Design and Simulation of an IP-Based Real-Time Patient Monitoring System

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<u>Abstract</u>

In today's healthcare systems, real-time patient monitoring plays a critical role in ensuring timely medical response and enhanced patient safety. This project aims to simulate a basic version of such a system using Cisco Packet Tracer, where multiple patient monitoring devices are connected to a central system over a computer network. The goal is to demonstrate how simple network communication can support health data monitoring in a smart hospital environment.

In our proposed setup, each patient room is equipped with a virtual device that represents a health sensor, such as one that measures body temperature or heart rate. These devices are connected to the hospital's local network using switches and routers. Each device is assigned a unique IP address so that it can send data to a central monitoring station — typically represented by a server or a nurse's computer.

The main idea is that whenever a patient's health data crosses a certain threshold (like a high temperature), the system is able to trigger an alert or notification to the central system. This setup allows healthcare staff to be immediately informed and take quick action. Although the simulation doesn't involve real sensor data, we use logic blocks and event-based programming available in Packet Tracer to mimic this behaviour.

The project also explores how multiple rooms or departments in a hospital can be part of the same network, how communication flows across different sections using routers and switches, and how simple automation can improve healthcare efficiency. By using IoT devices and IP-based communication within Cisco Packet Tracer, we are able to showcase how hospitals can integrate smart technology in patient care — even within a simplified, simulated environment.

This project highlights core concepts in computer networking such as IP addressing, device communication, and basic event-based automation. It also encourages the practical use of IoT and network simulation tools in designing smarter and more responsive systems, bridging the gap between healthcare and technology in an educational context.