COLLEGE OF APPLIED BUSINESS AND TECHNOLOGY

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**Case Study of**

**Computer Network (CSC-258)**

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# Introduction:

In this case study, we examine the network topology of “Uptechsys Pvt. Ltd”, a prominent software company in Dhumbarahi, Kathmandu, Nepal, offering a wide range of services related to consulting, outsourcing, application development, and digital transformation. The company operates across three floors, and to support its growing operations efficiently and securely

**Objective:**

# Conduct a comprehensive analysis of Uptechsys Pvt. Ltd.’s network topology to evaluate its efficiency, security, and scalability.

# Provide recommendations based on the examination of the existing network design, addressing policies, and security measures to enhance overall network performance and effectiveness.

# Topology:

Uptechsys utilizes a Hybrid topology, effectively merging the advantages of bus and star topologies. This network layout proves to be a powerful choice, offering enhanced data flow and reduced data congestion, all while maintaining cost-efficiency. The network diagram displays a central main router that acts as the backbone, interconnecting different departments via switches.

Each department, in turn, benefits from a star configuration, where PCs and laptops are seamlessly connected to the departmental switch. This well-designed network architecture enables smoother data transmission and optimized communication across the organization, supporting a seamless flow of information and promoting productivity. The hybrid topology's flexibility and scalability make it an ideal choice for Uptechsys' diverse connectivity needs without incurring excessive costs.

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# Fig: Hybrid Topology used in Uptechsys

# Addressing Policy:

At Uptechsys Pvt. Ltd, a comprehensive IP addressing policy combines IPv4 and IPv6 schemes. Static IP addresses are assigned to critical devices and servers to ensure control and stability. For simplified network management, end-user devices receive dynamic IP allocation through DHCP. Dynamic routing protocols like OSPF or BGP are utilized for efficient data forwarding across network segments. Redundant routes bolster network resilience and minimize potential downtime.

This strategic IP addressing and routing approach empowers Uptechsys to uphold a strong and scalable network infrastructure. It facilitates seamless connectivity, improved data management, and heightened security, ensuring reliable operations throughout the organization.

# Security Policy:

Uptechsys Pvt. Ltd has a comprehensive security policy in place to protect its network and data. They utilize firewall appliances to filter incoming and outgoing traffic, ensuring unauthorized access and cyber threats are thwarted. To detect and respond to suspicious activities, Intrusion Detection Systems (IDS) and Intrusion Prevention Systems (IPS) are implemented in real-time.

The organization enforces stringent access control using VLANs and role-based authentication, limiting network access according to user roles and responsibilities. Furthermore, they prioritize data security during transmission by employing encryption protocols like SSL/TLS to safeguard sensitive information. With these robust security measures, Uptechsys ensures the confidentiality, integrity, and availability of its network resources and data, safeguarding against potential security breaches and cyberattacks.

# Conclusion:

In conclusion, Uptechsys Pvt. Ltd.'s adoption of a Hybrid topology, combining bus and star configurations, has proven effective in enhancing network performance. The central main router and departmental switches ensure efficient data flow and productivity. This flexible and cost-effective solution meets the organization's diverse connectivity needs.

Additionally, the comprehensive IP addressing policy, dynamic routing, and stringent security measures, including firewalls, IDS/IPS, VLANs, and encryption, contribute to network security and stability. Our analysis provided valuable recommendations for further improving performance and effectiveness. By leveraging the strengths of the Hybrid topology and robust security measures, Uptechsys is well-prepared to support business operations and future growth confidently.

# Recommendation:

Based on the findings, the following recommendations are suggested for further improvement:

1. Conduct Regular Network Audits: Perform periodic network audits to identify vulnerabilities and ensure compliance with security standards.
2. Implement Network Segmentation: Consider segmenting the network to enhance security and control access between different departments or projects.
3. Establish Redundancy and Disaster Recovery Plans: Implement robust redundancy measures and disaster recovery plans to minimize the impact of network failures. Enhance Network Monitoring and Incident Response: Improve network monitoring capabilities to promptly detect and respond to security incidents.
4. Provide Continuous Employee Training: Educate employees regularly on cybersecurity best practices to reduce the risk of insider threats and social engineering attacks.

By adopting these measures, Uptechsys Pvt. Ltd. can strengthen its network infrastructure, ensuring a highly secure, resilient, and efficient IT environment for its clients and internal operations.