

Lab Title: IoT Based Smart Home			Experiment # : LAB PROJECT		
Student Name: Alishbah Waseem Malik			Reg. #: 2022-BSE-003		
Experiment Name: IoT Based Smart Home					
Performance Indicator	Level of Achievements				
	Excellent (2.5)	Good (2)	Average (1.5)	Below Average (1)	Poor (0.5)
Understanding problem statement					
Optimized implementation					
Troubleshooting					
Report, Presentation & timeliness					
Maximum Marks		2.5+2.5+2.5+2.5=10		Obtained Marks	
Lab Instructor: Sir Muhammad Shahzad					



PROJECT

COMPUTER NETWORKS

BSE-4(A)

SUBMITTED TO: SIR SHAHZAD

SUBMITTED BY:

Alishbah Waseem Malik
Muneeba Bibi
Laraib Tanveer

(2022-BSE-003)
(2022-BSE-023)
(2022-BSE-016)

DEPARTMENT:

Software Engineering

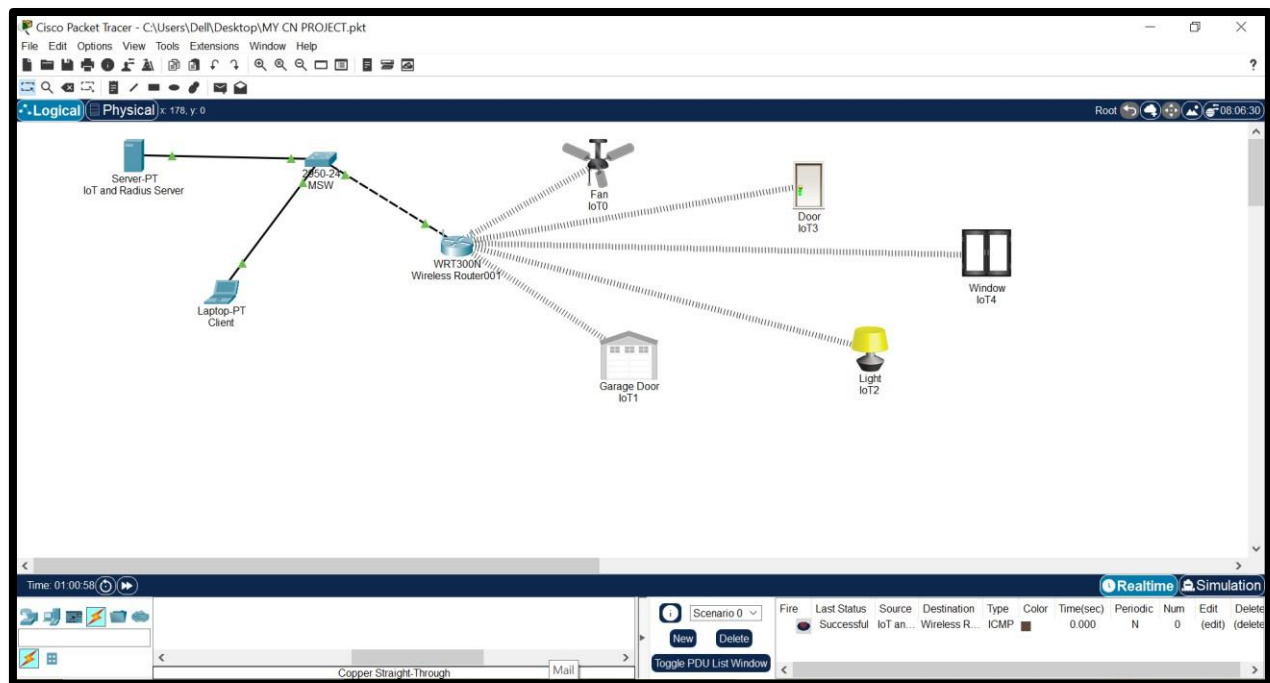
Project Title: IOT BASED SMART HOME

AIM

The aim of this project is to design and implement a robust IoT-based smart home system using Cisco Packet Tracer. By meticulously configuring the network infrastructure, the goal is to facilitate seamless connectivity and ensure stringent security measures for all IoT-enabled devices within the home environment.

OBJECTIVE

The objective is to establish a highly secure network environment by deploying WPA2 security protocol and integrating a RADIUS server for authentication and authorization purposes. This setup will enable only authorized users to access and control the various IoT devices, guaranteeing both efficient communication and robust protection against unauthorized access or malicious threats.



SERVER

(IoT and Radius Server)

- IP-Configuration

The screenshot shows a window titled "IoT and Radius Server" with a standard Windows-style title bar (minimize, maximize, close buttons). The window has a tabbed interface with the following tabs: "Physical", "Config", "Services", "Desktop" (which is the active tab), "Programming", and "Attributes".

Under the "Desktop" tab, there is a sub-tab labeled "IP Configuration" with a close button (X) in its top right corner. The "IP Configuration" section contains the following fields and options:

- IP Configuration:**
 - Radio buttons for "DHCP" (unselected) and "Static" (selected).
 - IPv4 Address: 192.168.0.10
 - Subnet Mask: 255.255.255.0
 - Default Gateway: 192.168.0.1
 - DNS Server: 0.0.0.0
- IPv6 Configuration:**
 - Radio buttons for "Automatic" (unselected) and "Static" (selected).
 - IPv6 Address: Two empty text boxes separated by a slash (/).
 - Link Local Address: FE80::230:A3FF:FE19:DA49
 - Default Gateway: Empty text box.
 - DNS Server: Empty text box.
- 802.1X:**
 - Checkbox for "Use 802.1X Security" (unchecked).
 - Authentication: A dropdown menu currently showing "MD5".
 - Username: Empty text box.
 - Password: Empty text box.

- Services

IoT and Radius Server

PhysicalConfigServicesDesktopProgrammingAttributes

SERVICES

HTTP

DHCP

DHCPv6

TFTP

DNS

SYSLOG

AAA

NTP

EMAIL

FTP

IoT

VM Management

Radius EAP

AAA

Service

☒ On

☐ Off

Radius Port

1645

Network Configuration

Client NameClient IP

SecretServerType

Radius

	Client Name	Client IP	Server Type	Key	
1	Home	192.168.0.1	Radius	pass123	Add
					Save
					Remove

User Setup

UsernamePassword

	Username	Password	
1	Door	Door	Add
2	Fan	Fan	
3	GDoor	GDoor	Save
4	Light	Light	
5	Window	Window	Remove

IoT and Radius Server

Physical

Config

Services

Desktop

Programming

Attributes

SERVICES

HTTP

DHCP

DHCPv6

TFTP

DNS

SYSLOG

AAA

NTP

EMAIL

FTP

IoT

VM Management

Radius EAP

Registration Server

This service runs on top of the HTTP or HTTPS service.

Service

On

Off

	Username	Password
1	admin	mla123

Delete

- IoT Monitor

IoT and Radius Server

PhysicalConfigServicesDesktopProgrammingAttributes

IoT Monitor

IoT Server Address: 192.168.0.10

User Name: admin

Password: mla123

Login

IoT and Radius Server

PhysicalConfigServicesDesktopProgrammingAttributes

IoT Monitor

IoT Server - Devices

Home | Conditions | Editor | Log Out

IoT0 (PTT08100T4N-)Ceiling Fan

Status

LowHigh

IoT3 (PTT0810BN1S-)Door

Open

Lock

UnlockLock

IoT4 (PTT08105K98-)Window

On

IoT1 (PTT081021FH-)Garage Door

On

IoT2 (PTT081086RN-)Light

Status

OffDimOn

ROUTER

(Wireless Router 001)

- GUI

Wireless Router001

Physical Config **GUI** Attributes

Wireless-N Broadband Router Firmware Version: v0.93.3

Wireless Setup Wireless Security Access Restrictions Applications & Gaming Administration Status

Basic Wireless Settings

Network Mode: Mixed

Network Name (SSID): Home

Radio Band: Auto

Wide Channel: Auto

Standard Channel: 1 - 2.412GHz

SSID Broadcast: ☒ Enabled ☐ Disabled

Help...

- Wireless Security

Wireless Router001

Physical Config **GUI** Attributes

Wireless-N Broadband Router Firmware Version: v0.93.3

Wireless Setup Wireless Security Access Restrictions Applications & Gaming Administration Status

Wireless Security

Security Mode: WPA2 Enterprise

Encryption: AES

RADIUS Server: 192 . 168 . 0 . 10

RADIUS Port: 1645

Shared Secret: pass123

Key Renewal: 3600 seconds

Help...

FAN

IoT0

Specifications

I/O Config

Physical

Config

Thing Editor

Programming

Attributes

GLOBAL

Settings

Algorithm Settings

Files

INTERFACE

Wireless0

Bluetooth

Global Settings

Display Name

IoT0

Serial Number

PTT08100T4N-

Interfaces

Wireless0

Gateway/DNS IPv4

☒ DHCP

☐ Static

Default Gateway

192.168.0.1

DNS Server

Gateway/DNS IPv6

☐ Automatic

☒ Static

Default Gateway

DNS Server

IoT Server

☐ None

☐ Home Gateway

☒ Remote Server

Server Address

192.168.0.10

User Name

admin

Password

mla123

Refresh

☐ Top

Advanced

IoT0

Specifications Physical **Config** Attributes

GLOBAL

Settings

Algorithm Settings

Files

INTERFACE

Wireless0

Bluetooth

Wireless0

Port Status ☒ On

Bandwidth 300 Mbps

MAC Address 0001.97E5.E177

SSID Home

Authentication

<input type="radio"/> Disabled	<input type="radio"/> WEP	WEP Key	<input type="text"/>
<input type="radio"/> WPA-PSK	<input type="radio"/> WPA2-PSK	PSK Pass Phrase	<input type="text"/>
<input type="radio"/> WPA	<input checked="" type="radio"/> WPA2	User ID	Fan
<input type="radio"/> 802.1X	Method:	Password	Fan
			MD5
		User Name	<input type="text"/>
		Password	<input type="text"/>

Encryption Type AES

IP Configuration

☒ DHCP

☐ Static

IPv4 Address 192.168.0.108

Subnet Mask 255.255.255.0

IPv6 Configuration

☒ Automatic

☐ Static

IPv6 Address

Link Local Address: FE80::201:97FF:FEE5:E177

DOOR

IoT3

Specifications I/O Config Physical **Config** Thing Editor Programming Attributes

GLOBAL

- Settings
- Algorithm Settings
- Files

INTERFACE

- Wireless0
- Bluetooth

Global Settings

Display Name

Serial Number

Interfaces

Gateway/DNS IPv4

☒ DHCP
☐ Static

Default Gateway

DNS Server

Gateway/DNS IPv6

☐ Automatic
☒ Static

Default Gateway

DNS Server

IoT Server

☐ None
☐ Home Gateway
☒ Remote Server

Server Address

User Name

Password

Refresh

IoT3

SpecificationsI/O ConfigPhysicalConfigThing EditorProgrammingAttributes

GLOBAL

Settings

Algorithm Settings

Files

INTERFACE

Wireless0

Bluetooth

Wireless0

Port Status

☒ On

Bandwidth

300 Mbps

MAC Address

0010.1171.7723

SSID

Home

Authentication

☐ Disabled

☐ WEP

WEP Key

☐ WPA-PSK

☐ WPA2-PSK

PSK Pass Phrase

☐ WPA

☒ WPA2

User ID

Door

☐ 802.1X

Method:

Password

Door

MD5

Encryption Type

AES

IP Configuration

☒ DHCP

☐ Static

IPv4 Address

192.168.0.105

Subnet Mask

255.255.255.0

IPv6 Configuration

☒ Automatic

☐ Static

IPv6 Address

Link Local Address:

FE80::210:11FF:FE71:7723

☐ Top

Advanced

WINDOW

IoT4

Specifications

I/O Config

Physical

Config

Thing Editor

Programming

Attributes

GLOBAL

Settings

Algorithm Settings

Files

INTERFACE

Wireless0

Bluetooth

Global Settings

Display Name

IoT4

Serial Number

PTT08105K98-

Interfaces

Wireless0

Gateway/DNS IPv4

DHCP

Static

Default Gateway

192.168.0.1

DNS Server

Gateway/DNS IPv6

Automatic

Static

Default Gateway

DNS Server

IoT Server

None

Home Gateway

Remote Server

Server Address

192.168.0.10

User Name

admin

Password

mla123

Refresh

Top

Advanced

IoT4

SpecificationsPhysicalConfigAttributes

GLOBAL

Settings

Algorithm Settings

Files

INTERFACE

Wireless0

Bluetooth

Wireless0

Port Status

☒ On

Bandwidth

300 Mbps

MAC Address

0005.5ECB.555E

SSID

Home

Authentication

☐ Disabled

☐ WEP

WEP Key

☐ WPA-PSK

☐ WPA2-PSK

PSK Pass Phrase

☐ WPA

☒ WPA2

User ID

Window

☐ 802.1X

Method:

Password

Window

Encryption Type

MD5

IP Configuration

☒ DHCP

☐ Static

IPv4 Address

192.168.0.103

Subnet Mask

255.255.255.0

IPv6 Configuration

☒ Automatic

☐ Static

IPv6 Address

Link Local Address

FE80::205:5EFF:FCB:555E

☐ Top

Advanced

LIGHT

IoT2

SpecificationsI/O ConfigPhysicalConfigThing EditorProgrammingAttributes

GLOBAL

Settings

Algorithm Settings

Files

INTERFACE

Wireless0

Bluetooth

Global Settings

Display NameIoT2

Serial NumberPTT081086RN-

InterfacesWireless0

Gateway/DNS IPv4

DHCP

Static

Default Gateway192.168.0.1

DNS Server

Gateway/DNS IPv6

Automatic

Static

Default Gateway

DNS Server

IoT Server

None

Home Gateway

Remote Server

Server Address192.168.0.10

User Nameadmin

Passwordmla123

Refresh

☐ Top

Advanced

IoT2

SpecificationsPhysicalConfigAttributes

GLOBAL

Settings

Algorithm Settings

Files

INTERFACE

Wireless0

Bluetooth

Wireless0

Port Status

☒ On

Bandwidth

300 Mbps

MAC Address

00E0.A311.007E

SSID

Home

Authentication

☐ Disabled

☐ WEP

WEK Key

☐ WPA-PSK

☐ WPA2-PSK

PSK Pass Phrase

☐ WPA

☒ WPA2

User ID

Light

☐ 802.1X

Method:

Password

Light

Encryption Type

MD5

Encryption Type

AES

IP Configuration

☒ DHCP

☐ Static

IPv4 Address

192.168.0.101

Subnet Mask

255.255.255.0

IPv6 Configuration

☒ Automatic

☐ Static

IPv6 Address

Link Local Address:

FE80::2E0:A3FF:FE11:7E

☐ Top

Advanced

IoT1

SpecificationsPhysicalConfigAttributes

GLOBAL

Settings

Algorithm Settings

Files

INTERFACE

Wireless0

Bluetooth

Wireless0

Port Status

☒ On

Bandwidth

300 Mbps

MAC Address

0002.4AE2.6B28

SSID

Home

Authentication

☐ Disabled

☐ WEP

WEP Key

☐ WPA-PSK

☐ WPA2-PSK

PSK Pass Phrase

☐ WPA

☒ WPA2

User ID

GDoor

☐ 802.1X

Method:

Password

GDoor

Encryption Type

MD5

Encryption Type

AES

IP Configuration

☒ DHCP

☐ Static

IPv4 Address

192.168.0.100

Subnet Mask

255.255.255.0

IPv6 Configuration

☐ Automatic

☒ Static

IPv6 Address

Link Local Address:

FE80::202:4AFF:FEE2:6B28

☐ Top

Advanced

LAPTOP

- IP-Configuratiom

Client

PhysicalConfigDesktopProgrammingAttributes

IP Configuration

InterfaceFastEthernet0

IP Configuration

☒ DHCP☐ Static

IPv4 Address192.168.0.106

Subnet Mask255.255.255.0

Default Gateway192.168.0.1

DNS Server0.0.0.0

IPv6 Configuration

☐ Automatic☒ Static

IPv6 Address

Link Local AddressFE80::20C:CFFF:FEC8:60A2

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

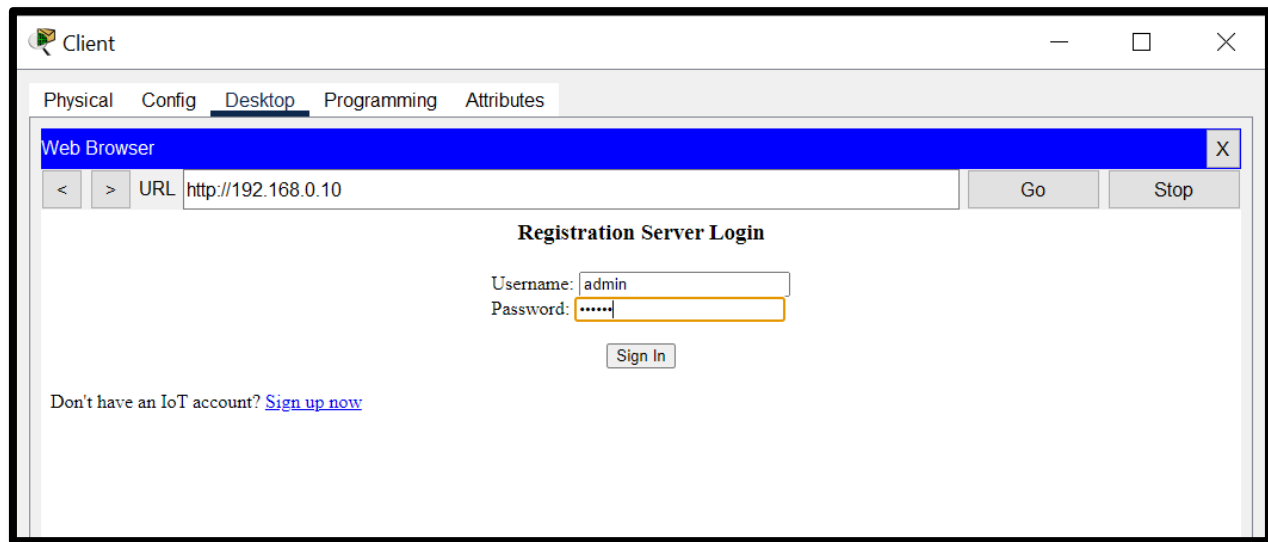
AuthenticationMD5

Username

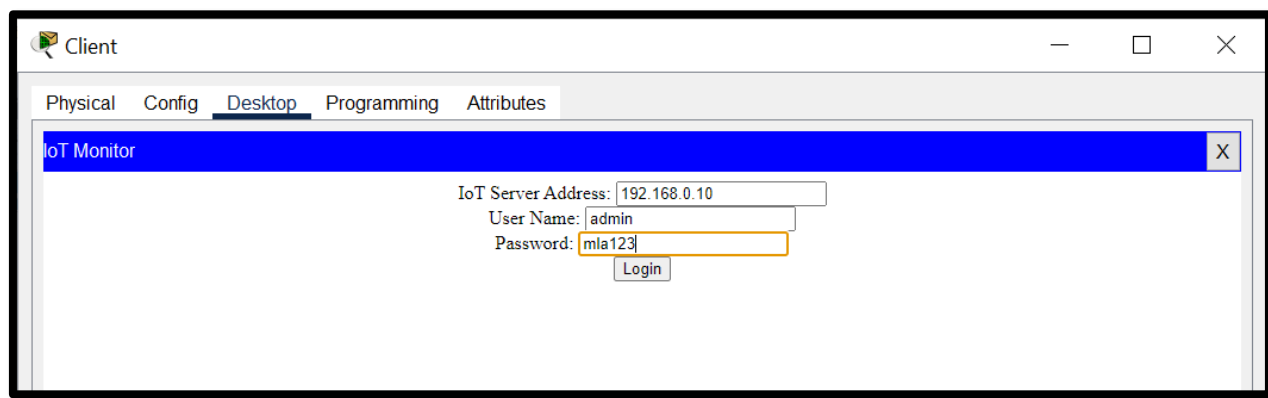
Password

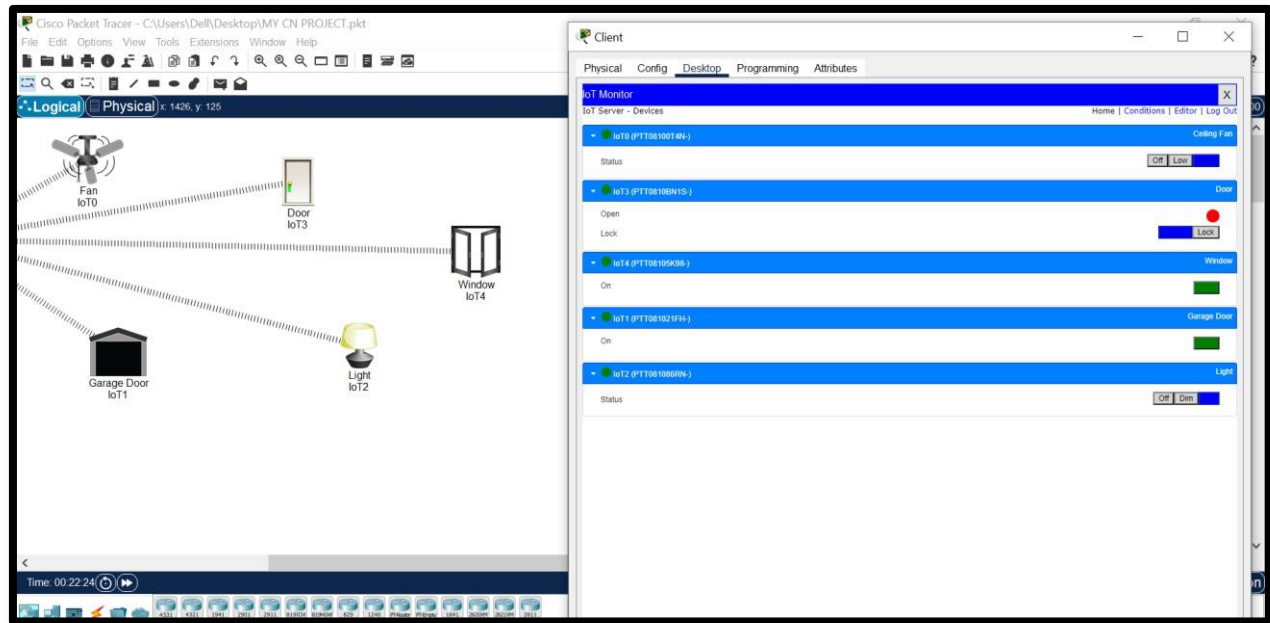
☐ Top

- Web Browser



- IoT Monitor





CONCLUSION

In conclusion, the successful configuration and implementation of the IoT-based smart home system using Cisco Packet Tracer have resulted in a seamlessly connected network environment with enhanced security measures. By integrating WPA2 security and a RADIUS server, we have established a robust infrastructure that ensures only authorized users can access and control the array of IoT devices within the smart home. This project demonstrates the effectiveness of leveraging advanced networking technologies to create a secure and efficient IoT ecosystem, ultimately enhancing the convenience and safety of modern residential living.