Network Simulation with Star Topology

This network simulation program demonstrates the communication between devices using a star topology configuration with the help of hubs. The program is written in C++ and simulates the transmission of data between devices connected through a hub.

Description

The program simulates a network consisting of devices connected through hubs. Each device has a unique name, data, and MAC address. The devices communicate with each other by sending data packets. The communication can occur directly between devices or through a hub, switch, or bridge.

Features

Direct Transmission

Devices can communicate directly with each other without going through any intermediary device. This allows for efficient communication between devices that are directly connected.

Transmission through Hub

Devices can send data through a hub to reach other devices connected to the same hub. The hub acts as a central point of connection, allowing devices to communicate with each other through a shared medium.

Transmission through Switch

Devices can send data through a switch to reach specific devices based on their MAC

addresses. The switch acts as an intelligent intermediary device that forwards data packets only to the intended recipient device, improving network efficiency.

Transmission through Bridge

Devices can send data through a bridge to reach devices connected to other hubs. The bridge connects two or more hubs together, allowing devices connected to different hubs to communicate with each other.

Error Control

Parity bits are used for error detection and correction in the transmitted data. Each data packet includes a parity bit that is calculated based on the data contents. Upon receiving a data packet, the recipient device verifies the parity bit to ensure data integrity.

Access Control

The Carrier Sense Multiple Access (CSMA) protocol is implemented to regulate access to the communication medium. Before transmitting data, devices check if the communication medium is busy. If the medium is busy, devices wait for a random period before attempting to transmit again, reducing the likelihood of collisions.

User Interface

The program provides a simple user interface that allows the user to select the mode of transmission. The user can choose between direct transmission, transmission through a hub, switch, or bridge, and observe the communication between devices.

How to Use

1. Compile the code using a C++ compiler.
2. Run the compiled executable.
3. Follow the prompts to select the mode of transmission.
4. View the output to see the communication between devices.

Credits

This project was developed with the assistance of ChatGPT and Stack Overflow.