STAR TOPOLOGY NETWORK DESIGN FOR A WORKSTATION NETWORK CENTER

PRESENTED BY:

BESIRA, MARK LAURENZ M.

DELLATAN, BRENDO JR. L.

DIVINO, JERICO C.

DIZON, ARJEC JOSE A.

FERNANDEZ, ALGEO L.
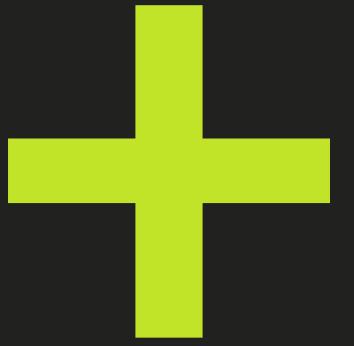
Glaiza Mustapha

Adviser

INTRODUCTION

Modern schools increasingly depend on digital tools and networked systems for everyday learning. However, many workstation centers struggle with poor connectivity, cable clutter, and outdated network layouts. To address these issues, this project proposes a Star Topology Network Design — a centralized structure where each workstation connects directly to a central switch, ensuring stable and organized performance.

- Integration of digital tools in modern schools requires reliable network systems.
- Workstation Network Centers often face connectivity and cabling issues.
- The project proposes a Star Topology Network System for stable and organized performance.
- (Visual: simple diagram showing a central switch connected to workstations)

PURPOSE AND DESCRIPTION

The main goal of this project is to design and simulate a structured Star Topology for a Workstation Network Center. It emphasizes stable connections, organized cabling, and simplified maintenance. The project includes a detailed network layout, simulation through Cisco Packet Tracer, and documentation outlining setup and maintenance guidelines.

CONVENIENT

To design and simulate a structured star topology for a Workstation Network Center.

STABILITY

Focus on stable connectivity, organized cabling, and easy maintenance.

PERSONALIZED

Detailed network layout

Organized cabling

Simulation (Cisco Packet Tracer)

Setup and maintenance guidelines

OBJECTIVES OF THE STUDY

This study aims to develop a structured and efficient Star Topology Network Design for the Workstation Network Center. It focuses on creating a clear and organized layout, validating the design through Cisco Packet Tracer simulation, and addressing common issues such as slow connections and cable clutter. Overall, the project seeks to improve network performance, simplify troubleshooting, and provide a complete, well-documented network system.

Design a structured star topology layout.

Simulate and validate using Cisco Packet Tracer.

Organize workstation connections.

Address slow connections and cable clutter.

Produce a complete, well-documented network design.

SCOPE AND LIMITATIONS

The project focuses on designing and simulating a Local Area Network (LAN) specifically for the Workstation Network Center. It covers device assessment, layout creation, and troubleshooting guidelines. However, it excludes advanced cybersecurity systems, remote access management, and devices outside the center's current equipment list.

- LAN design and simulation for a Workstation Network Center
- Includes device assessment, diagram, topology, and troubleshooting guidelines
- Limitations:
- Focused only on one center
- No advanced cybersecurity or remote management

SIGNIFICANCE OF THE STUDY

This study benefits several groups.
Students gain smoother access to digital learning tools.
Teachers experience more efficient ICT-based instruction.
IT staff benefit from simplified monitoring and maintenance.
Lastly, future researchers can use this project as a reference for building scalable and organized network systems.

STUDENTS & USERS

Students & Users: Better connectivity and learning access

TEACHERS & TRAINERS

Enhanced ICT-based instruction

IT STAFF & MANAGERS

Easier monitoring and maintenance

FUTURE RESEARCHERS

Reference for scalable and efficient networks

REVIEW OF RELATED LITERATURE

—

CONCEPTUAL

STAR TOPOLOGY: RELIABLE, CENTRALIZED DESIGN (MONTERO, 2019; BARTON, 2021)

STRUCTURED CABLING: IMPROVES SIGNAL INTEGRITY AND MAINTENANCE (FLORES & MEDINA, 2020)

WORKSTATION NETWORKS: SUPPORT COLLABORATIVE ENVIRONMENTS (REYES & SANTIAGO, 2021)

STUDIES SHOW THAT STAR TOPOLOGY REMAINS A PREFERRED NETWORK DESIGN BECAUSE OF ITS RELIABILITY AND FAULT ISOLATION. RESEARCHERS LIKE MONTERO (2019) AND BARTON (2021) EMPHASIZE THAT IT'S IDEAL FOR MULTI-USER ENVIRONMENTS, ALLOWING EASY TROUBLESHOOTING AND EXPANSION. STRUCTURED CABLING ALSO IMPROVES NETWORK PERFORMANCE BY MAINTAINING ORGANIZATION AND REDUCING SIGNAL INTERFERENCE.

REVIEW OF RELATED LITERATURE — LOCAL AND FOREIGN LOCAL STUDIES

REDESIGNED NETWORKS IMPROVE SCHOOL ICT FACILITIES (ABALOS, 2019; CRUZ & PEREZ, 2022) FOREIGN STUDIES:

STAR TOPOLOGY ENHANCES RELIABILITY AND SCALABILITY (OPPENHEIMER, 2018; SULLIVAN & CARTER, 2021)

LOCAL STUDIES (ABALOS, 2019; CRUZ & PEREZ, 2022) REVEAL THAT SCHOOLS USING STAR TOPOLOGY EXPERIENCE BETTER CONNECTIVITY AND EASIER MAINTENANCE.
FOREIGN STUDIES (OPPENHEIMER, 2018; SULLIVAN & CARTER, 2021) HIGHLIGHT ITS SCALABILITY AND RELIABILITY. BOTH AGREE THAT WELL-STRUCTURED NETWORKS ENHANCE LEARNING ENVIRONMENTS AND MINIMIZE DOWNTIME.

METHODOLOGY / STRATEGIES

The project followed a systematic process: assessing the workstation area, selecting the Star Topology design, drafting the layout, and creating a miniature prototype model. Materials like cardboard, labels, and colored strings represented the network components. Each workstation was connected to a central switch to visually demonstrate proper cable management.

Step 1: Assess workstation area and devices

Step 2: Choose Star Topology design

Step 3: Draft layout of switch and cabling

Step 4: Build prototype using cardboard, labels, and strings

Step 5: Review model for accuracy and organization

PROTOTYPE MODEL

The miniature model successfully represented the layout of a real network center. Each workstation was visibly connected to the switch, showing how data flows through the system. The clean cable arrangement and accurate labeling helped viewers easily understand the structure and function of a star topology.

MINIATURE MODEL SHOWS CLEAR WORKSTATION CONNECTIONS TO A CENTRAL SWITCH

EMPHASIZES NEAT CABLING AND LOGICAL LAYOUT

DEMONSTRATES HOW STAR TOPOLOGY SUPPORTS ORGANIZATION AND SCALABILITY

SUCCESSFULLY DEMONSTRATED
A CENTRALIZED NETWORK
LAYOUT

CLEAR, ORGANIZED CABLING
IMPROVES VISUALIZATION AND
UNDERSTANDING

RESULTS AND DISCUSSION

THE PROTOTYPE DEMONSTRATED THE BENEFITS OF A STAR TOPOLOGY NETWORK. IT CLEARLY
SHOWED ORGANIZED CABLING, EASIER TROUBLESHOOTING, AND SCALABILITY FOR FUTURE
EXPANSION. IN REAL-LIFE APPLICATION, THIS DESIGN WOULD REDUCE DOWNTIME AND IMPROVE
EFFICIENCY WITHIN THE WORKSTATION NETWORK CENTER.

SCALABLE DESIGN SUPPORTS
FUTURE EXPANSION

LAYOUT SIMPLIFIES
TROUBLESHOOTING AND REDUCES
DISRUPTION

CONCLUSION

IN CONCLUSION, THE STAR TOPOLOGY NETWORK DESIGN OFFERS A RELIABLE, EFFICIENT, AND SCALABLE SOLUTION FOR EDUCATIONAL ENVIRONMENTS. THE PROTOTYPE MODEL PROVIDED A CLEAR VISUALIZATION OF HOW THE NETWORK WORKS AND REINFORCED THE IMPORTANCE OF STRUCTURED CABLING AND ORGANIZED DESIGN FOR MODERN DIGITAL LEARNING SPACES.
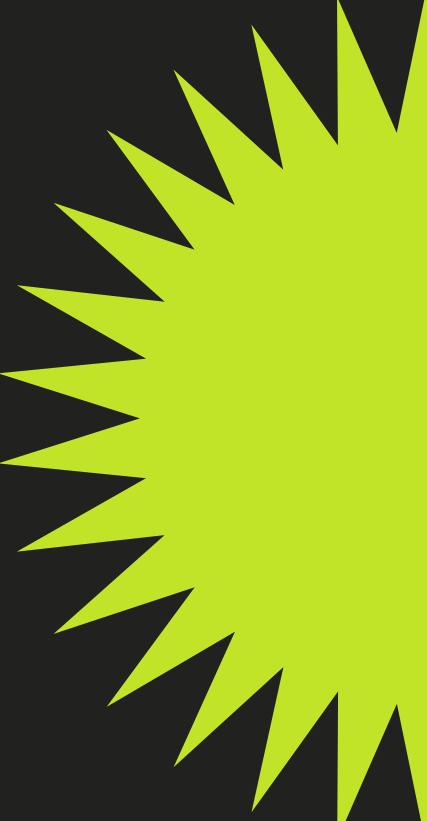
RECOMMENDATIONS

THE GROUP RECOMMENDS IMPLEMENTING STRUCTURED CABLING IN REAL WORKSTATION CENTERS, PROVIDING IT STAFF WITH NETWORK MAINTENANCE TRAINING, AND EXPLORING FUTURE INTEGRATION WITH CYBERSECURITY SYSTEMS TO FURTHER STRENGTHEN NETWORK STABILITY.

1. IMPLEMENT STRUCTURED CABLING IN ACTUAL CENTERS.

2. TRAIN IT STAFF ON MAINTENANCE AND TROUBLESHOOTING.

3 EXPLORE INTEGRATION WITH NETWORK SECURITY SYSTEMS IN FUTURE STUDIES.

STAR TOPOLOGY NETWORK DESIGN
FOR A WORKSTATION NETWORK CENTER

THANK YOU.

WE WOULD LIKE TO THANK OUR INSTRUCTOR, MEMBERS, AND EVERYONE WHO CONTRIBUTED TO THIS

PROJECT.

THANK YOU FOR LISTENING!