

Task 12

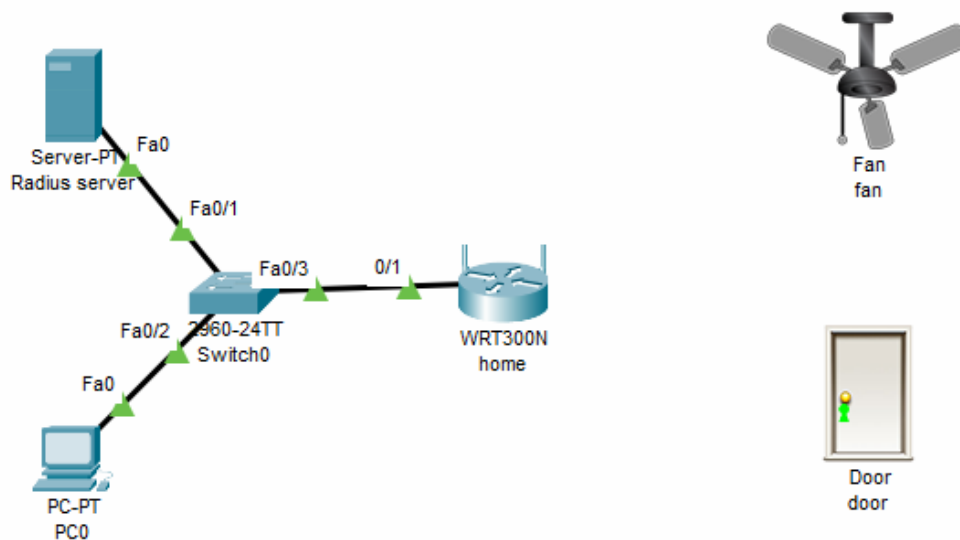
- a). Adding IoT devices to Smart Homes using Packet Tracer
- b). Connect and Monitor IoT Devices using Packet Tracer

IoT Devices are physical objects embedded with sensors, software, and other technologies that enable them to connect to the internet and exchange data with other devices, systems, or users. They are part of the **Internet of Things (IoT)** ecosystem, designed to automate processes, enhance efficiency, and provide real-time data insights.

Key Features:

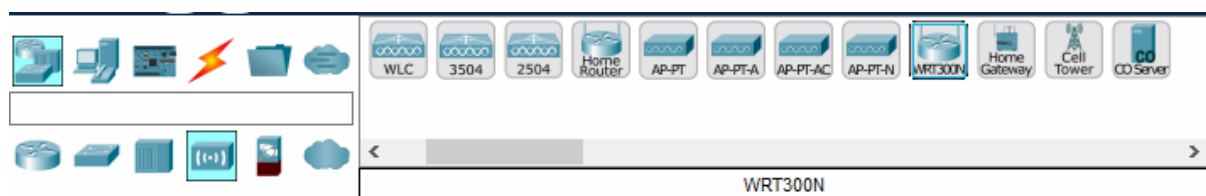
- **Connectivity:** Can connect to networks (Wi-Fi, Bluetooth, or wired).
- **Sensors/Actuators:** Collect data or perform actions (e.g., turning on a light, adjusting temperature).
- **Automation:** Operate automatically based on predefined conditions or commands.
- **Remote Control:** Can be controlled or monitored from anywhere via the internet.

Examples: fan, light, door, security cameras



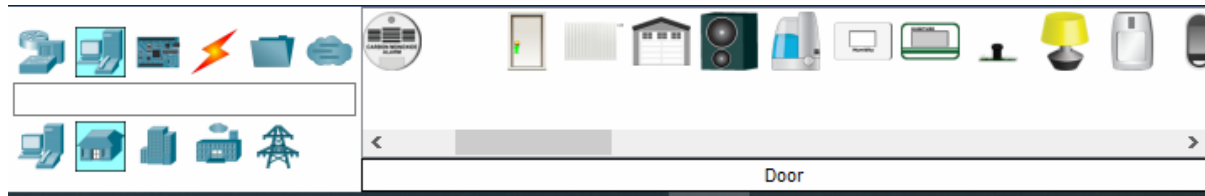
WRT300N home router -> Under network devices->sub category 4th option (wireless devices)

Click on wireless devices->WRT300N (from last 4th option)



IoT devices (like fan, door) -> Under End devices -> sub category 2nd option (home)

Click on home -> drag and drop fan and door



Description of the network

Radius server:

RADIUS server (Remote Authentication Dial-In User Service) can control access to IoT devices by implementing centralized **authentication, authorization, and accounting (AAA)** mechanisms

When a user or device (e.g., PC or smartphone) attempts to control or access an IoT device (e.g., fan, door, or lamp), the access request is sent to the RADIUS server via the router.

The RADIUS server verifies the credentials (e.g., username and password, token, or certificates) provided by the user/device.

If the credentials are valid, the RADIUS server grants access to the network resources; otherwise, it denies the request.

WRT300N router

WRT300N is a wireless router commonly used in networking simulations (like in Cisco Packet Tracer) and real-world scenarios to provide network connectivity.

Its primary purpose is to act as a gateway between connected devices and the wider network (e.g., the internet or a local network).

PC:

The PC hosts the IoT server or monitoring software, enabling centralized control and management of connected IoT devices.

It acts as the interface for users to monitor the status or control devices (e.g., turning a lamp on/off or unlocking the door).

IoT Devices:

Fan:

- A smart device that allows remote control of its operations, such as turning on/off and adjusting speed.

Door (Smart Lock):

- Allows secure, remote locking/unlocking of doors.
- Monitors door status (open/closed) for enhanced security.

Configurations:

Configuring radius server

Under config->Give device name as radius server

IP address:192.168.0.10 subnet mask:255.255.255.0

Default Gateway:192.168.0.1

The screenshot shows a window titled "Radius server" with a tabbed interface. The "Desktop" tab is selected, and a sub-tab "IP Configuration" is active. The "IP Configuration" section has two radio buttons: "DHCP" (unselected) and "Static" (selected). Below these are four text input fields: "IPv4 Address" (192.168.0.10), "Subnet Mask" (255.255.255.0), "Default Gateway" (192.168.0.1), and "DNS Server" (0.0.0.0). The "IPv6 Configuration" section also has two radio buttons: "Automatic" (unselected) and "Static" (selected). Below these are four text input fields: "IPv6 Address" (empty), "Link Local Address" (FE80::201:64FF:FEA4:5995), "Default Gateway" (empty), and "DNS Server" (empty). The "802.1X" section has a checkbox "Use 802.1X Security" (unchecked). Below it is a dropdown menu for "Authentication" set to "MD5", and two text input fields for "Username" and "Password". At the bottom left, there is a "Top" button.

Under services click -> AAA ->click service=on radio button

Do the following as in the below screenshot

Radius server

Physical Config **Services** Desktop Programming Attributes

SERVICES

- HTTP
- DHCP
- DHCPv6
- TFTP
- DNS
- SYSLOG
- AAA**
- NTP
- EMAIL
- FTP
- IoT
- VM Management
- Radius EAP

AAA

Service ☒ On ☐ Off Radius Port

Network Configuration

Client Name Client IP

Secret ServerType

Client Name	Client IP	Server Type	Key

Add Save Remove

User Setup

Click on add and configuration gets added

Radius server

Physical Config **Services** Desktop Programming Attributes

SERVICES

- HTTP
- DHCP
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AAA

Service ☒ On ☐ Off Radius Port

Network Configuration

Client Name Client IP

Secret ServerType

Client Name	Client IP	Server Type	Key
1 home	192.168.0.1	Radius	pass1234

Add Save Remove

User Setup

Now setup for user i.e user setup

Need to add username and password for iot devices

In username tab enter fan and in password 1234 and click add. same way do for all devices

User Setup

Username Password

	Username	Password
1	door	1234
2	fan	1234
<div></div>		

Add

Save

Remove

Under services click->IoT->service=on

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

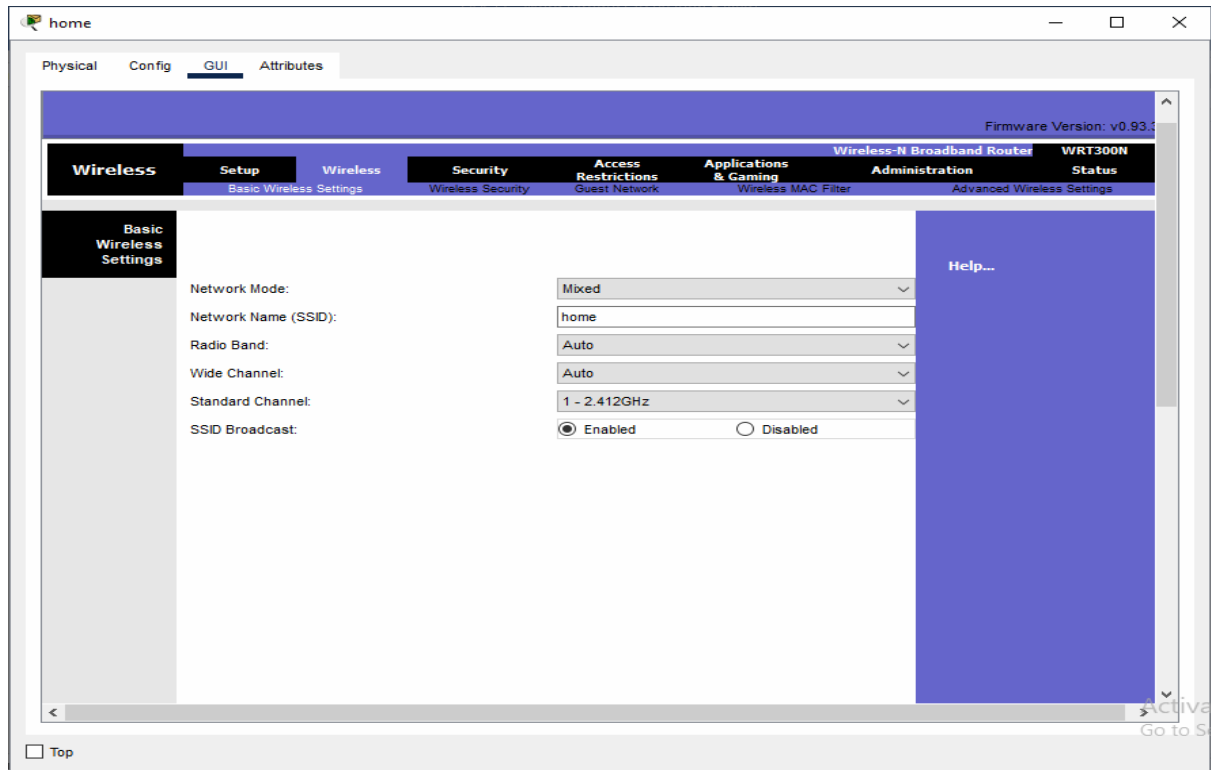
Delete

☐ Top

Configuration for Wireless router

Config->give display name as home

In GUI->click on wireless and enter the below shown configuration

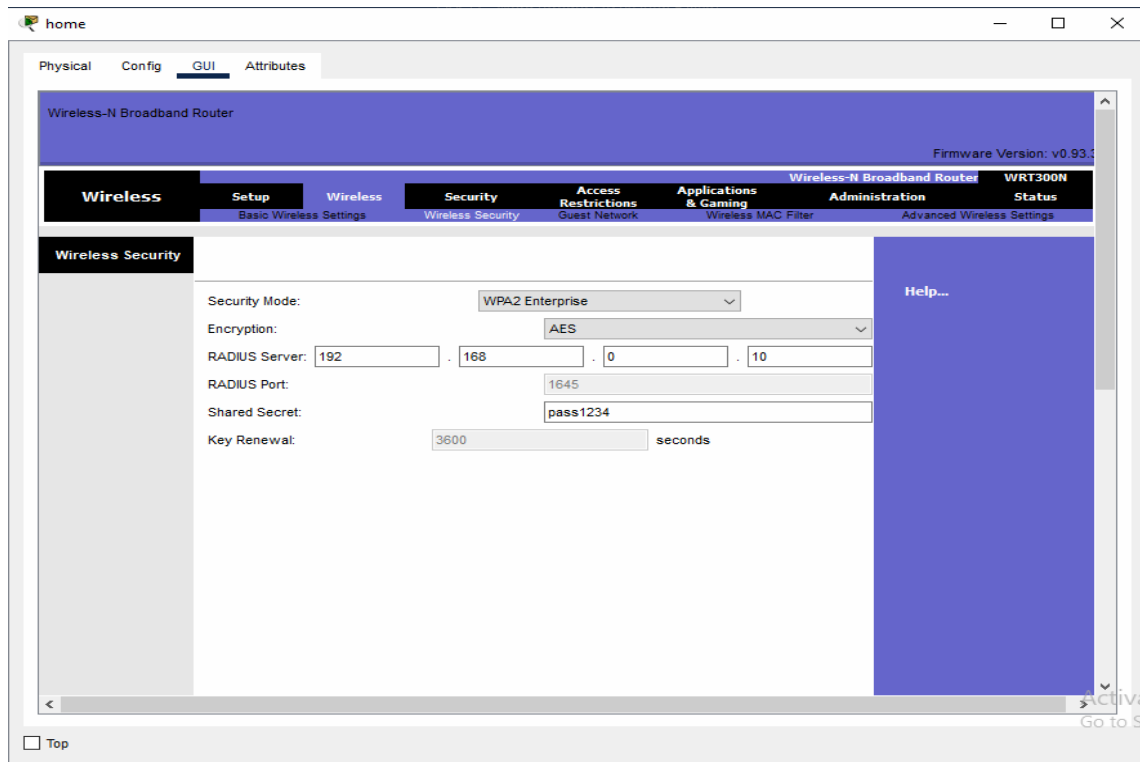


And scroll down and click on save settings



In GUI->under wireless->right side option click on security and add the below shown config

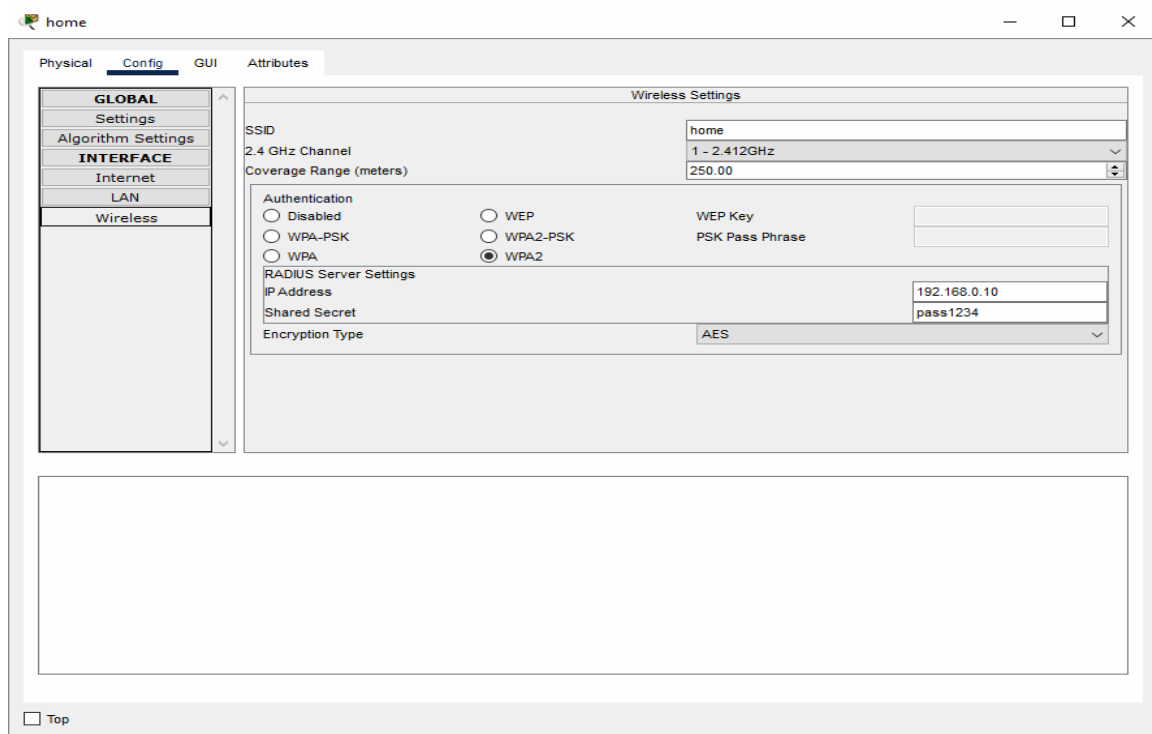




And scroll down and click on save settings

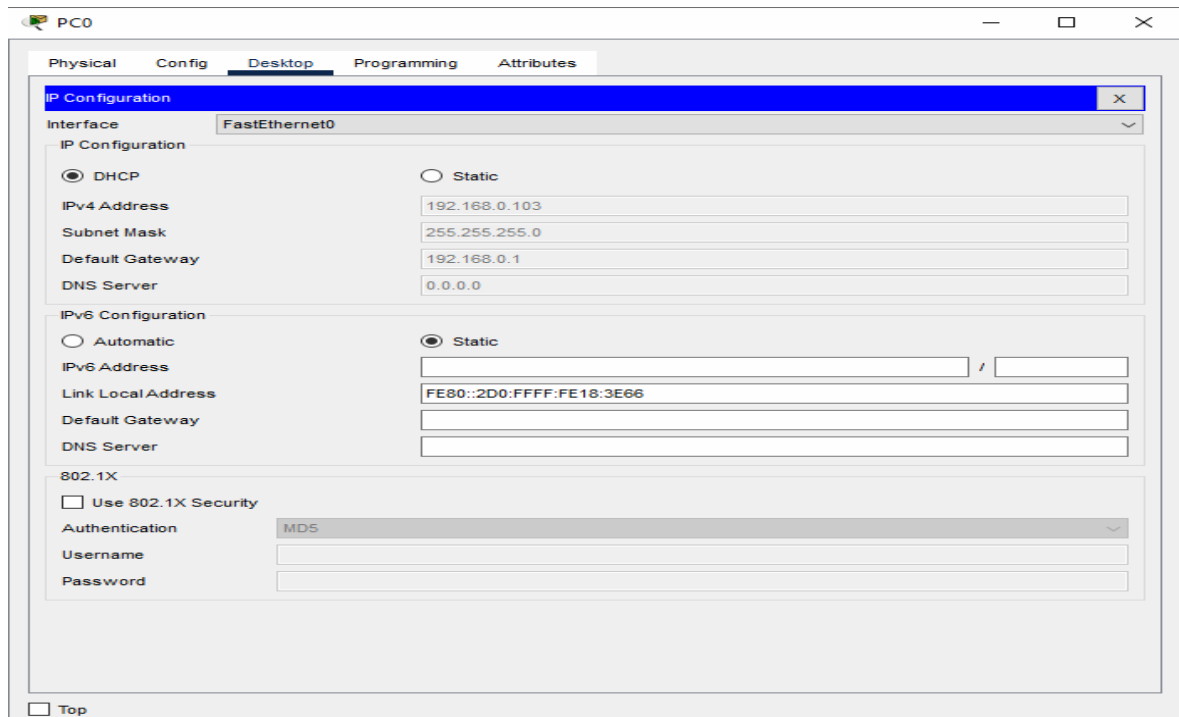
To check if all configurations which we gave are added

Goto->config in router->>wireless



Configuration for PC

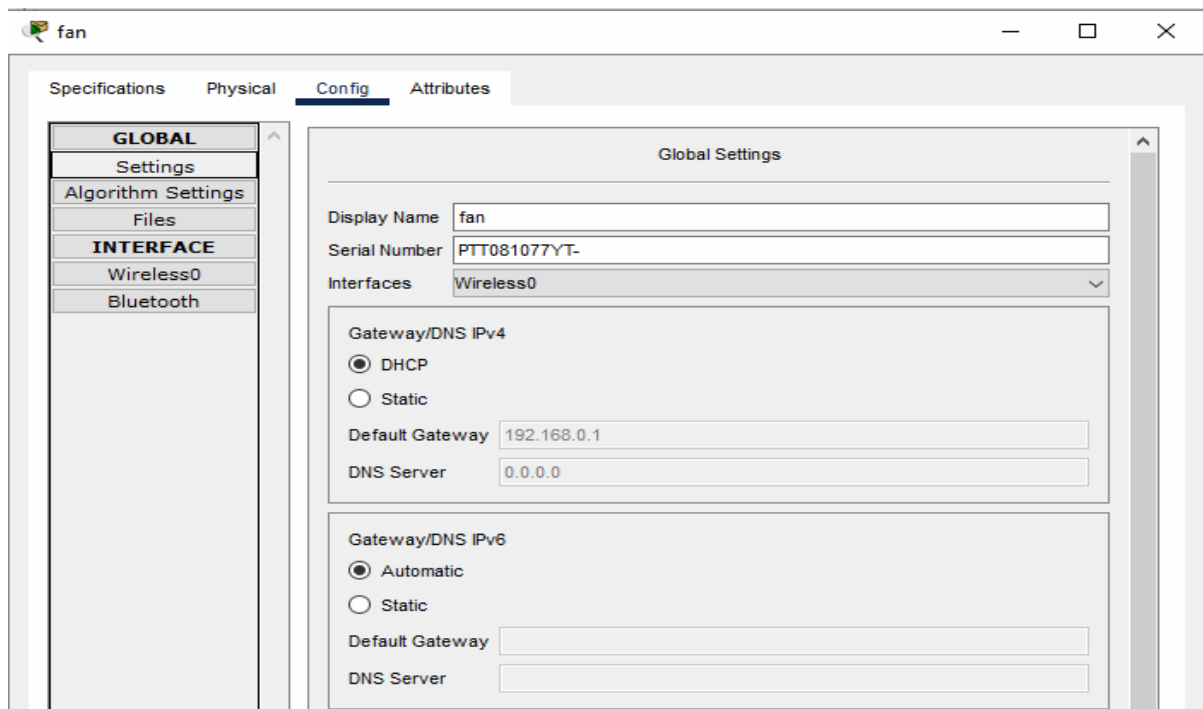
Select DHCP



Configuration for fan

Goto->config->change the display name as fan

Goto->settings->follow the screenshot



In settings->configure remoteserver as shown below

This screenshot shows a configuration window for an IoT Server. It features three radio buttons: 'None', 'Home Gateway', and 'Remote Server', with 'Remote Server' selected. Below these are three text input fields: 'Server Address' (192.168.0.10), 'User Name' (admin), and 'Password' (admin). A 'Connect' button is located at the bottom right of the configuration area. The window has a 'Top' link and an 'Advanced' button at the bottom.

IoT Server

☐ None

☐ Home Gateway

☒ Remote Server

Server Address

User Name

Password

Connect

☐ Top Advanced

Below is the screenshot we get after connecting

This screenshot shows the 'fan' configuration window with the 'Config' tab selected. The left sidebar shows a tree view with 'GLOBAL' (Settings, Algorithm Settings, Files) and 'INTERFACE' (Wireless0, Bluetooth). The 'Wireless0' interface is selected, showing 'Gateway/DNS IPv4' settings (DHCP selected, Default Gateway: 192.168.0.1, DNS Server: 0.0.0.0) and 'Gateway/DNS IPv6' settings (Automatic selected). The 'IoT Server' section at the bottom is identical to the first screenshot, with 'Remote Server' selected and fields for '192.168.0.10', 'admin', and 'admin'. A 'Refresh' button is present. The window has a 'Top' link and an 'Advanced' button at the bottom.

fan

Specifications Physical **Config** Attributes

GLOBAL

- Settings
- Algorithm Settings
- Files

INTERFACE

- Wireless0
- Bluetooth

Interfaces **Wireless0**

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

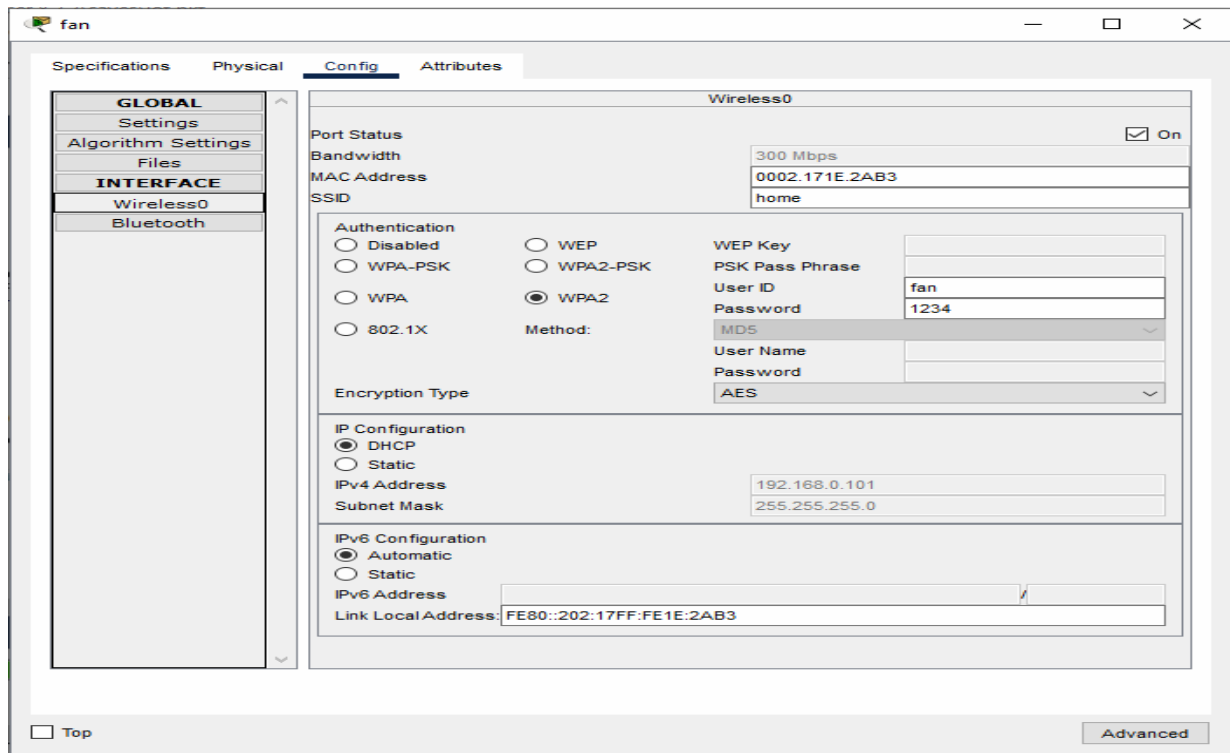
User Name

Password

Refresh

☐ Top Advanced

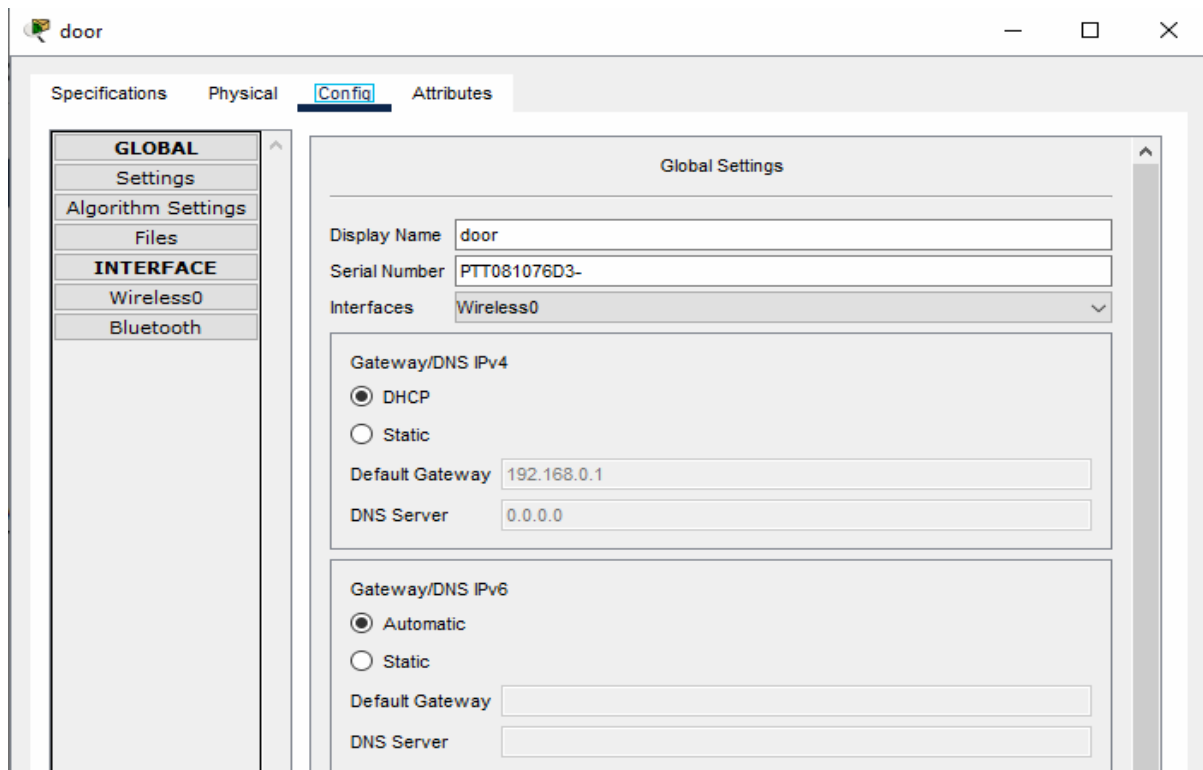
Under->config->wireless0->do the below config as shown in the screenshot



Configuration for Door

Goto->config->change the display name as door

Goto->settings->follow the screenshot



Click on connect

This screenshot shows a configuration window for an IoT Server. It features three radio buttons: 'None', 'Home Gateway', and 'Remote Server', with 'Remote Server' selected. Below these are three text input fields: 'Server Address' (192.168.0.10), 'User Name' (admin), and 'Password' (admin). A 'Connect' button is located at the bottom right of the configuration area. The window has a 'Top' button and an 'Advanced' button at the bottom.

IoT Server

☐ None

☐ Home Gateway

☒ Remote Server

Server Address

User Name

Password

Connect

Top Advanced

Below is the screenshot after connecting

This screenshot shows the 'door' application window after a successful connection. The 'Config' tab is active, and the 'Wireless0' interface is selected. The 'Gateway/DNS IPv4' section shows 'DHCP' selected with a 'Default Gateway' of 192.168.0.1 and a 'DNS Server' of 0.0.0.0. The 'Gateway/DNS IPv6' section shows 'Automatic' selected. The 'IoT Server' section at the bottom shows 'Remote Server' selected with the same 'Server Address', 'User Name', and 'Password' as the previous screenshot. A 'Refresh' button is present. The window includes a sidebar with 'GLOBAL' and 'INTERFACE' sections, and 'Top' and 'Advanced' buttons at the bottom.

door

Specifications Physical **Config** Attributes

GLOBAL

Settings

Algorithm Settings

Files

INTERFACE

Wireless0

Bluetooth

Interfaces Wireless0

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

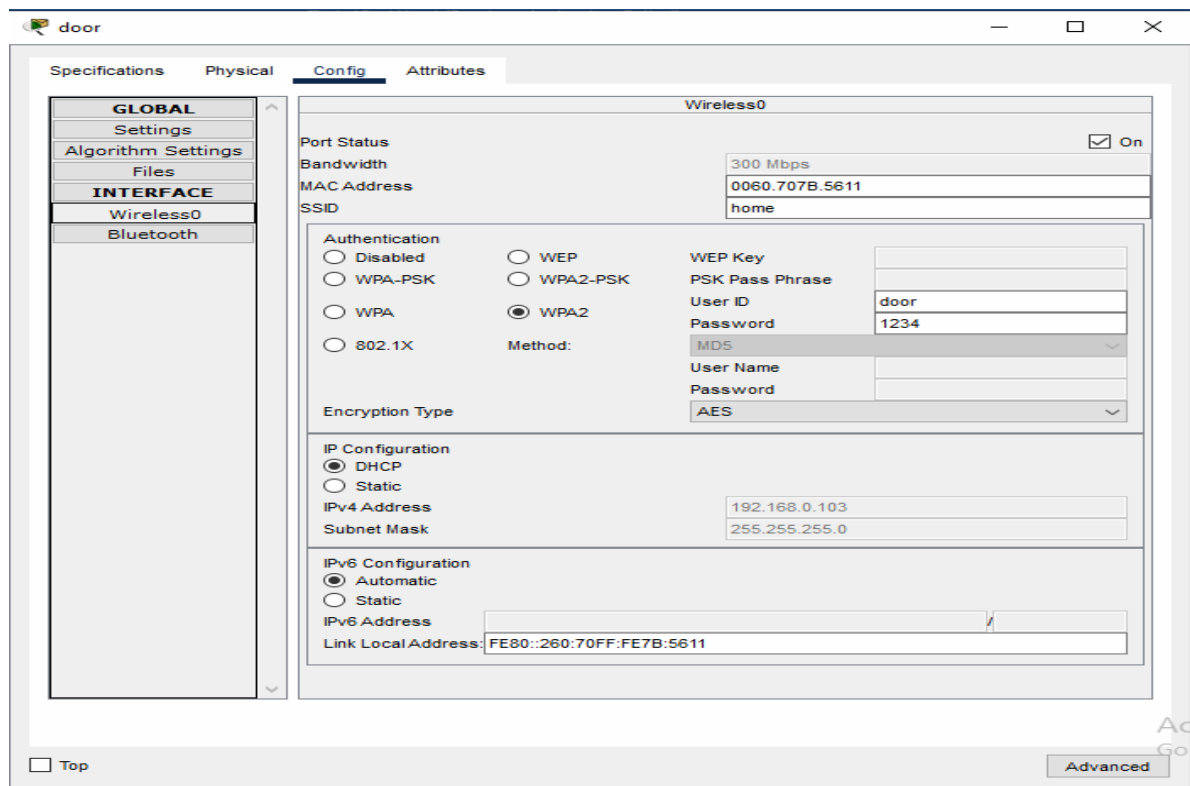
User Name

Password

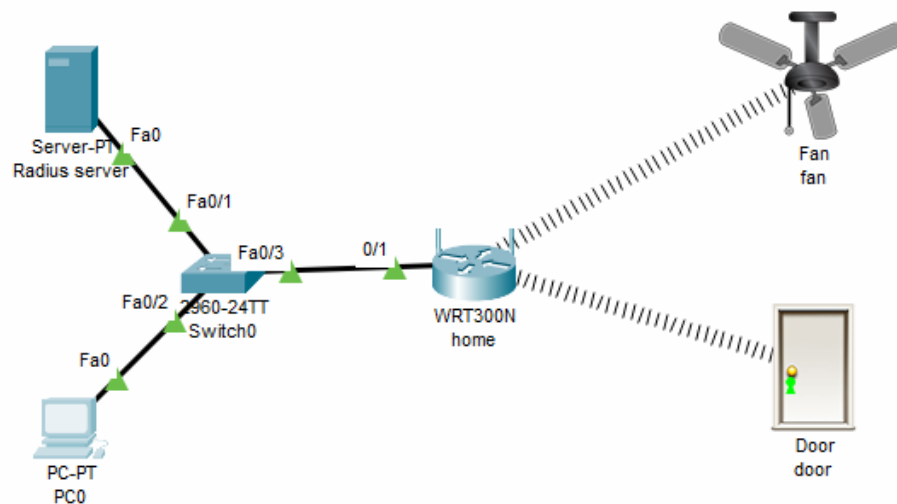
Refresh

Top Advanced

In config->wireless0 do below configuration



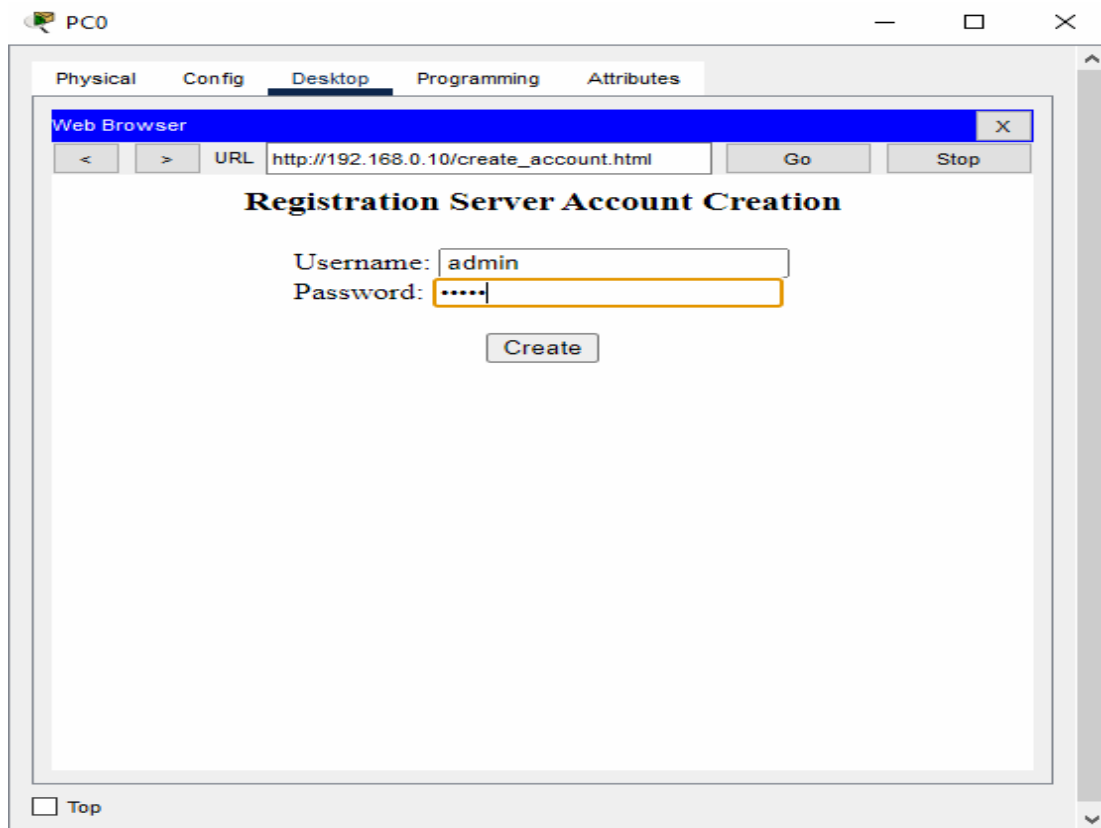
We will get link line between router and devices if both got connected successfully as shown in the below screenshot



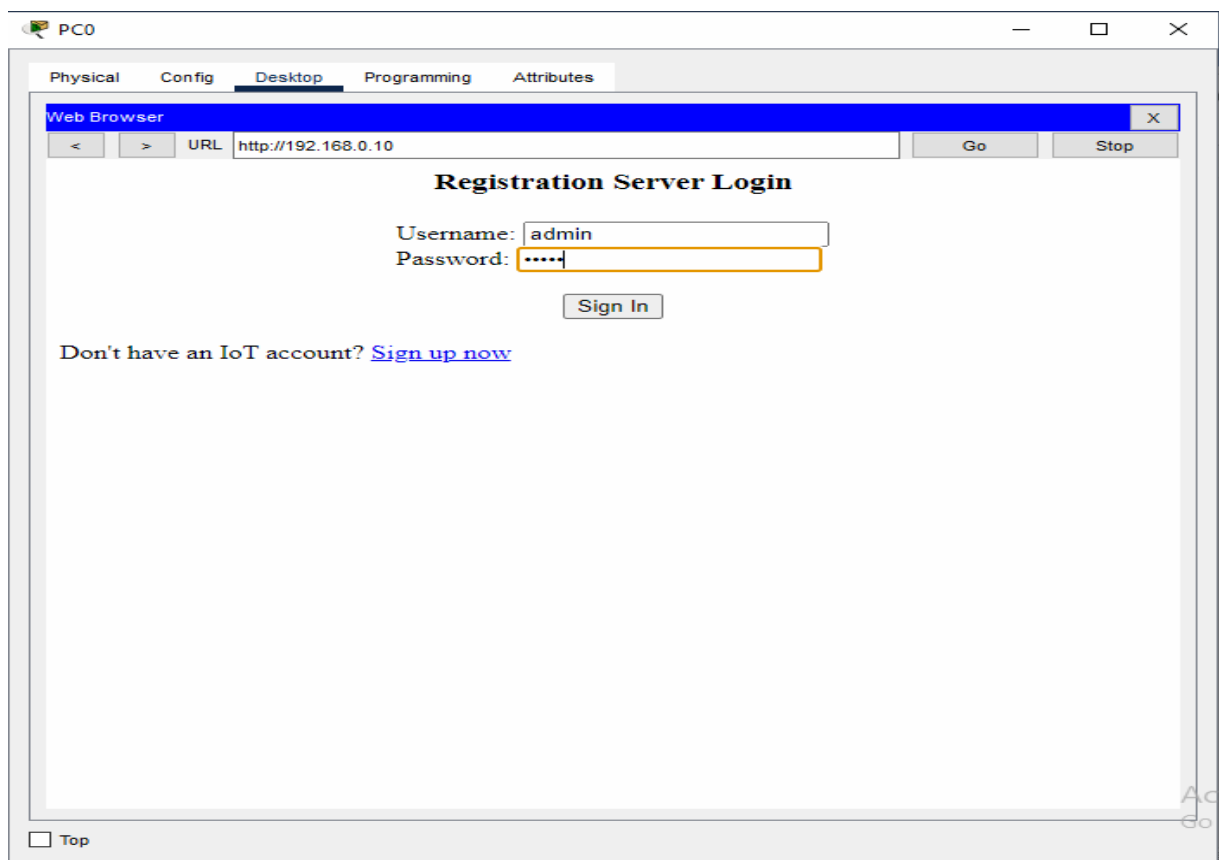
Testing

We on/off the fan and door from the PC

Goto PC->Desktop->webbrowser->give <https://192.168.0.10> and register as shown below



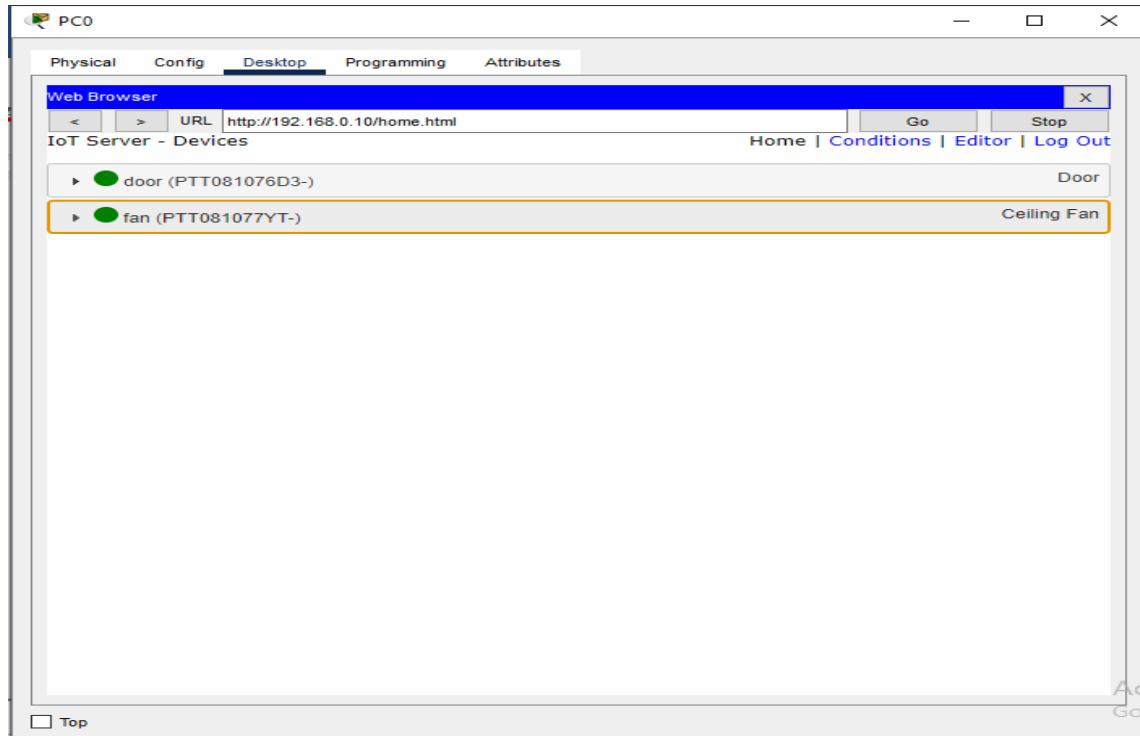
Then signin after registration



Once signin we will get below screen as it screenshot

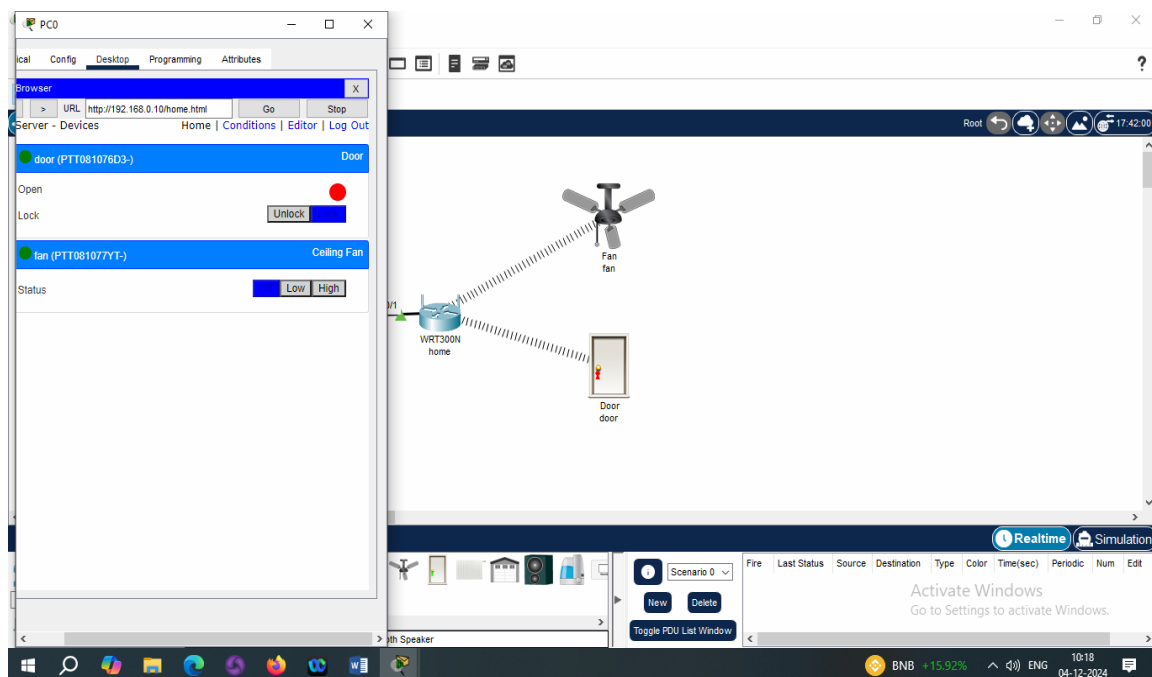
IoT devices get added and we can operate

Note: If you're not able to see devices added, check if DHCP is enabled in PC->config



Click on small arrow left of fan and we can see controls for on/off and for door lock/unlock

Door turns red if we click on lock and turns green if we click unlock



For fan if we click on low, vibration is less and if we click on high, vibration will be more as shown in below screenshot

