NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE

COMPUTER NETWORKS

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Class	CS-A
Lab	13
Course	Computer Networks
Date	26th -December-25
Submitted To	Lec. Naveed Yousaf
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Lab – 12

IP Routing protocols

Warm-up Task [30 Minutes]

1. What is the Internet of Things (IoT)?

The Internet of Things (IoT) refers to a network of everyday physical objects—like appliances, vehicles, sensors, and machines—that are connected to the internet. These devices can collect, share, and act on data without requiring constant human input.

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2. How do IoT devices collect and transmit data?

- **Collection:** IoT devices use built-in sensors (temperature, motion, GPS, cameras, etc.) to gather information from their environment.
- **Transmission:** The collected data is sent through communication technologies such as Wi-Fi, Bluetooth, Zigbee, or cellular networks to other devices or cloud platforms for processing and analysis.

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3. What are the main components of an IoT system?

- **Devices/Sensors:** Physical objects that detect and measure data.
- **Connectivity:** Communication channels (Wi-Fi, 4G/5G, Bluetooth, etc.) that link devices to networks.
- **Data Processing:** Cloud servers or local gateways that analyze and interpret the data.
- **User Interface:** Applications or dashboards that allow humans to monitor, control, and interact with IoT devices.

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4. What is the primary role of IoT in modern networks?

IoT's main role is to enable **automation and real-time communication** between devices. It integrates physical systems with digital networks, allowing organizations and individuals to monitor, control, and optimize processes more efficiently.

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5. How does IoT improve efficiency in smart homes?

- **Energy Management:** Smart thermostats and lighting systems reduce unnecessary energy use.
- **Automation:** Devices like smart locks, appliances, and assistants perform tasks automatically.
- **Convenience:** Centralized control through apps or voice assistants saves time and effort.
- **Monitoring:** Sensors detect issues (like water leaks or smoke) early, preventing damage and reducing costs.

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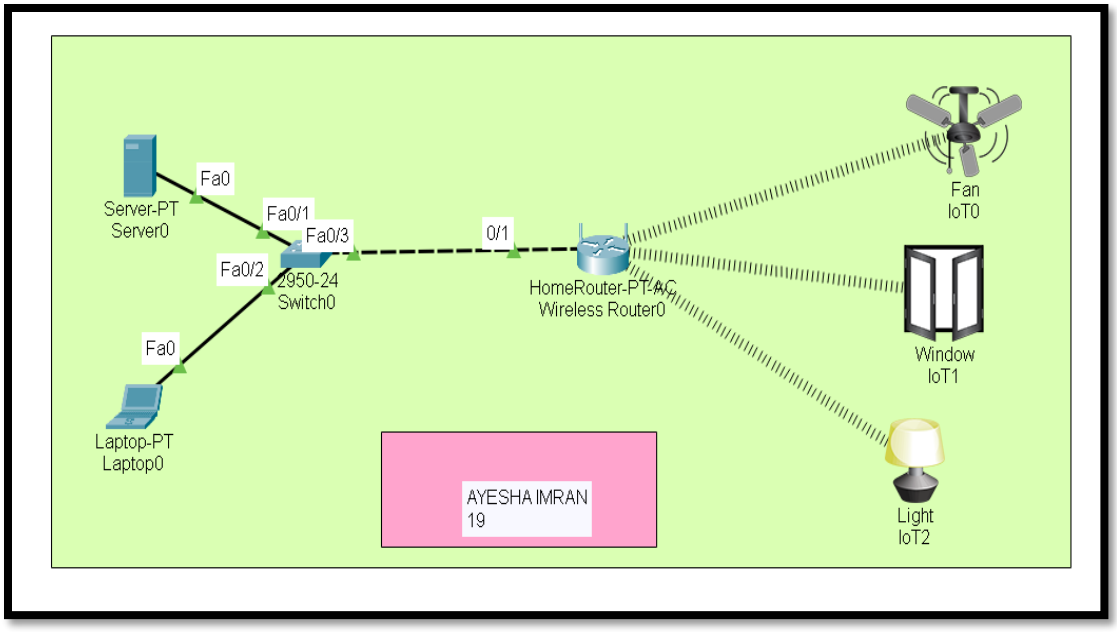
6. What are the common security challenges associated with IoT networks?

- **Weak Authentication:** Many devices lack strong password protection.
- **Data Privacy Risks:** Sensitive personal data can be exposed if not encrypted.
- **Device Vulnerabilities:** Insecure firmware or outdated software can be exploited.
- **Large Attack Surface:** With millions of devices connected, hackers have more entry points.
- **Denial of Service (DoS) Attacks:** Compromised IoT devices can be used in botnets to disrupt services.

TASK 01:

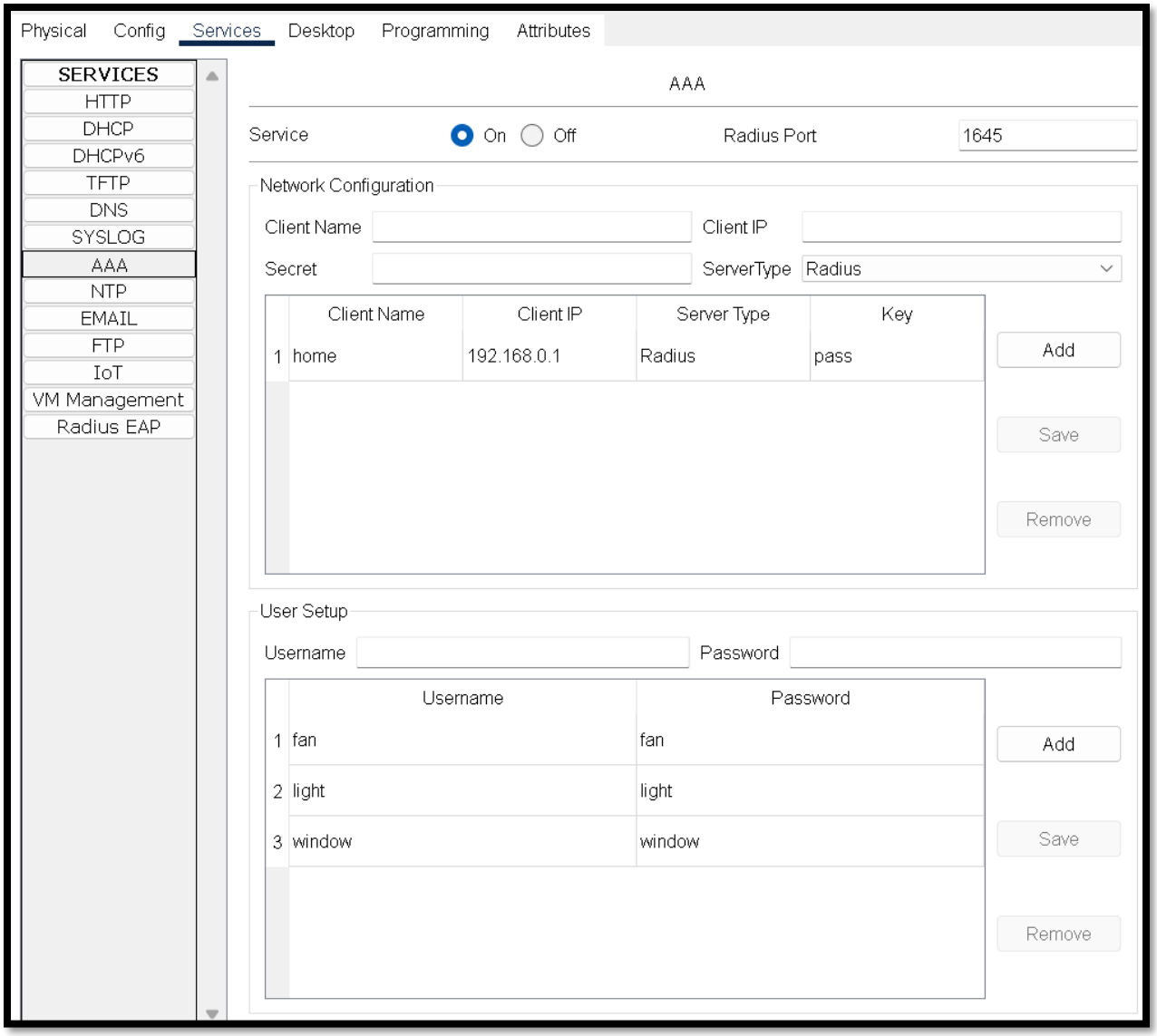
Instructions:

- Implement the given topology diagram.
- Make Server Account/profile of your name and roll number instead of Admin for example “ali05”
- Operate all IOT devices from Client laptop and take screen shots.
- Send packets(Simulation).

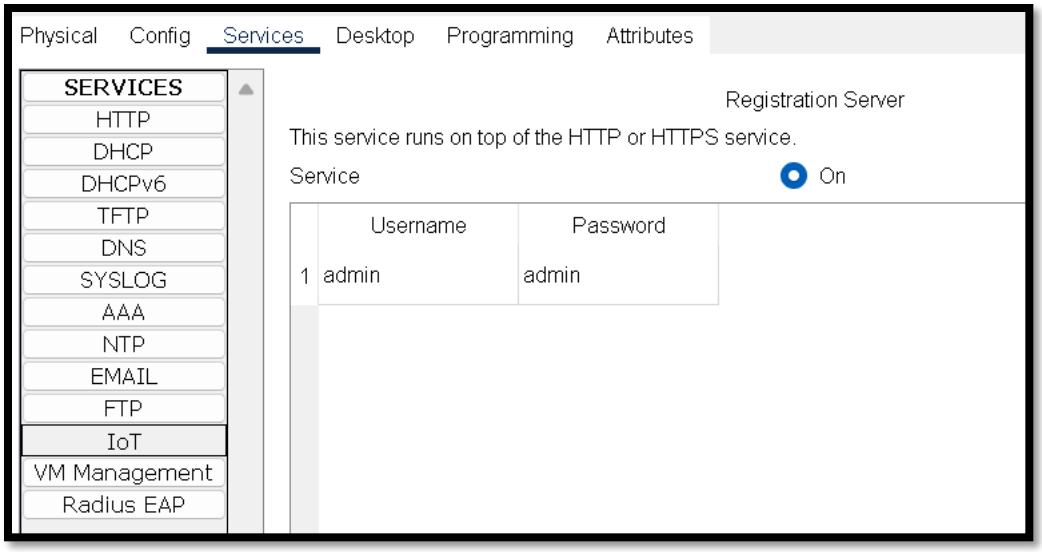


SERVER

Step 1: goto AAA, add client Account, and devices

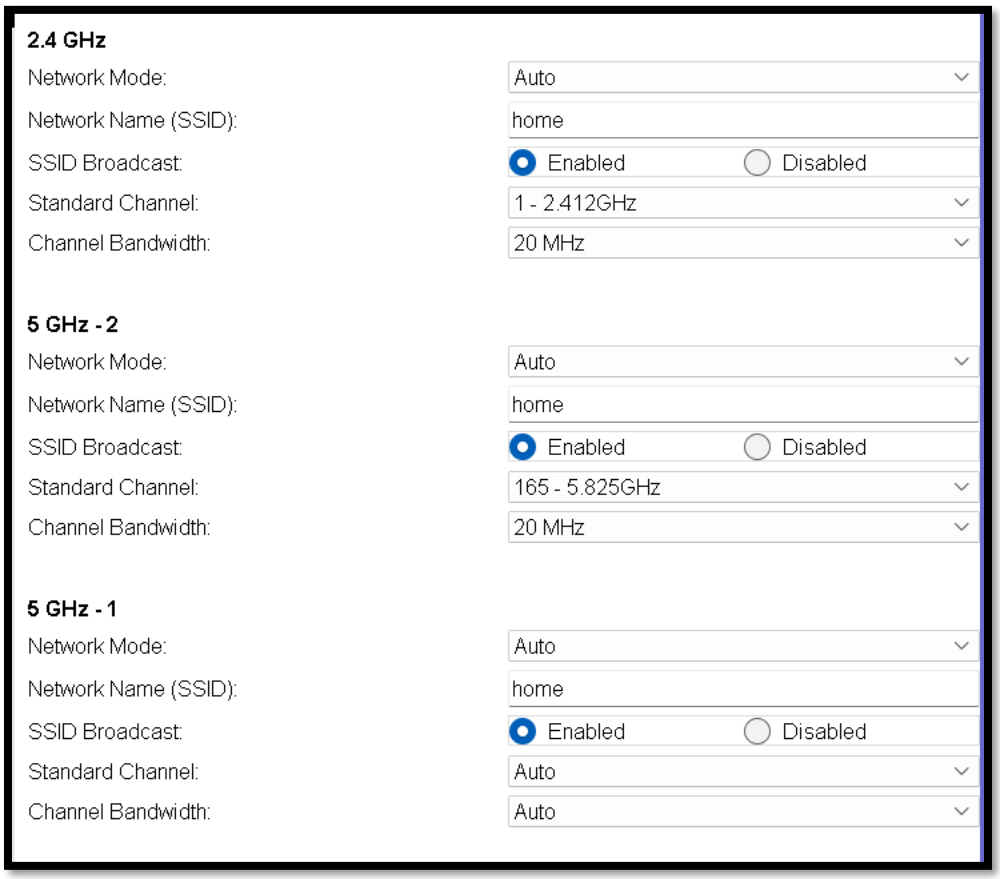


Step 02: goto IoT and just ON

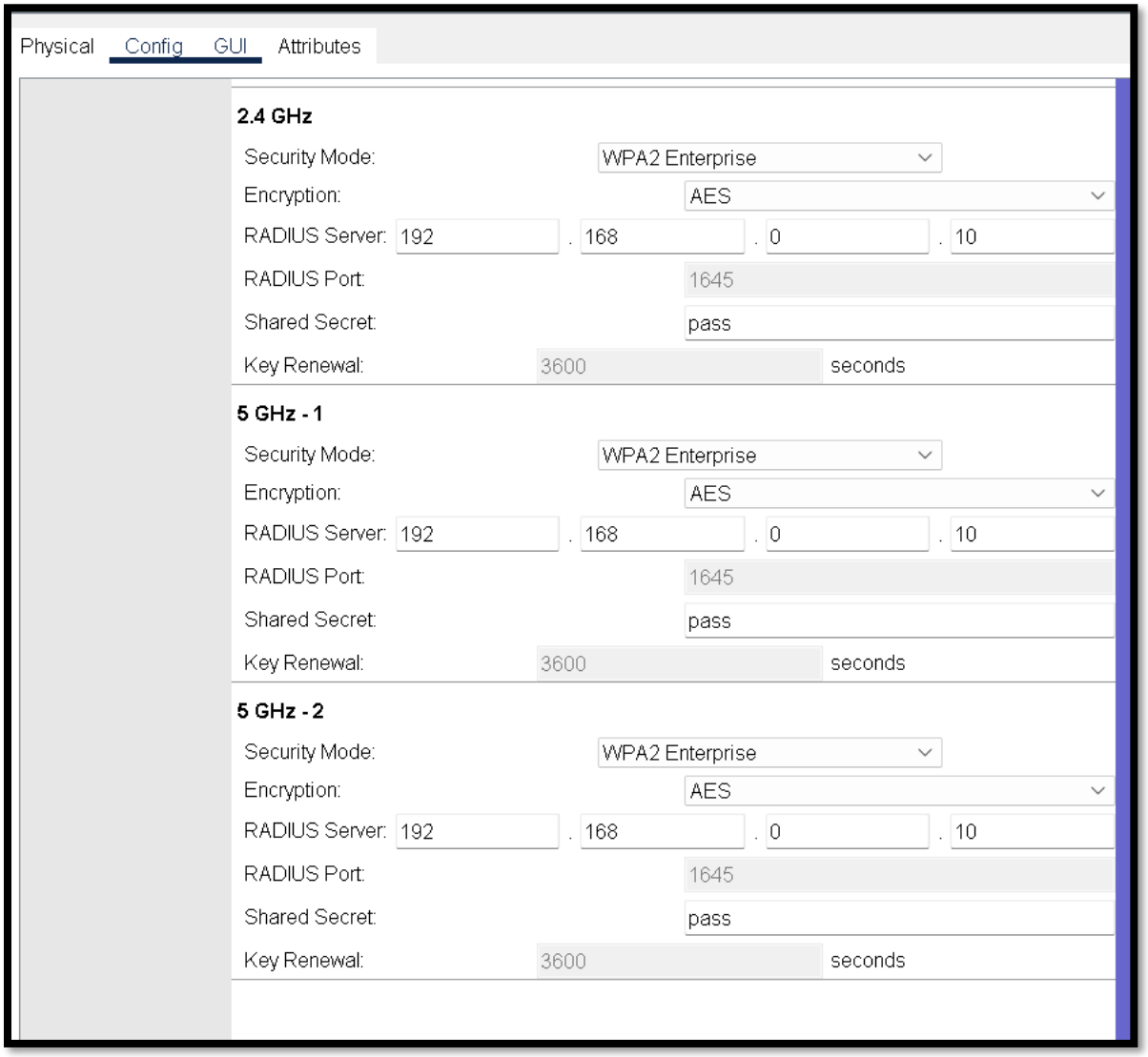


Router Configuration:

Step 01: goto Wireless

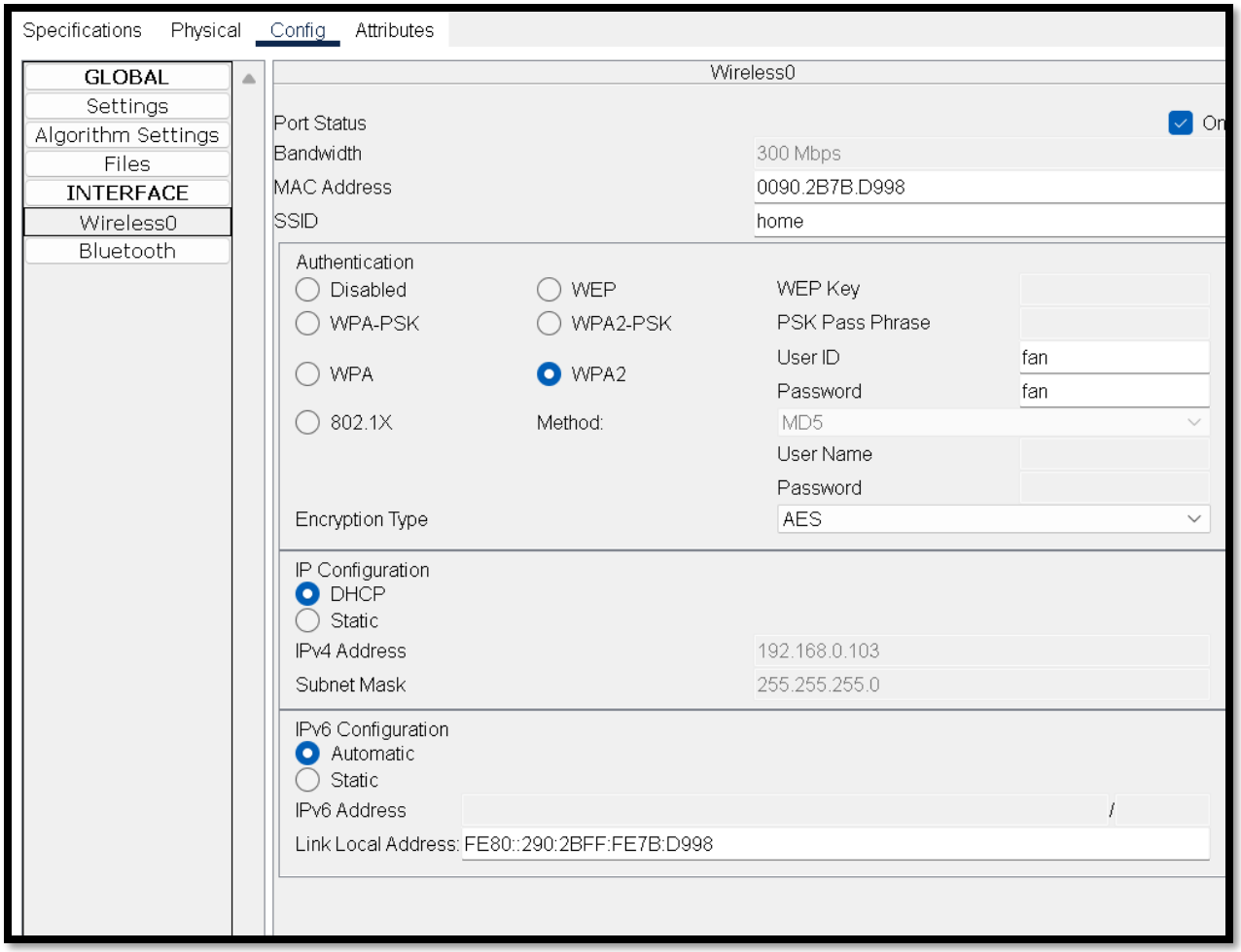


Step 02: goto wireless security:

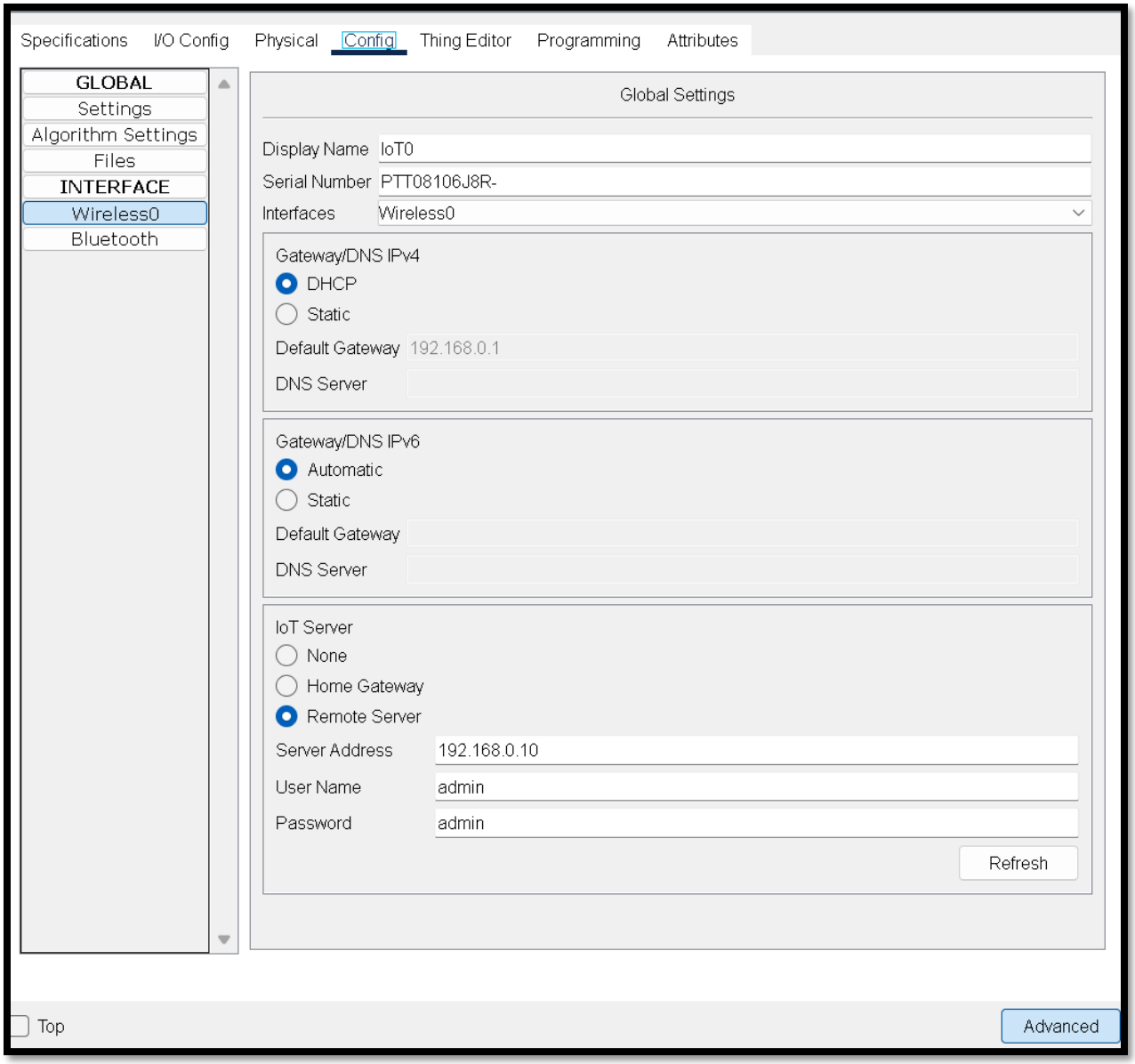


Fan Configuration:

Step 01: goto Wireless0 then config:

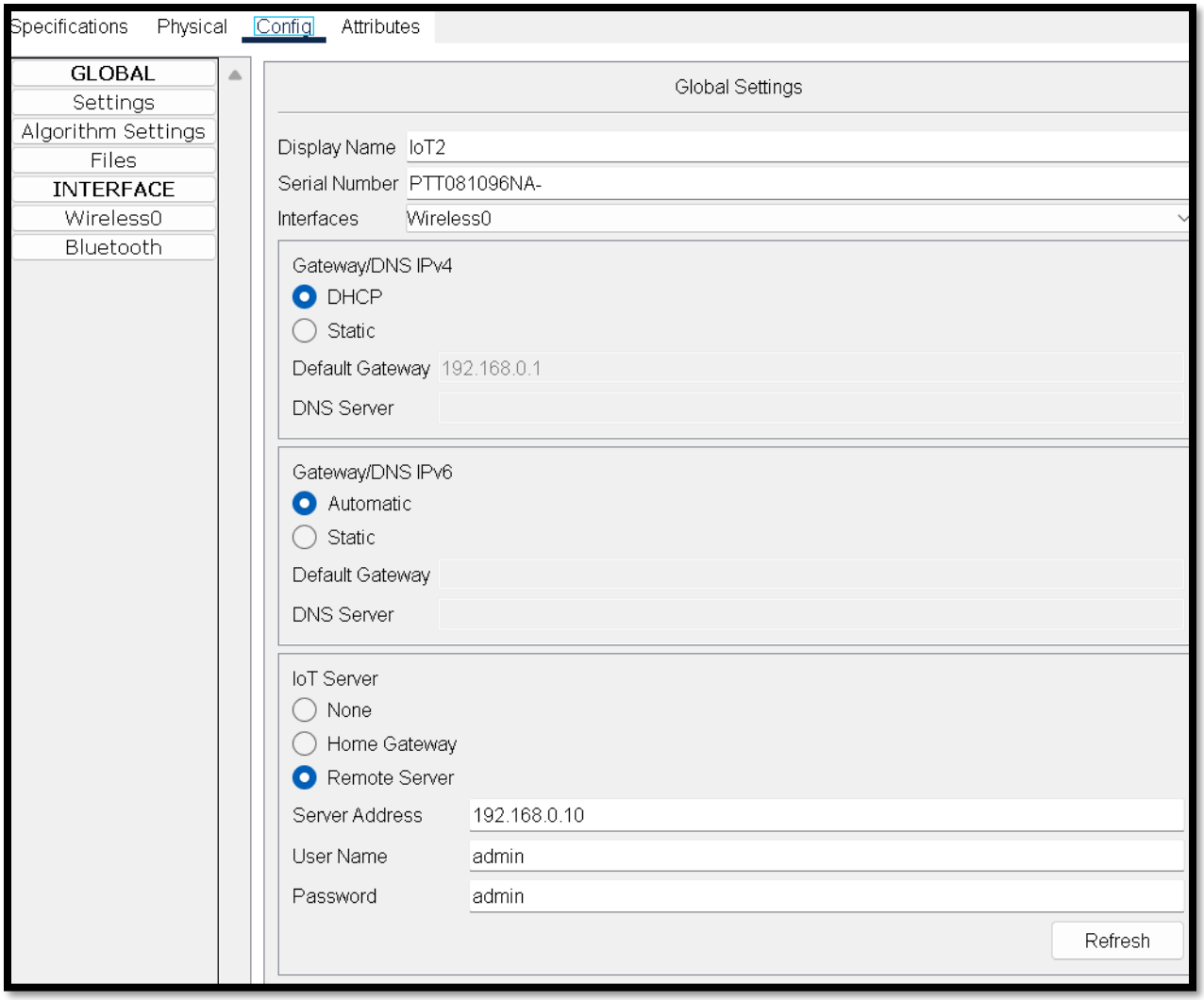


Step 02: goto remote Server:



Repeat these process for all the devices :

Lamp: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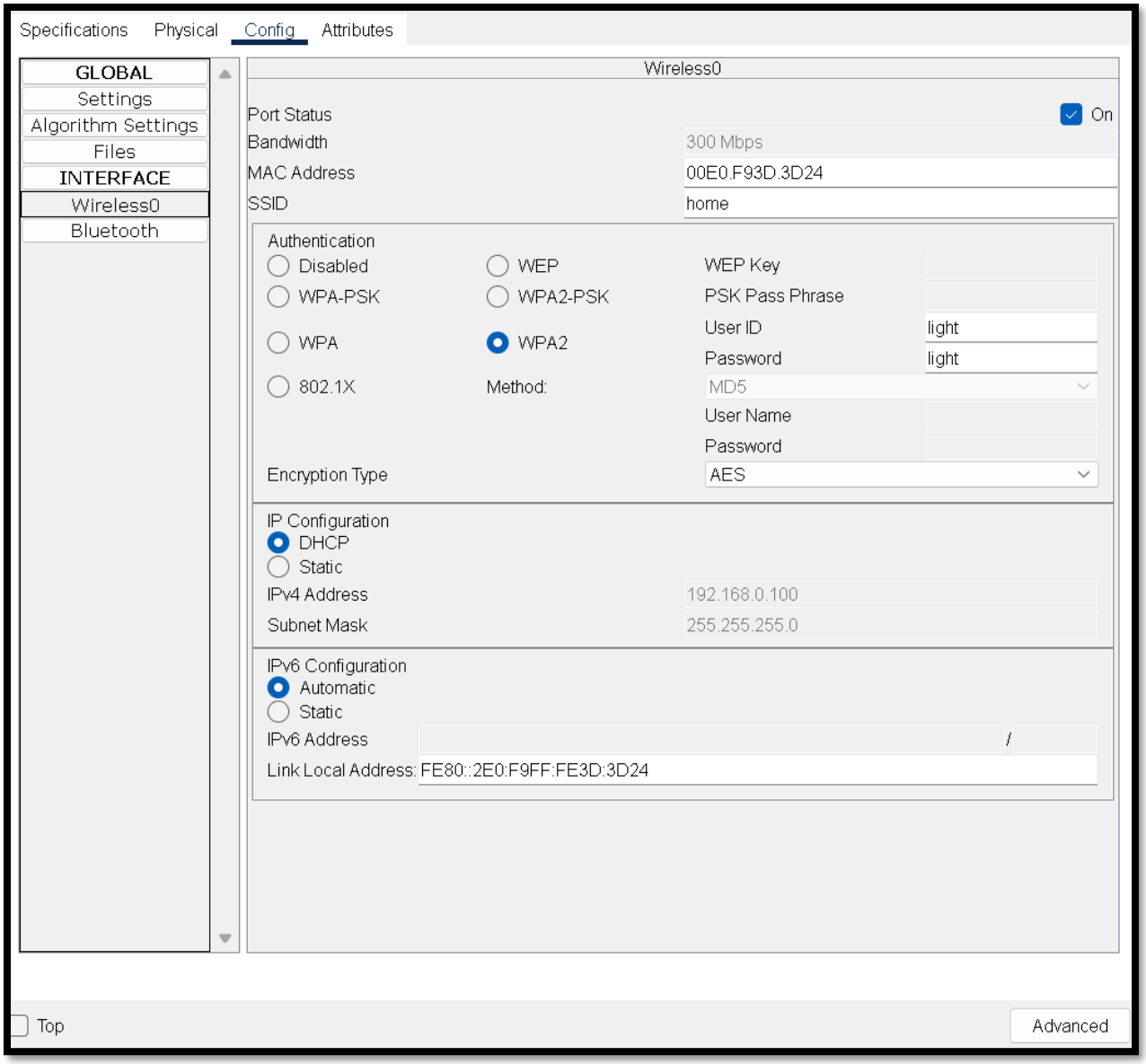
GLOBAL
Settings
Algorithm Settings
Files
INTERFACE
Wireless0
Bluetooth
Global Settings
Display Name
IoT2
Serial Number
PTT081096NA-
Interfaces
Wireless0
Gateway/DNS IPv4
DHCP
Static
Default Gateway
192.168.0.1
DNS Server
Gateway/DNS IPv6
Automatic
Static
Default Gateway
DNS Server
IoT Server
None
Home Gateway
Remote Server
Server Address
192.168.0.10
User Name
admin
Password
admin
Refresh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Settings
Algorithm Settings
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Bluetooth
Wireless0
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On
Bandwidth
300 Mbps
MAC Address
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SSID
home
Authentication
Disabled
WEP
WPA-PSK
WPA2-PSK
WPA
WPA2
802.1X
Method:
MD5
WEP Key
PSK Pass Phrase
User ID
light
Password
light
User Name
Password
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:
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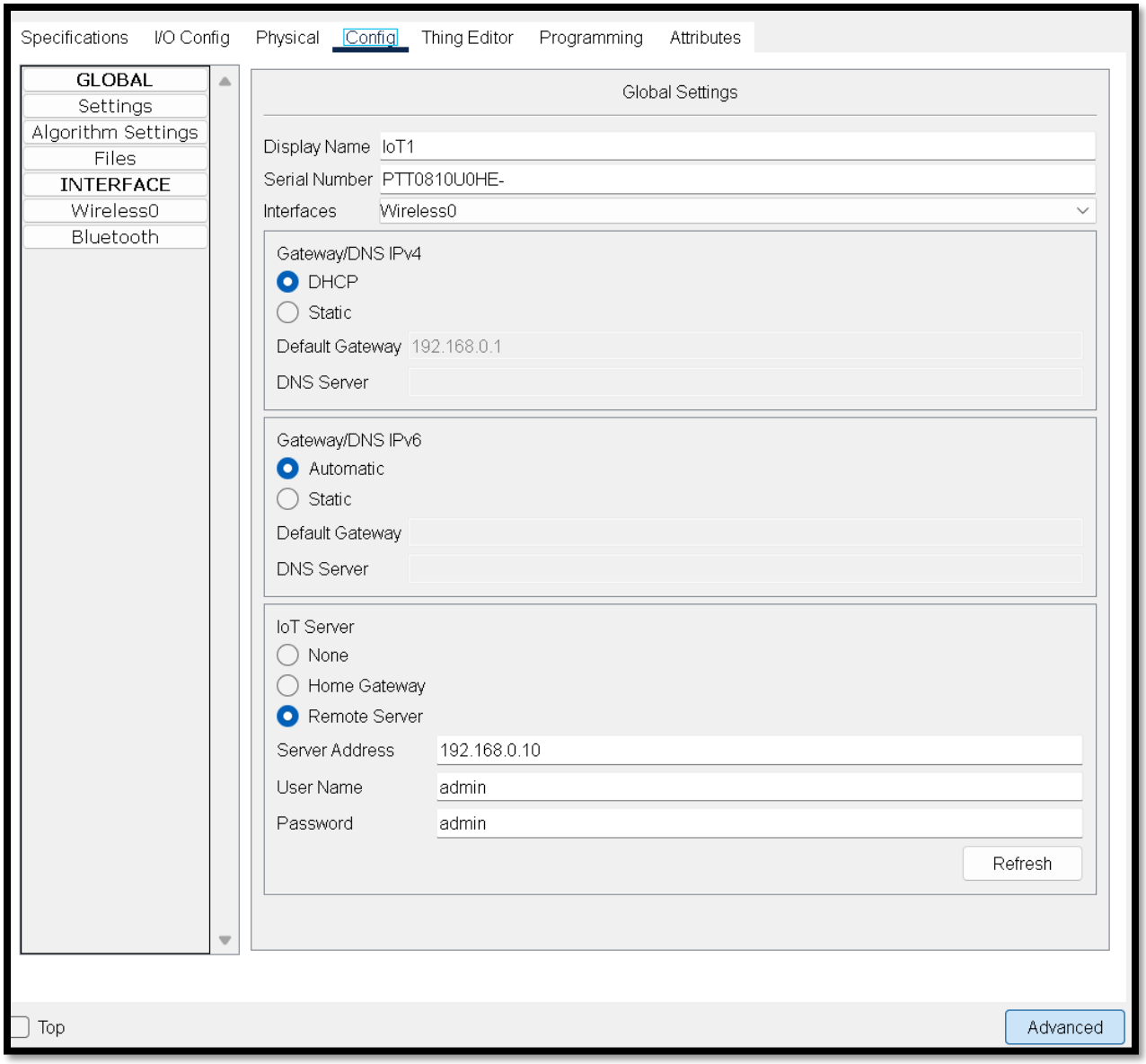
Top
Advanced

Window: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I/O Config
Physical
Config
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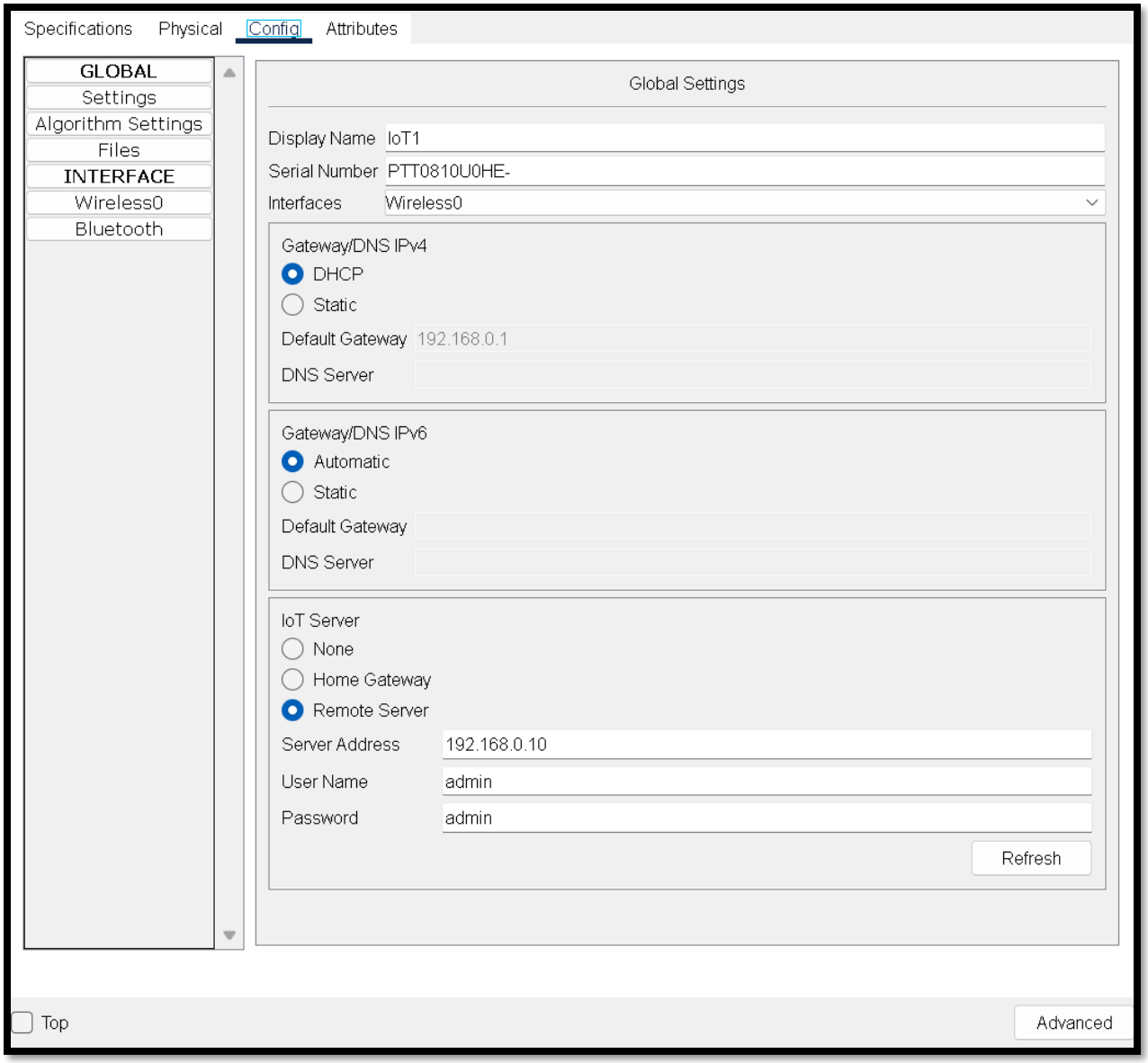
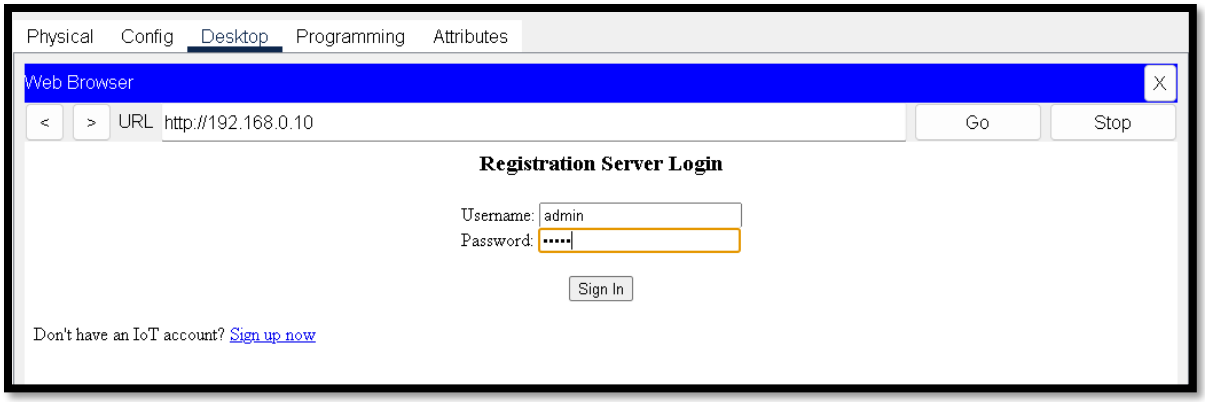
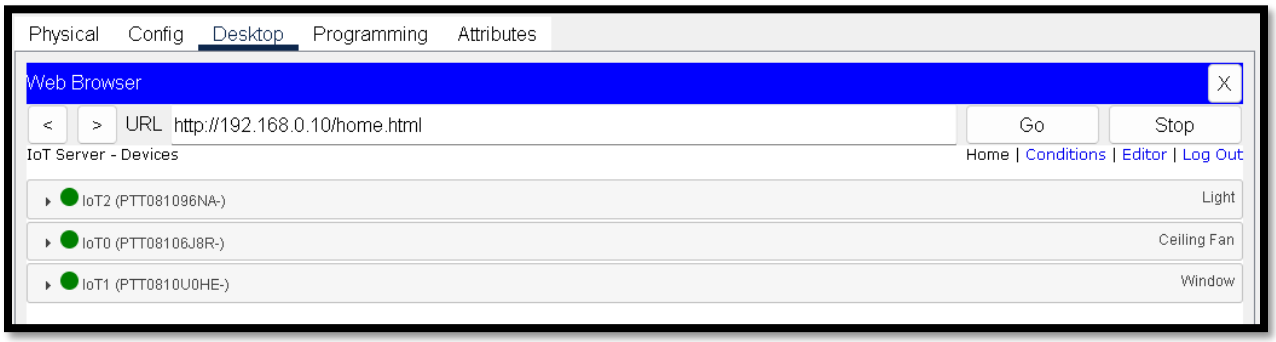
Programming
Attributes
GLOBAL
Settings
Algorithm Settings
Files
INTERFACE
Wireless0
Bluetooth
Global Settings
Display Name
IoT1
Serial Number
PTT0810U0HE-
Interfaces
Wireless0
Gateway/DNS IPv4
DHCP
Static
Default Gateway
192.168.0.1
DNS Server
Gateway/DNS IPv6
Automatic
Static
Default Gateway
DNS Server
IoT Server
None
Home Gateway
Remote Server
Server Address
192.168.0.10
User Name
admin
Password
admin
Refresh
Top
Advanced



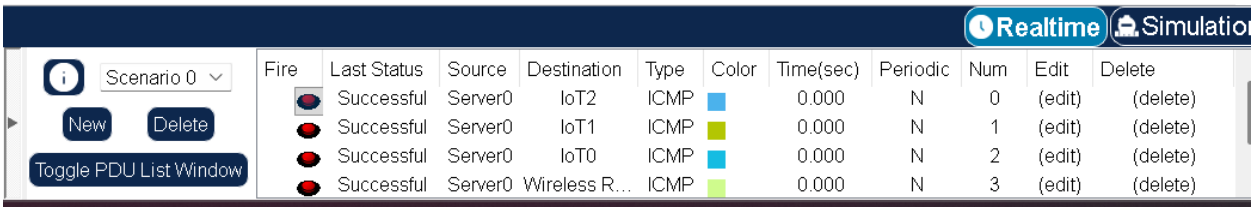
Make User Account On the Laptop Device:





Now you can control the devices From IoT Monitor

Packet Real Time:



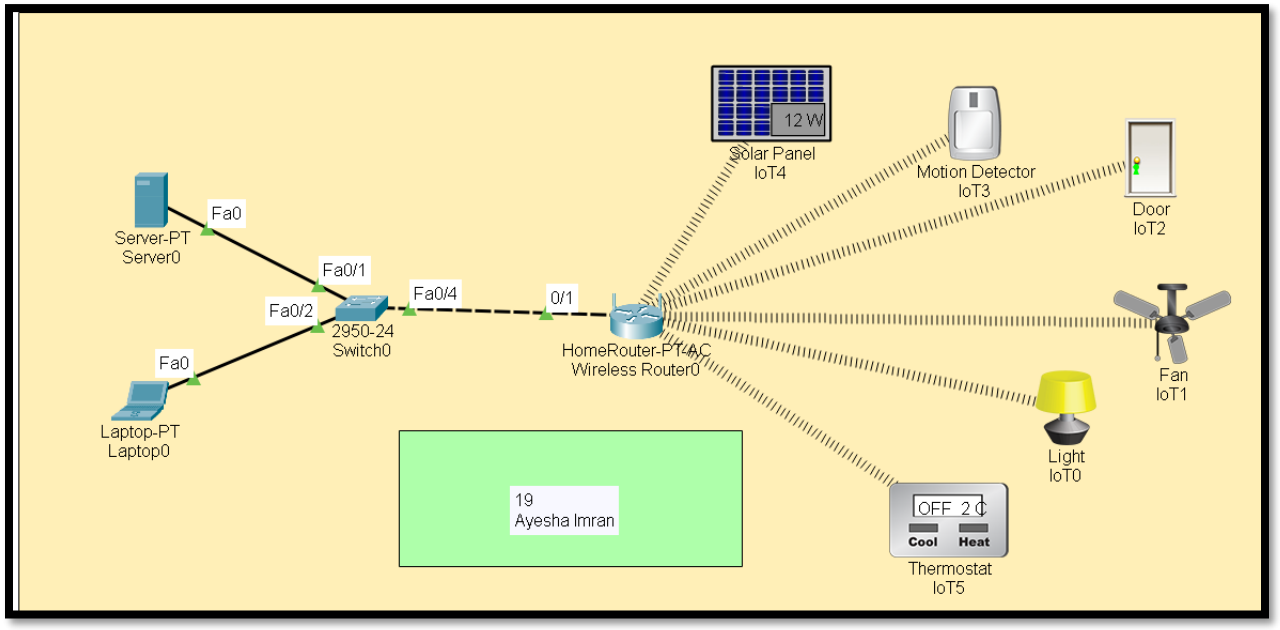
Post Lab Task

Design a smart home network using Cisco Packet Tracer. The smart home will include various IoT devices for automation and monitoring, and it will utilize solar panels for renewable energy.

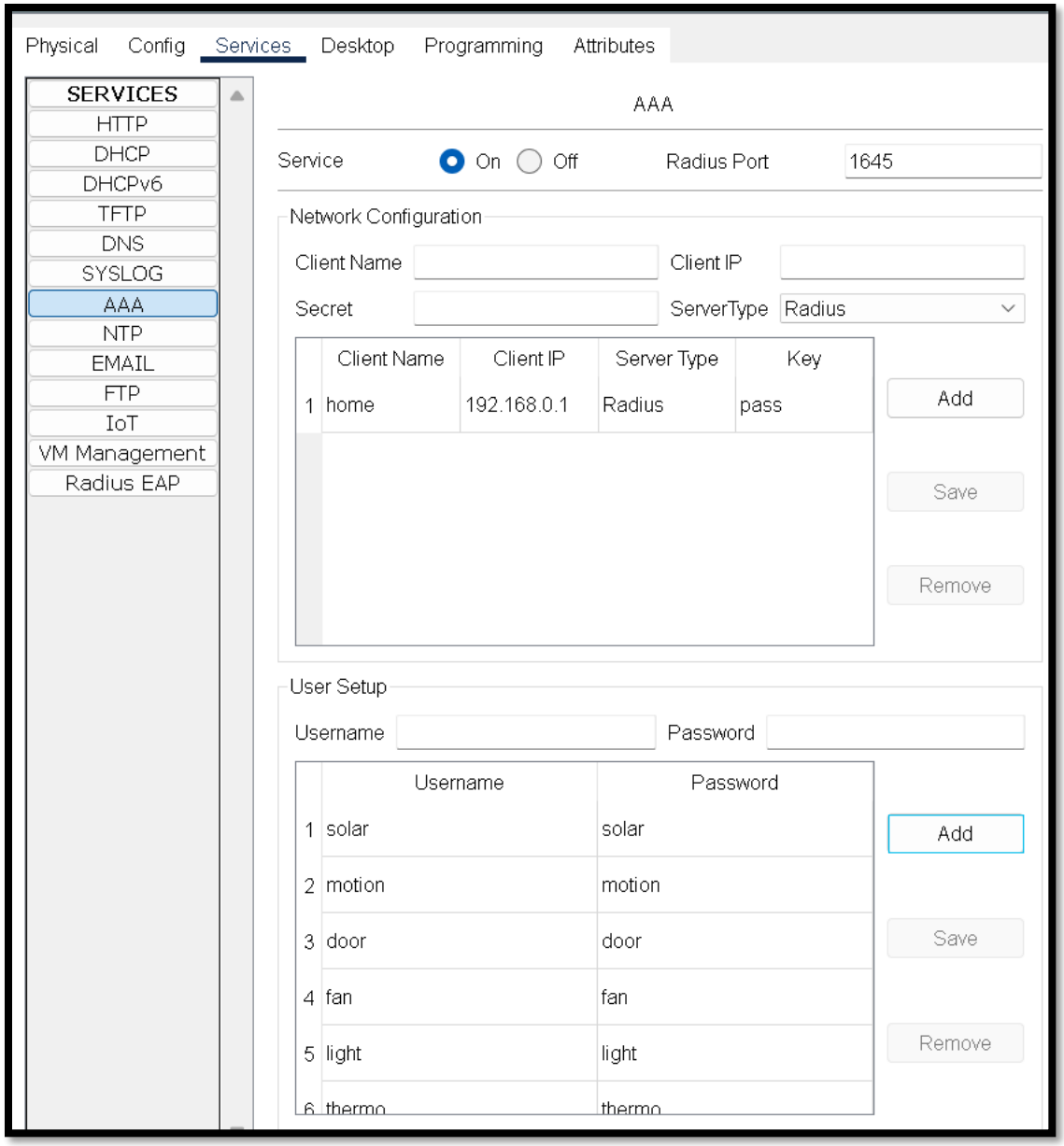
Your goal is to ensure that all devices are connected and can be managed centrally.

Add IoT Devices:

- Place smart lights, smart Fans, a smart thermostat, smart door lock, smart motion sensors, smart plugs, and a smart energy meter in the topology.
- Add the solar panel system with a monitoring interface.
- Instructions:
- Implement the given topology diagram.
- Make Server Account/profile of your name and roll number instead of Admin
- for example “ali05” otherwise you will get zero marks.
- Operate all IOT devices from Client laptop and take screen shots.



Server Configuration: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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
1645
Network Configuration
Client Name
Client IP
Secret
ServerType
Radius
Client Name
Client IP
Server Type
Key
1
home
192.168.0.1
Radius
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Add
Save
Remove
User Setup
Username
Password
Username
Password
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2
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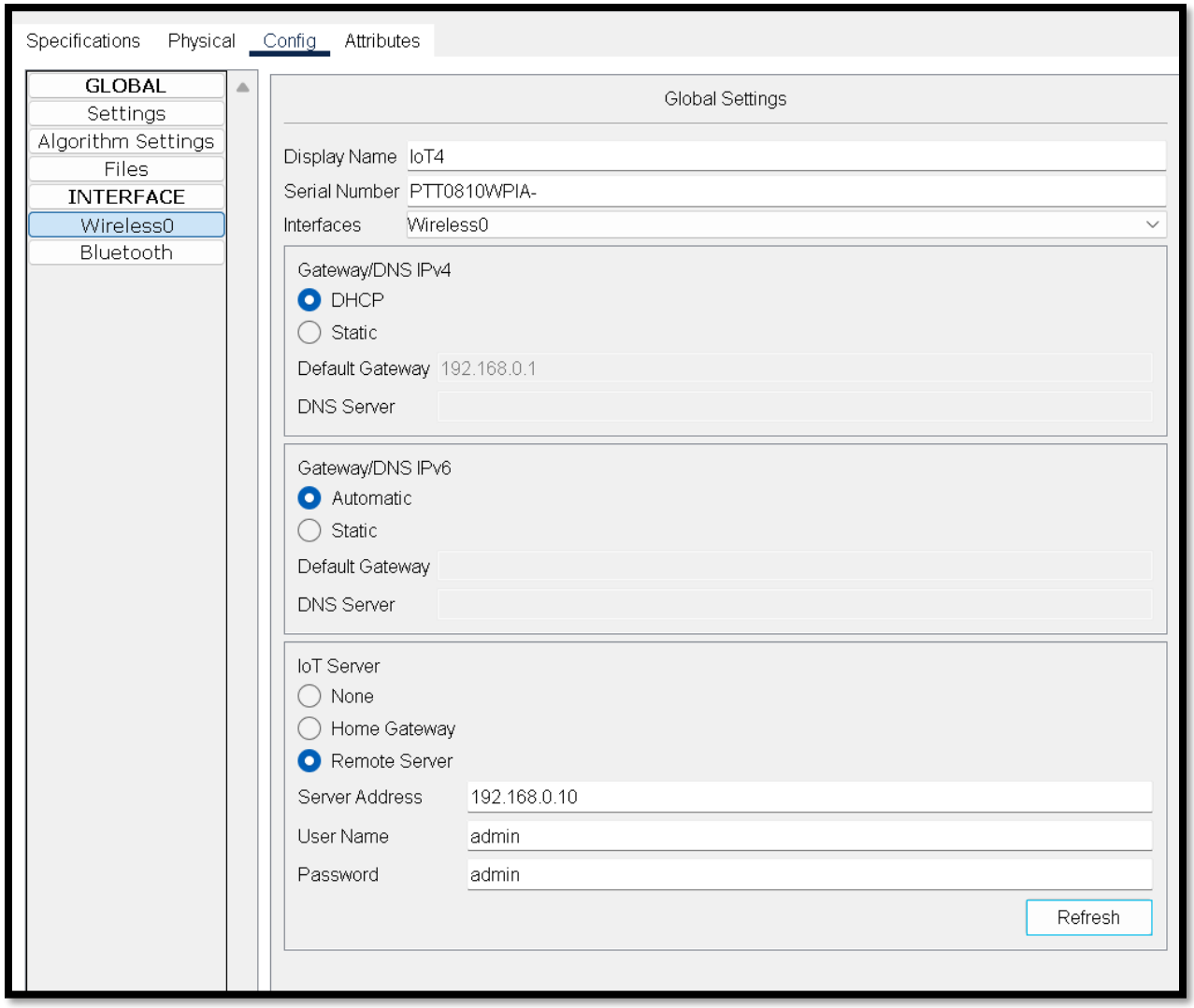
SOLAR PANEL: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Algorithm Settings
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Bluetooth
Global Settings
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Serial Number
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Gateway/DNS IPv6
Automatic
Static
Default Gateway
DNS Server
IoT Server
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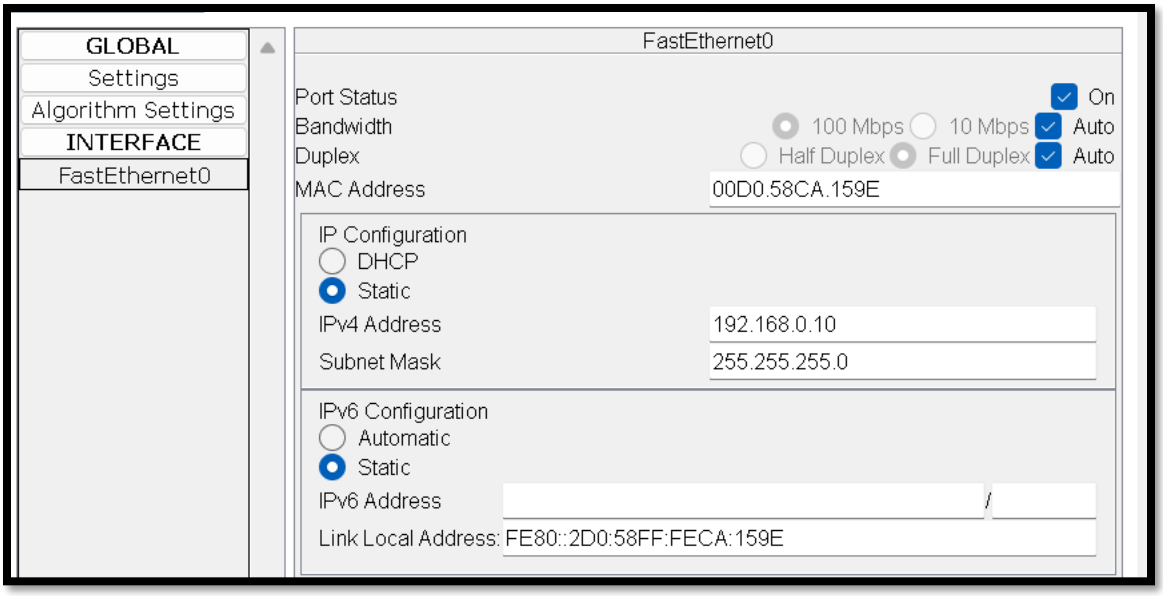
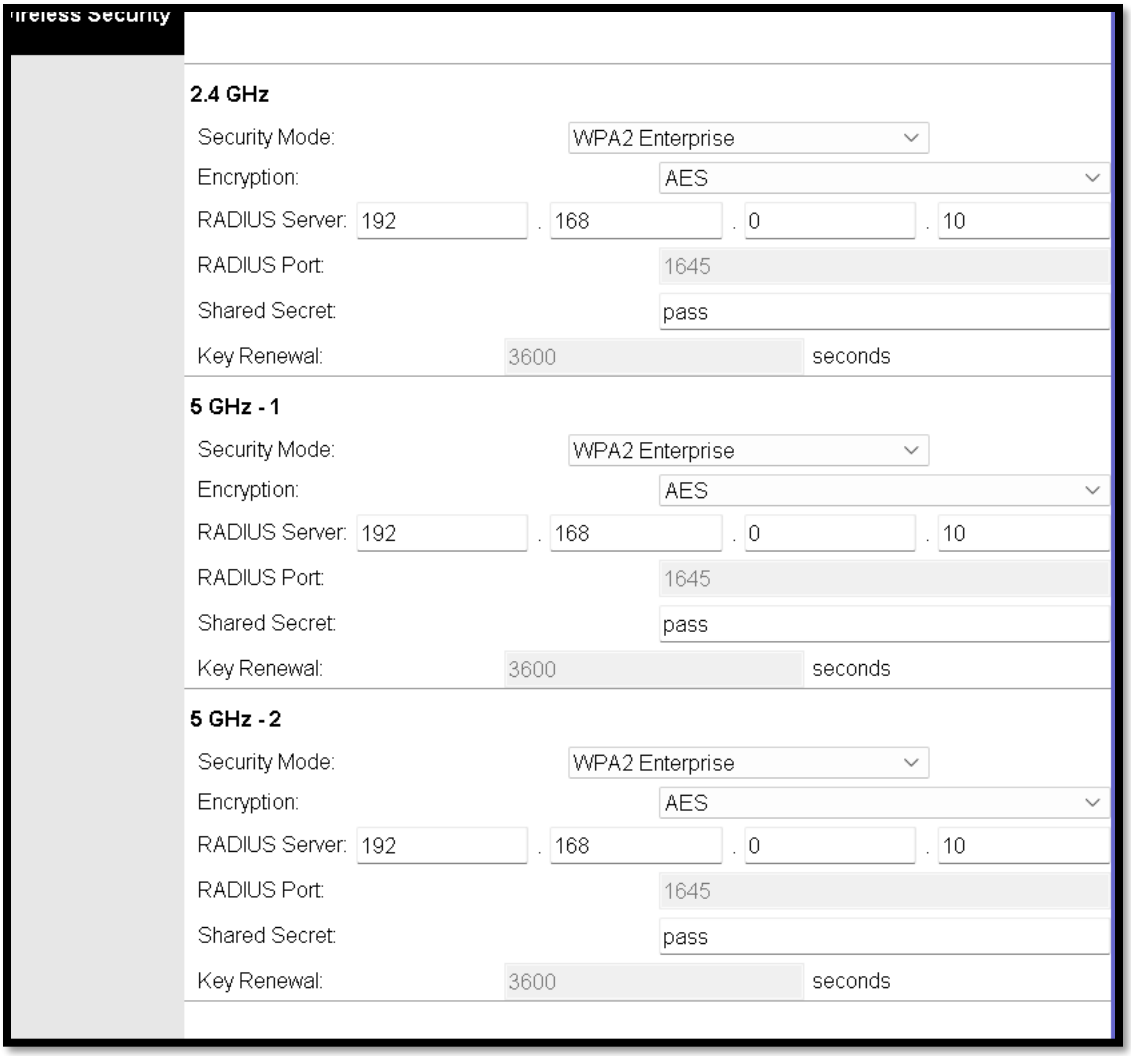
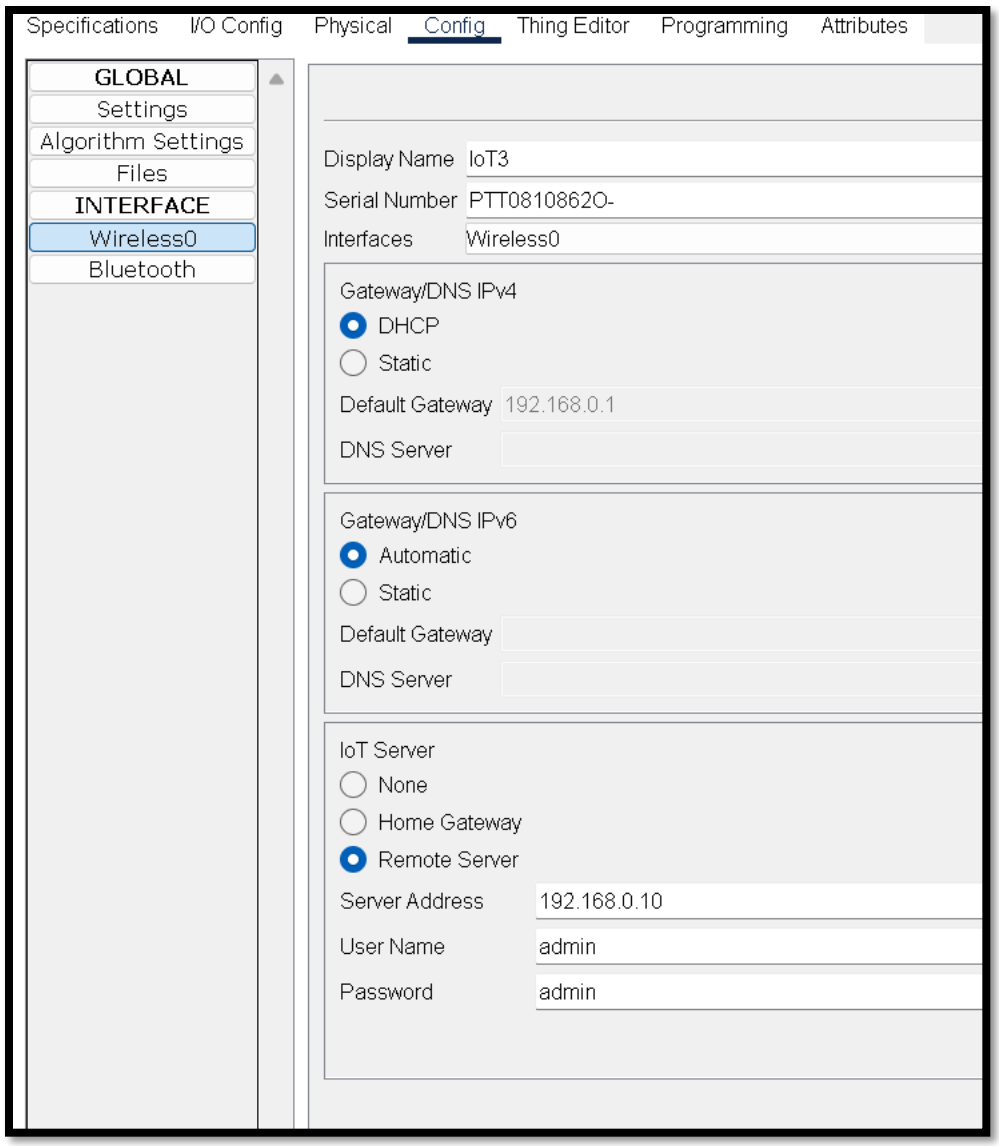
Home Gateway
Remote Server
Server Address
192.168.0.10
User Name
admin
Password
admin
Refresh



Router Configuration:



Motion Sensor: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Display Name
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Serial Number
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192.168.0.1
DNS Server
Gateway/DNS IPv6
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IoT Server
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Server Address
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User Name
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Password
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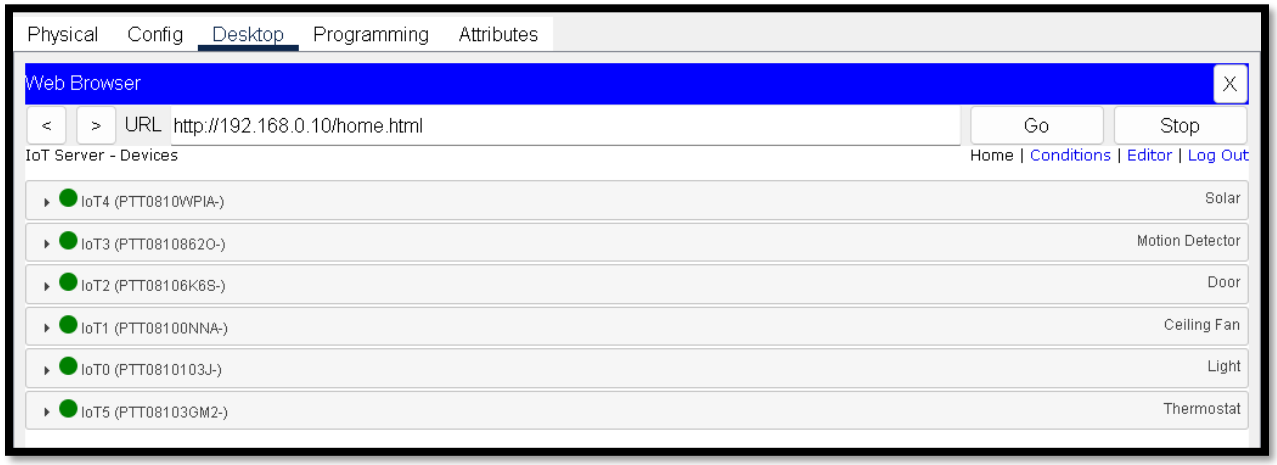
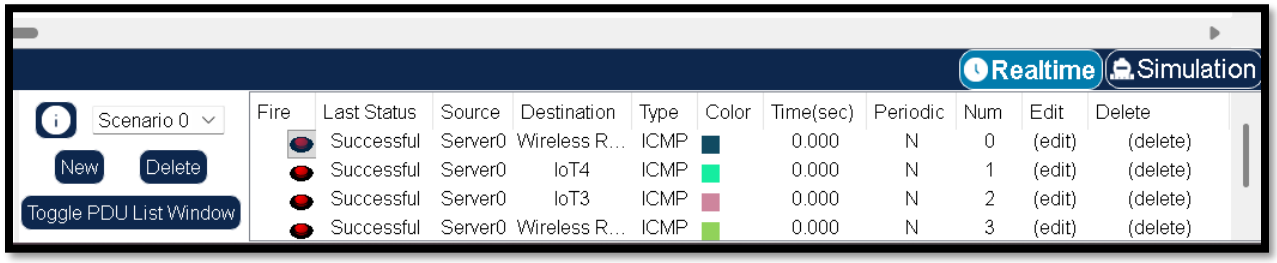

Physical
Config
Desktop
Programming
Attributes
Web Browser
X
<
>
URL
http://192.168.0.10/home.html
Go
Stop
IoT Server - Devices
Home | Conditions | Editor | Log Out
IoT4 (PTT0810WPIA-)
Solar
IoT3 (PTT0810862O-)
Motion Detector
IoT2 (PTT08106K6S-)
Door
IoT1 (PTT08100NNA-)
Ceiling Fan
IoT0 (PTT0810103J-)
Light
IoT5 (PTT08103GM2-)
Thermostat

Packet Send:


Realtime
Simulation
Scenario 0
New
Delete
Toggle PDU List Window
Fire
Last Status
Source
Destination
Type
Color
Time(sec)
Periodic
Num
Edit
Delete
Successful Server0 Wireless R... ICMP 0.000 N 0 (edit) (delete)
Successful Server0 IoT4 ICMP 0.000 N 1 (edit) (delete)
Successful Server0 IoT3 ICMP 0.000 N 2 (edit) (delete)
Successful Server0 Wireless R... ICMP 0.000 N 3 (edit) (delete)