SAVEETHA SCHOOL OF ENGINEERING

CAPSTONE PROJECT

An IoT Gateway for Smart Home Networks connects to Local networks

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COURSE NAME: Computer Network for IOT

INTRODUCTION:

In the realm of the Internet of Things (IoT), smart home networks rely heavily on Sophisticated technology to create interconnected environments. An IoT Gateway for Smart Home Networks functions as a crucial intermediary that links various smart home devices—such as thermostats, lights, cameras, and sensors—with the internet. This gateway enables a seamless flow of communication and integration among these devices, allowing users to manage and automate their home environment with ease. By providing interoperability, robust security, and centralized management, an IoT Gateway enhances the convenience,comfort, and efficiency of modern living spaces, allowing users to tailor their homes to their individual needs and preferences

Objective:

- Design a Network with a Gateway
- Implement Gateway Services
- Showcase Gateway Functionality
- Analyze Pros and Cons

LITERATURE REVIEW:

IoT Gateways for Smart Home Networks serve as pivotal hubs connecting and managing communication between various smart devices and the internet enabling seamless Integration and centralized control. Despite their critical role in enhancing user convenience and automation, these gateways face significant security challenges similar to those encountered by web services. Research highlights that while IoT Gateways offer substantial benefits in terms of interoperability and management, they are vulnerable to threats such as Denial-of-Service attacks and unauthorized access. The literature underscores that while various security strategies, including encryption and access control, are implemented to mitigate these risks, no single solution effectively addresses all vulnerabilities. Instead, ongoing research focuses on improving threat detection and system resilience through a combination of dynamic and static analysis methods, aiming to balance robust security with the seamless functionality required for an intelligent and secure smart home environment.

Software:

- Cisco Packet Tracer

Network Design:

The network consists of:

- 1 IoT Gateway
- 1 Router
- 1 Switch
- 2 PCs

In this design, the IoT Gateway is connected to the router, which in turn connects to the switch. The PCs are connected to the switch to ensure they can communicate with the IoT Gateway and other devices. This configuration enables the seamless integration and control of various smart devices, allowing for remote monitoring and automation of the smart home environment.

IP Address Allocation:

- let us assume switch 1 consist of two PCs and 1 router then,
  - PC0 IP-address be - 192.168.11.1
  - PC1 IP-address be - 192.168.11.2

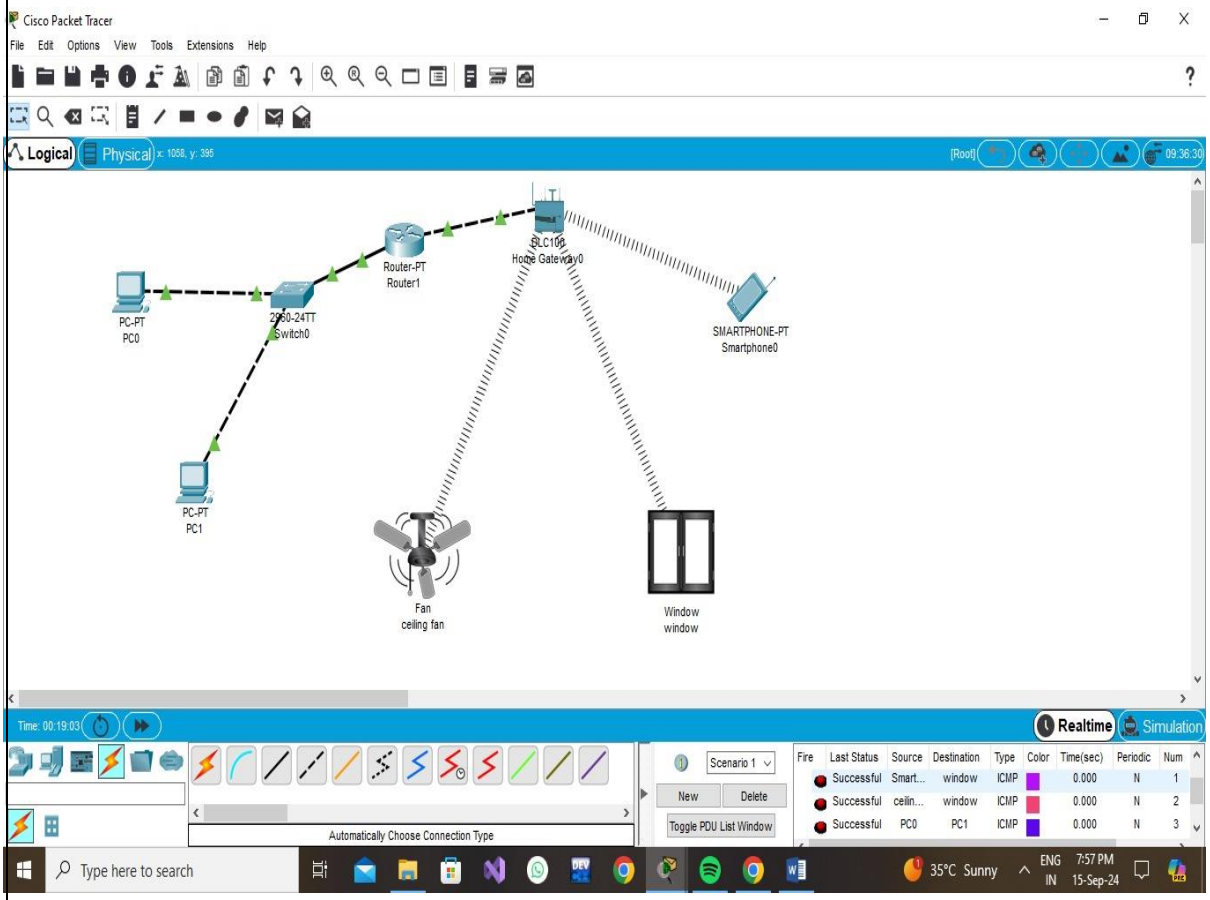
Protocol: HTTP

- The IoT Gateway uses various communication protocols to manage interactions between smart home devices and the internet.
- HTTP (Hypertext Transfer Protocol) is a primary communication protocol that can be employed by IoT Gateways to facilitate interactions between smart home devices and external servers. It defines how requests from clients (such as user interfaces or mobile apps) and responses from the server are structured and transmitted.
- HTTP is a stateless protocol, meaning each request-response interaction is independent. The server does not retain information about previous requests or sessions, which necessitates that the IoT Gateway and smart devices handle state management and context independently for each interaction.

RESULT:

An IoT Gateway for Smart Home Networks acts as a central hub that connects and manages communication between various smart devices and the internet. It integrates devices like thermostats, lights, cameras, and sensors into a cohesive system, allowing users to remotely monitor, control, and automate their home environment. By providing interoperability, security, and centralized management, the gateway enhances convenience, comfort, and efficiency, enabling users to create personalized and intelligent living spaces that match their preferences and lifestyle.

Network Design:


Cisco Packet Tracer
File Edit Options View Tools Extensions Help
Logical
Physical
PC-PT PC0
2960-24TT Switch0
Router-PT Router1
SLC100 Home Gateway0
SMARTPHONE-PT Smartphone0
PC-PT PC1
Fan ceiling fan
Window window
Realtime
Simulation
Automatically Choose Connection Type
Scenario 1
New
Delete
Toggle PDU List Window
Fire Last Status Source Destination Type Color Time(sec) Periodic Num
Successful Smart... window ICMP 0.000 N 1
Successful ceilin... window ICMP 0.000 N 2
Successful PC0 PC1 ICMP 0.000 N 3
Type here to search
35°C Sunny
ENG IN
7:57 PM 15-Sep-24


Physical
Config
Desktop
Programming
Attributes
IP Configuration
Dial-up
Terminal
Command Prompt
Web Br
PC Wireless
VPN
Traffic Generator
MIB Browser
IPv4
IPv6

- open pc -> desktop -> IP configuration

CONCLUSION:

Cisco Packet Tracer is a network simulation tool that, while not designed for direct deployment of real web services, is effective for simulating and understanding network interactions involving web services.

Here's a summary of what you can achieve with Cisco Packet Tracer regarding web services:

- **Simulate Web Server Functionality:** You can configure devices in Packet Tracer to replicate basic web server behavior, allowing you to test and observe how web traffic is managed within a network environment. This helps in understanding the flow of data and the configuration of network components.
- **Explore Web Service Interactions:** By connecting client PCs with web server devices in Packet Tracer, you can simulate how web browsers interact with web servers using protocols like HTTP. This setup allows you to see how requests are made and responses are received, providing insights into web service operations.
- **Practice Network Design for Web Services:** Packet Tracer aids in visualizing and designing the interactions between web servers, clients, and other network devices. This is valuable for planning and troubleshooting real-world web service setups, even though Packet Tracer itself does not run real web server software.

While Cisco Packet Tracer does not execute actual web server software, it serves as a useful platform for learning and experimenting with networked services in a virtual setting. Real-world deployment of web services requires dedicated server software and appropriate hardware.

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