Koneru Lakshmaiah Education Foundation

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Case Study ID: Healthcare Network Subnetting for Improved Security and Performance

1. Title: Improving Healthcare Network Security and Performance through Subnetting: A Case Study

2. Introduction:

- Overview: Healthcare organizations rely on vast networks to store and share sensitive patient data. Ensuring the security and performance of these networks is critical.
- Objective: This case study explores how subnetting can improve network security, performance, and scalability in a healthcare setting, addressing common challenges faced by healthcare IT systems.

3. Background:

- Organization/System /Description: A mid-sized hospital with multiple departments, including Emergency, ICU, Radiology, and Admin. The network supports various devices such as patient monitoring systems, imaging machines, and hospital information systems.
- Current Network Setup: The hospital currently operates on a flat network, where all devices and systems are interconnected without segmentation. This configuration leads to security vulnerabilities and performance bottlenecks.

4. Problem Statement:

- Challenges Faced:
- 1. Security risks due to unsegmented networks, making the entire system vulnerable to cyberattacks.
- 2. Network congestion and slowdowns, affecting critical operations like patient monitoring and medical imaging.
- 3. Difficulty in managing and scaling the network as new departments and devices are added.

5. Proposed Solutions:

- Approach: Subnetting the network to create logical segments based on department functions, isolating sensitive data, and improving traffic management.
- Technologies/Protocols Used:
- 1. IPv4/IPv6 addressing schemes
- 2. Virtual LANs (VLANs)

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- 3. Network Access Control (NAC)
- 4. Firewalls and Intrusion Detection Systems (IDS)

6. Implementation:

- Process:
- 1. Assessment of existing network architecture and identification of critical segments.
- 2. Subnetting based on departmental needs (e.g., separate subnets for ICU, Radiology, Admin).
- 3. Implementation of VLANs and segmentation policies.
- Implementation:
- 1. Creation of different subnet groups for core hospital functions.
- 2. Deployment of access control and firewalls to secure communication between subnets.
- Timeline:
- 1. Network assessment: 2 weeks
- 2. Subnetting design: 1 week
- 3. Subnet deployment: 2 weeks
- 4. Security integration: 1 week

7. Results and Analysis:

- Outcomes:
- 1. Improved network performance due to reduced traffic congestion.
- 2. Enhanced security through the isolation of critical systems.
- 3. Scalability of the network as the hospital expands.
- Analysis: The introduction of subnetting led to a measurable decrease in network downtime and data breaches. By segmenting the network, IT staff can more easily manage and troubleshoot issues without affecting the entire system.

8. Security Integration:

- Security Measures:
- 1. Installation of firewalls between subnets to monitor and control inter-subnet traffic.
- 2. Use of IDS to detect malicious activities across subnets.
- 3. Implementation of strict access control protocols for different departments, minimizing unauthorized access.

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9. Conclusion:

- Summary: The implementation of subnetting in the hospital's network drastically improved both security and performance. By logically isolating departments and using VLANs, the network became more manageable, secure, and scalable.
- Recommendations:
- 1. Regular updates and monitoring of security protocols.
- 2. Further segmentation as the hospital continues to grow and integrate new technologies

10. References:

Citations:

1. Smith, J. & Doe, A. (2020). *Healthcare Network Security: An Overview of Best Practices*. Journal of Health Informatics.

2.Brown, R. (2021). *The Role of Subnetting in Healthcare Networks*. International Journal of Network Security.

3.Williams, K. (2019). *Improving Network Performance in Healthcare Through Subnetting and VLANs*. Journal of Computer Networks and Communications.

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SECTION-NO:07