructure failures, compatibility issues, budget overruns, staff resistance and training, and downtime and service interruptions. Hospitals deal with sensitive patient data, making them attractive targets for cyberattacks. A security breach can result in the exposure of patient records and other confidential information, which could lead to legal and financial consequences. Hospitals must comply with various data privacy regulations, such as the Health Insurance Portability and Accountability Act (HIPAA) in the United States. Failing to adhere to these regulations can result in penalties and legal issues. Network outages, server crashes, or other infrastructure failures can disrupt critical healthcare operations, potentially leading to life-threatening situations. Redundancy and failover measures must be in place to mitigate these risks. Integrating existing medical devices, equipment, and software with the new network infrastructure can be challenging. Compatibility issues may lead to delays, increased costs, and operational disruptions. Hospital network projects can be costly, and cost overruns can strain the hospital's budget. It's essential to have a well-defined budget and contingency plans for unexpected expenses. Hospital staff may be resistant to changes in the network infrastructure, and they may require additional training to use new systems effectively. Resistance and inadequate training can hinder the project's success. Transitioning to a new network can lead to temporary service disruptions, which can negatively impact patient care. Minimizing downtime and ensuring contingency plans are in place are essential.

**Project Success Criteria**:

1. The network is stable and reliable.
2. Security measures are effectively preventing data breaches.
3. EHR integration is seamless and benefits patient care.
4. Staff is proficient in using the new network systems.
5. The project is completed within the defined budget and timeline.

**Approval**:

By signing below, we acknowledge our understanding of and commitment to this Hospital Network Project Charter:

**Project Sponsor**: T.M Letlalo

Date: 2023/11/03

**Project Manager**: G. Mogowe

Date: 2023/11/03

**Other Stakeholder(s)**:

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