Based Smart Connectivity System Using ISP, Modem Client, and 3G/4G Network

Team

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Problem Statement

In today’s digital world, smart home devices require reliable and continuous internet connectivity However, when one network (ISP or mobile) fails, devices often lose connection, affecting automation and monitoring.This project aims to design a hybrid IoT network that connects home devices to the internet via both ISP and 3G/4G cellular networks, ensuring uninterrupted smart home operations.

WHY IOT?

IoT enables automation, remote control, and monitoring of smart devices like fans, lights, webcams, and alarms.

Using IoT allows devices to communicate via internet or cellular networks automatically.

The IoT Cloud server helps control all smart appliances remotely through laptops or smartphones.

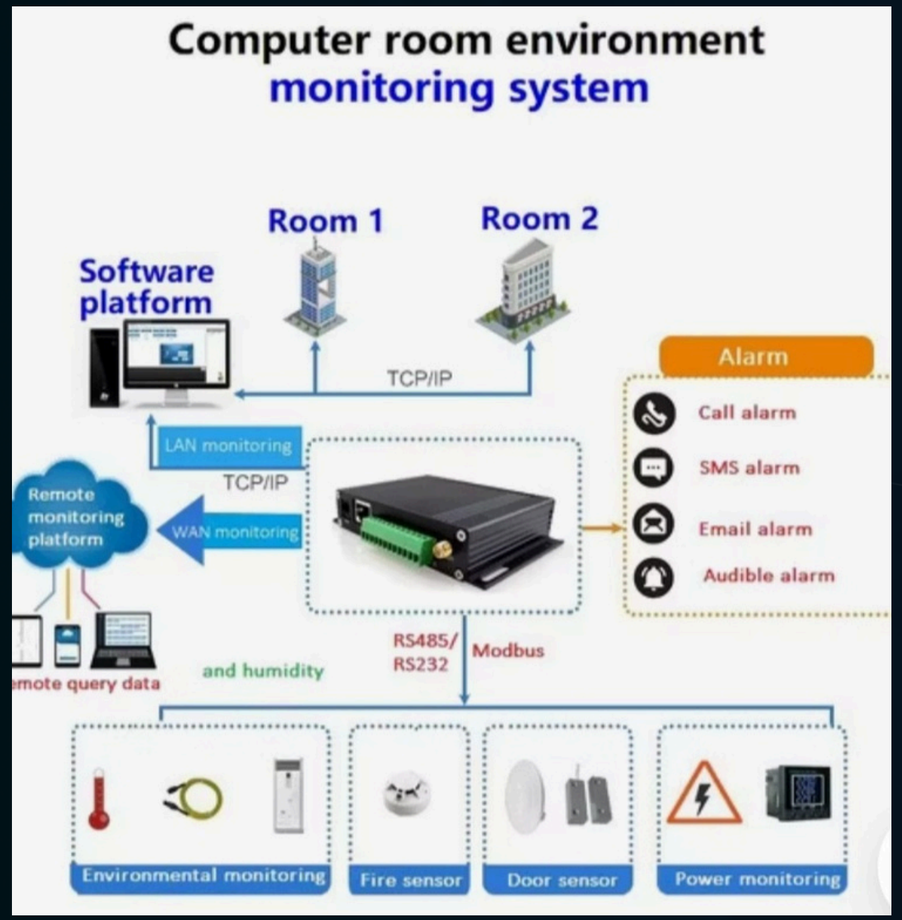
ROLE OF IOT IN THE PROJECT:

Manages and monitors all smart devices connected to the home gateway.

Transmits data through the IoT Cloud Server

Enables remote access using a smartphone or laptop via the 3G/4G connection.

WHERE IOT IS INVOLVED



Devices & Tools Used

Cisco Packet Tracer (simulation tool)

Central Office Server (CO Server) – Acts as main network hub

ISP Router (2911) – Connects servers to network

Switch (2960-24TT) – Distributes connections to servers

DNS Server (Server-PT) – Resolves domain names

IoT Server (Server-PT) – Connects IoT devices to the cloud

Home Gateway (DLink IoT Gateway) – Connects home devices

Cable Modem-PT – Wired ISP connection to home

LAPTOP-PT – LOCAL MONITORING/CONTROL

SMARTPHONE-PT – WIRELESS ACCESS VIA 3G/4G

CELL TOWER – PROVIDES CELLULAR CONNECTION

IoT Devices: Light, Fan, Siren, Webcam, Window Sensor

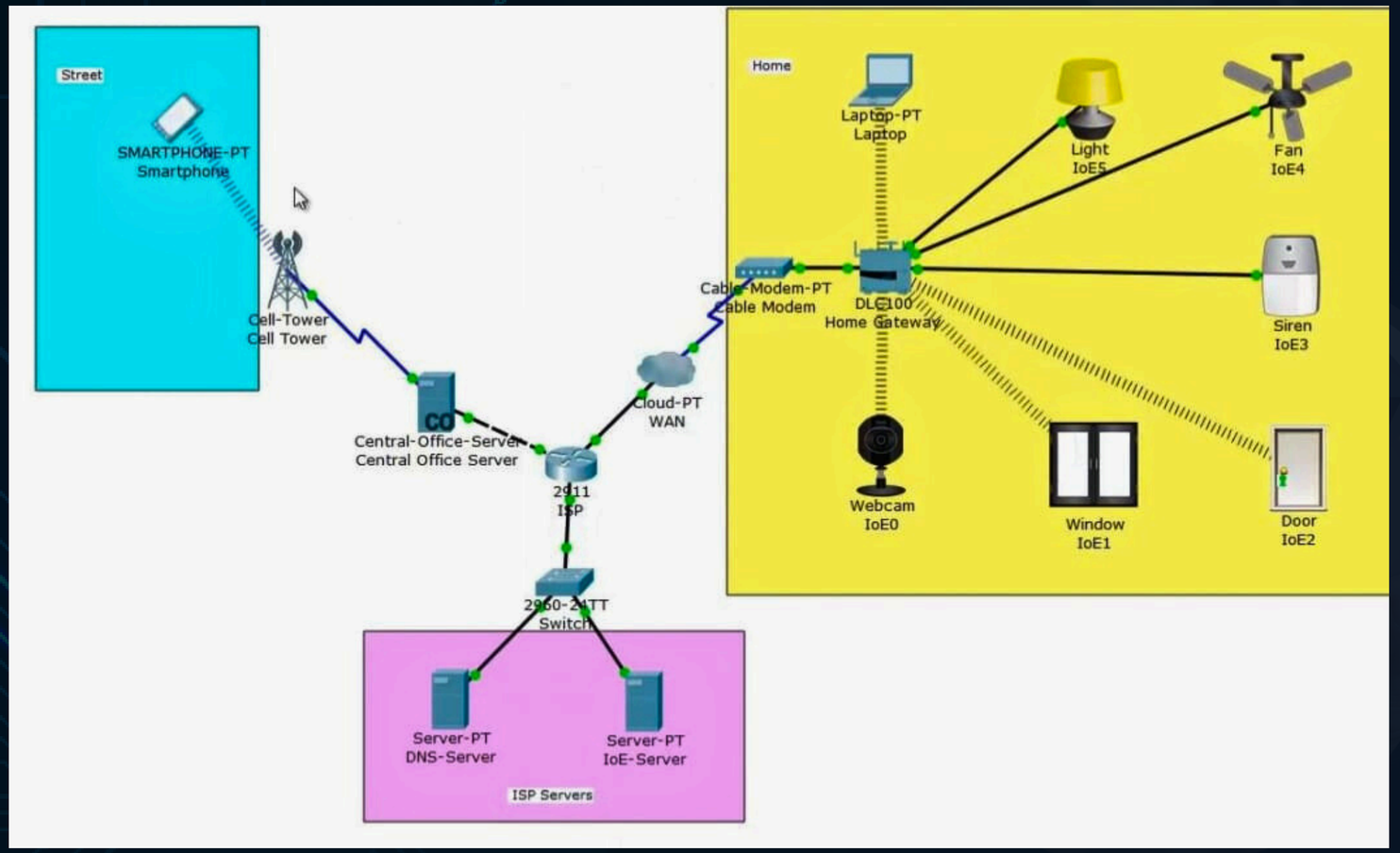
Sensors, Actuators & Communication

Sensors: Window Sensor (detects open/close)

Actuators: Light, Fan, Siren (operate remotely)

Communication Protocols: Wi-Fi, Cellular (3G/4G), Ethernet

NETWORK ARCHITECTURE / TOPOLOGY DIAGRAM



A Smartphone connects through Cell Tower → Central Office Server, providing wireless 3G/4G access to the same network

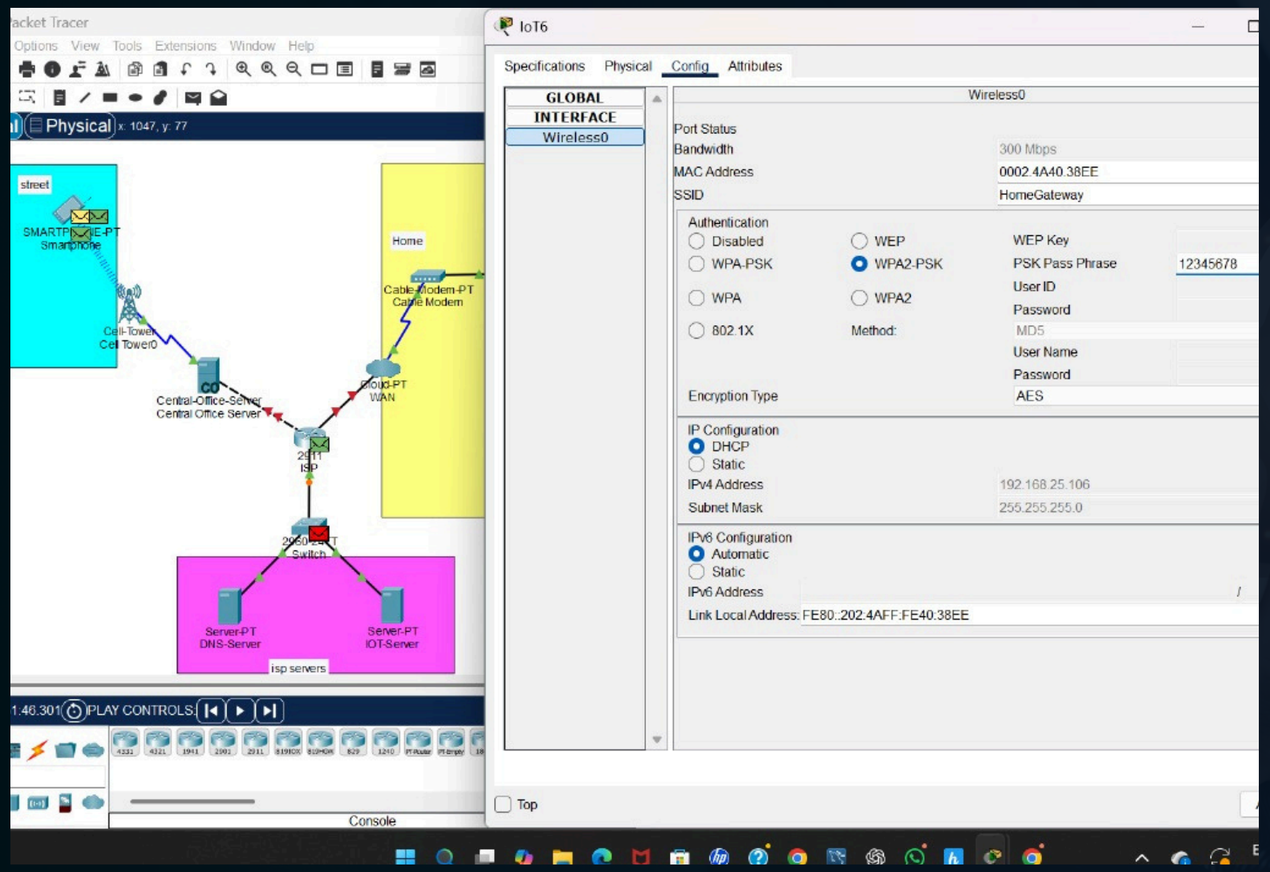
Central Office Server connects to ISP Router, linked to Switch for DNS and IoT servers.

ISP Router connects to Home Gateway via Cable Modem (wired).

The Home Gateway controls all IoT devices.

This design ensures dual connectivity if one (ISP) fails, 3G/4G maintains access.

Device Configuration



1. Home Gateway Configuration – IoT registration, SSID setup

2. ISP Router IP Configuration – WAN/LAN setup

3. DNS Server – Domain name configuration

4. IoT Server – Device registration and status

5. Cable Modem Configuration – Connecting home gateway to ISP

6. Cell Tower Configuration – For 3G/4G communication

WORKING PROCEDURE

1. Open Cisco Packet Tracer and place all components (ISP router, switch, servers, modem, gateway, and devices).

2. Configure IP addresses for all devices and establish WAN connections.

3. Connect ISP Server → Router → Switch → IoT Server + DNS Server.

4. Connect Cable Modem → Home Gateway → IoT Devices (Fan, Light, Webcam, Window, Siren).

5. Connect Smartphone → Cell Tower → Central Office Server → ISP Router.

6. Configure IoT Server and Home Gateway to register devices.

7. Control and monitor IoT devices via Laptop or Smartphone through IoT Cloud.

8. Test failover by disabling one connection (ISP or 3G/4G) — observe automatic switch.

Advantages & Applications

Advantages

- Dual network ensures continuous connectivity
- Centralized control of all smart devices
- Scalable for future IoT integrations
- Realistic network simulation using Packet Tracker

Applications

- Smart Homes and Smart Buildings
- Industrial automation and remote control
- IoT-based surveillance and alert systems
- Remote monitoring in rural areas using cellular network

conclusion

This project demonstrates an IoT-based smart home system with dual internet connectivity (ISP + 3G/4G) simulated in Cisco Packet TracerIIt ensures reliable communication between IoT devices and the cloud, providing automation, monitoring, and remote access.

FUTURE ENHANCEMENTS

- Integration with AI-based predictive monitoring
- Addition of energy consumption analytics
- Support for 5G and satellite communication
- Development of mobile app for live IoT control

Thank you