IoT Smart Home Network with RADIUS Authentication - Project Documentation

Project Name: Smart Home IoT Network with RADIUS Server
Version: Cisco Packet Tracer 8.2.0.20400
Date: 8th August 2025
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1. Introduction

This document provides detailed information about the IoT Smart Home Network project with RADIUS authentication. The network is designed and simulated in Cisco Packet Tracer, connecting IoT devices through a wireless router, controlled via an IoT server, and authenticated through a RADIUS server. This documentation includes network design, IP address allocation, device configurations, and project screenshots.

2. Objectives

- Simulate a smart home IoT network in Cisco Packet Tracer.
- Implement RADIUS authentication for secure device access.
- Connect IoT devices, PCs, and laptops for monitoring and control.
- Configure DHCP and static IP where required.
- Test the network for connectivity and authentication functionality.

3. Network Topology

The network topology consists of an IoT server, RADIUS server, wireless router, switch, and multiple IoT devices including smart lights, fans, temperature monitors, and motion detectors. The laptop is connected via a copper straight-through cable to the switch.

4. Device List

1. Wireless Router
2. Switch
3. IoT Server
4. RADIUS Server
5. Smart Light(s)
6. Smart Fan(s)

7. Temperature Monitor
8. Motion Detector
9. Laptop

5. IP Address Plan

The network uses the IP range 192.168.0.0 with a subnet mask of 255.255.255.0. DHCP is enabled on the wireless router for automatic IP allocation to IoT devices and laptops. Static IPs are assigned to servers.

Refer to ip_address_plan.txt for detailed IP allocation.

6. Device Configurations

Device-specific configurations are saved in the file device_configurations.txt.

7. RADIUS Configuration

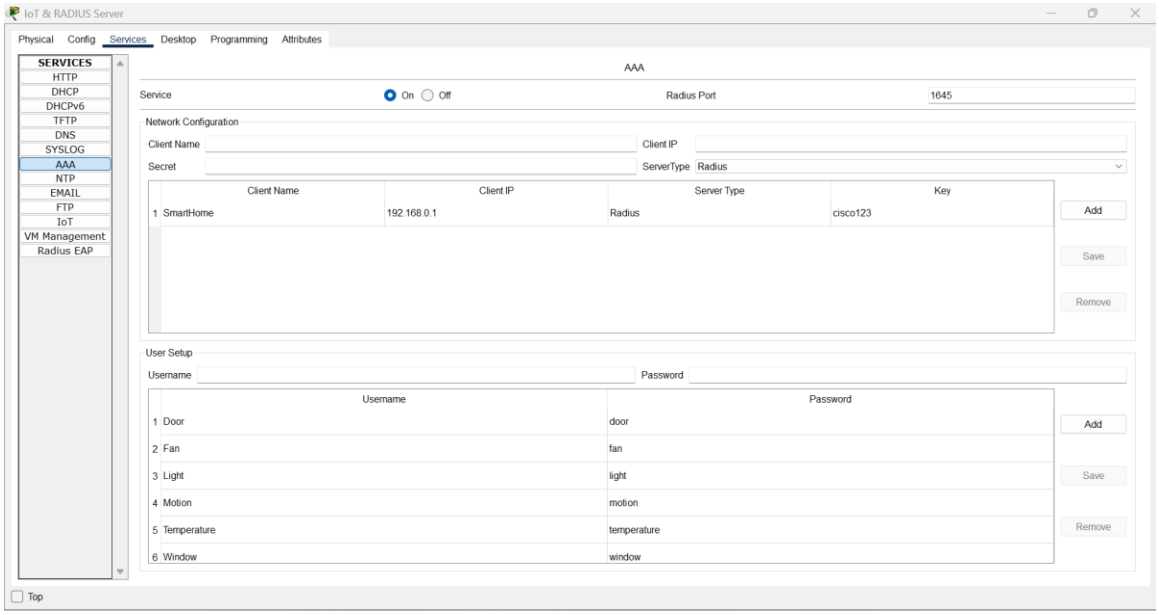
The RADIUS server is configured with user authentication settings. Refer to radius_config.txt for full configuration details.

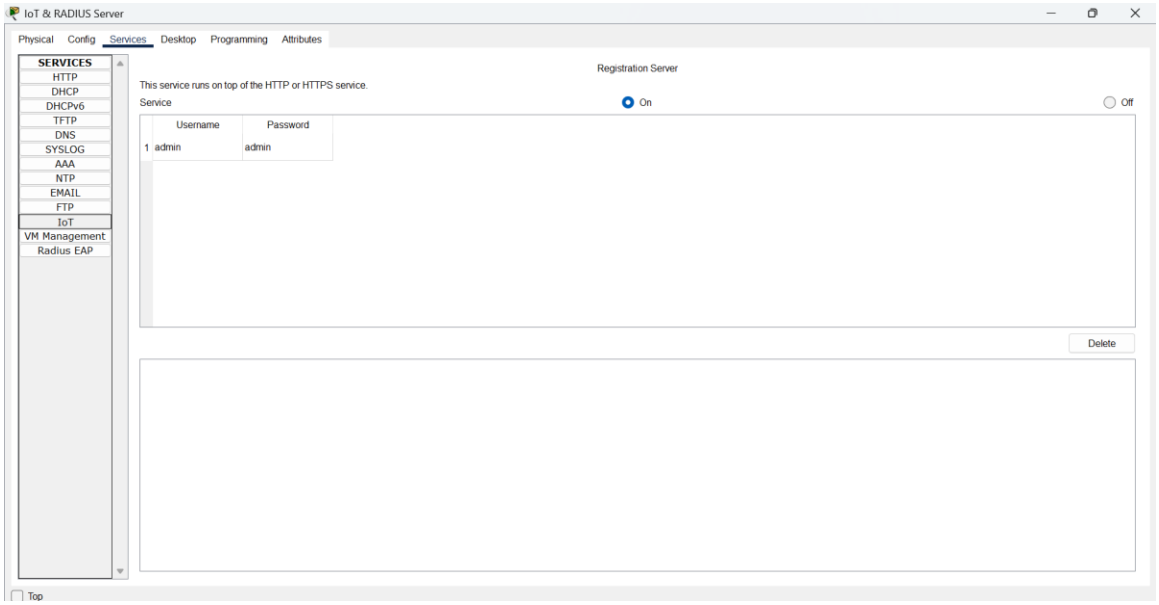
8. Testing and Verification

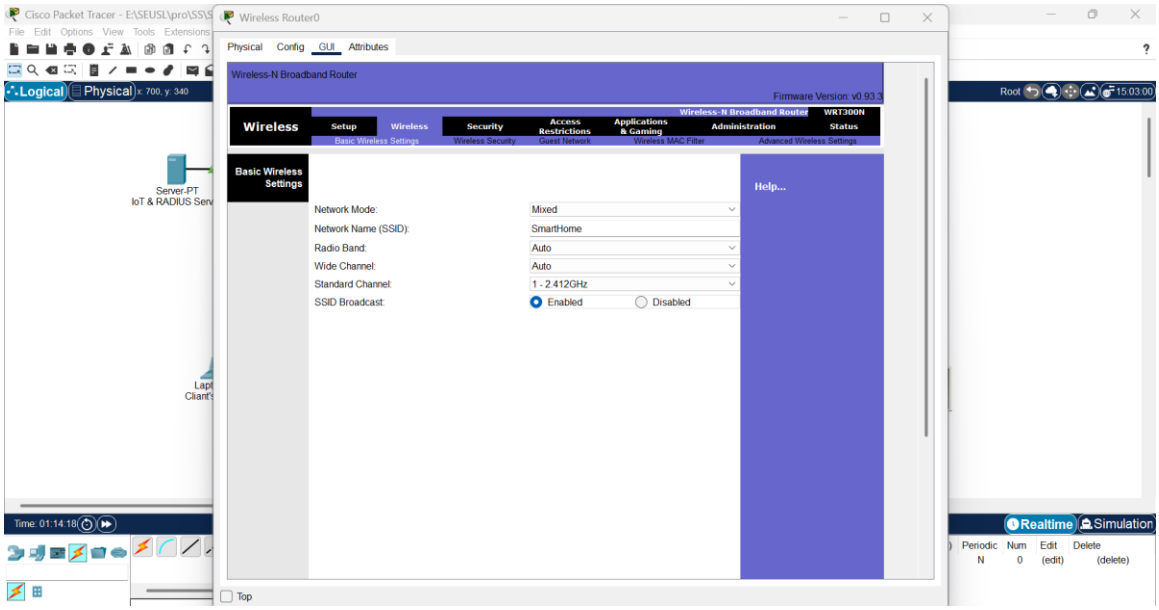
- Ping tests were conducted between devices to ensure network connectivity.
- IoT devices were successfully controlled via the IoT server.
- RADIUS authentication was tested to confirm secure access control.

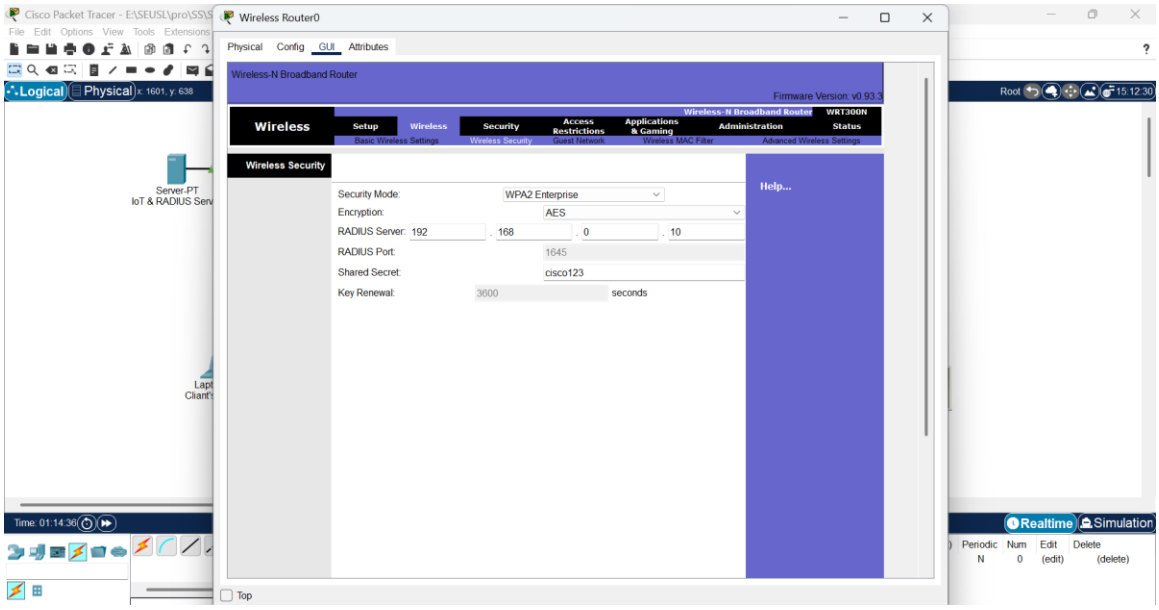
9. Screenshots

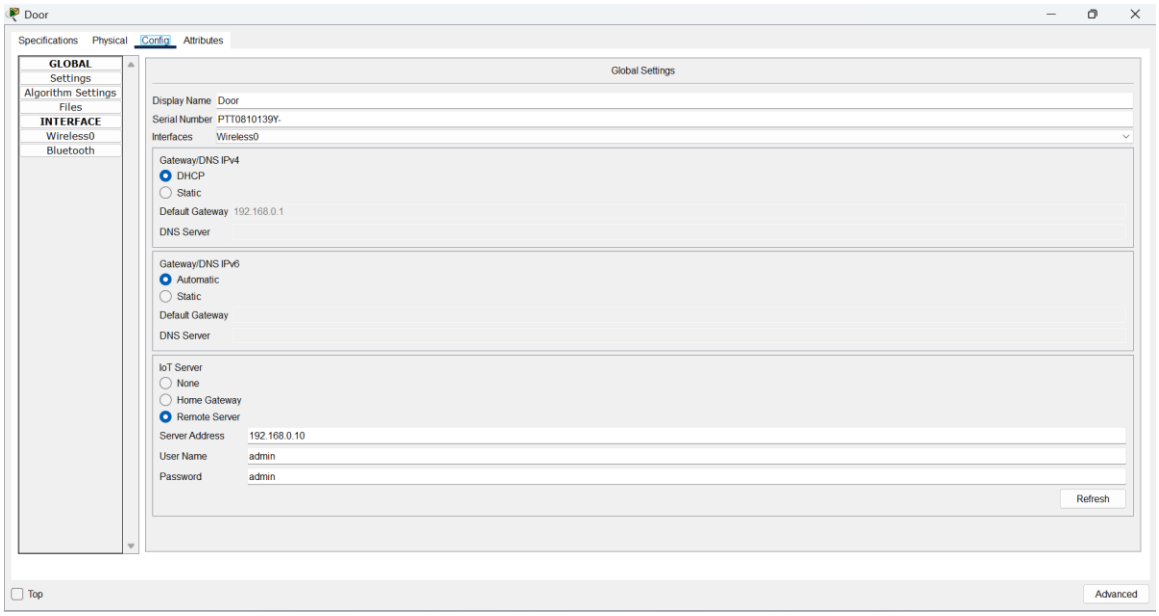
This section includes screenshots of the network topology, configurations, and testing results.






Wireless Router0
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
Wireless Security
Guest Network
Wireless MAC Filter
Advanced Wireless Settings
Basic Wireless Settings
Help...
Network Mode: Mixed
Network Name (SSID): SmartHome
Radio Band: Auto
Wide Channel: Auto
Standard Channel: 1 - 2.412GHz
SSID Broadcast: Enabled Disabled
Top


Wireless Router0
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
Help...
Security Mode: WPA2 Enterprise
Encryption: AES
RADIUS Server: 192 . 168 . 0 . 10
RADIUS Port: 1645
Shared Secret: cisco123
Key Renewal: 3600 seconds
Top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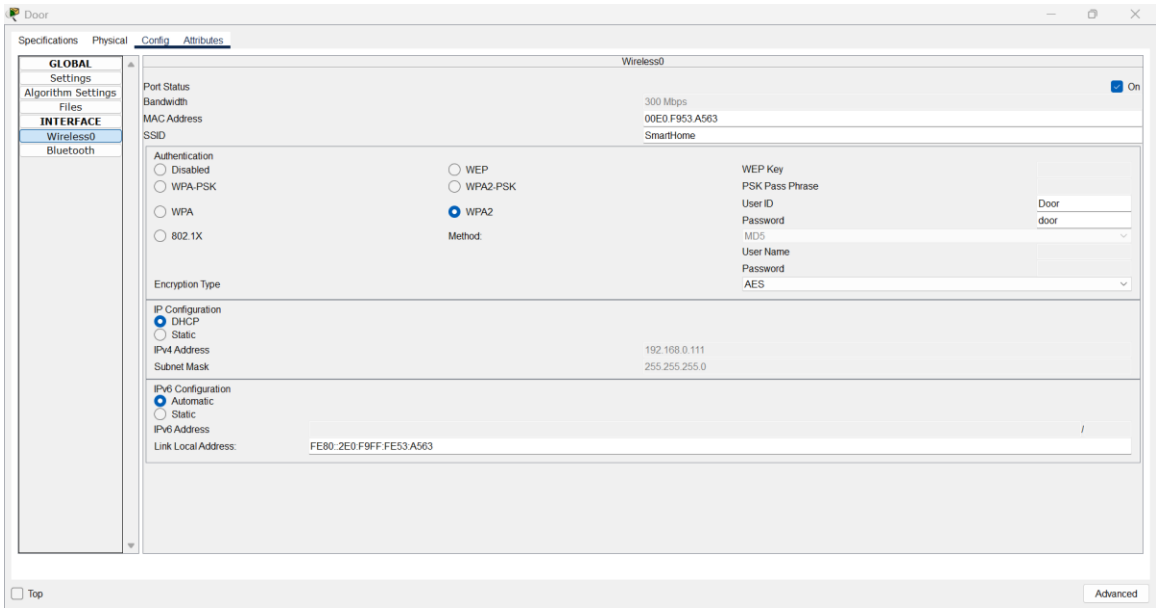
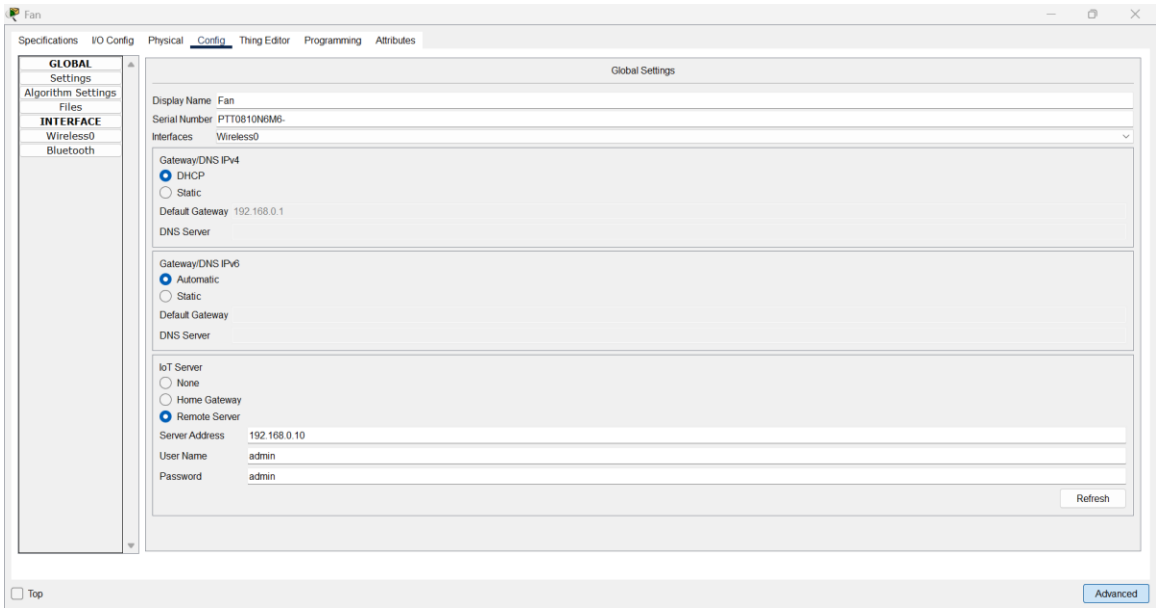
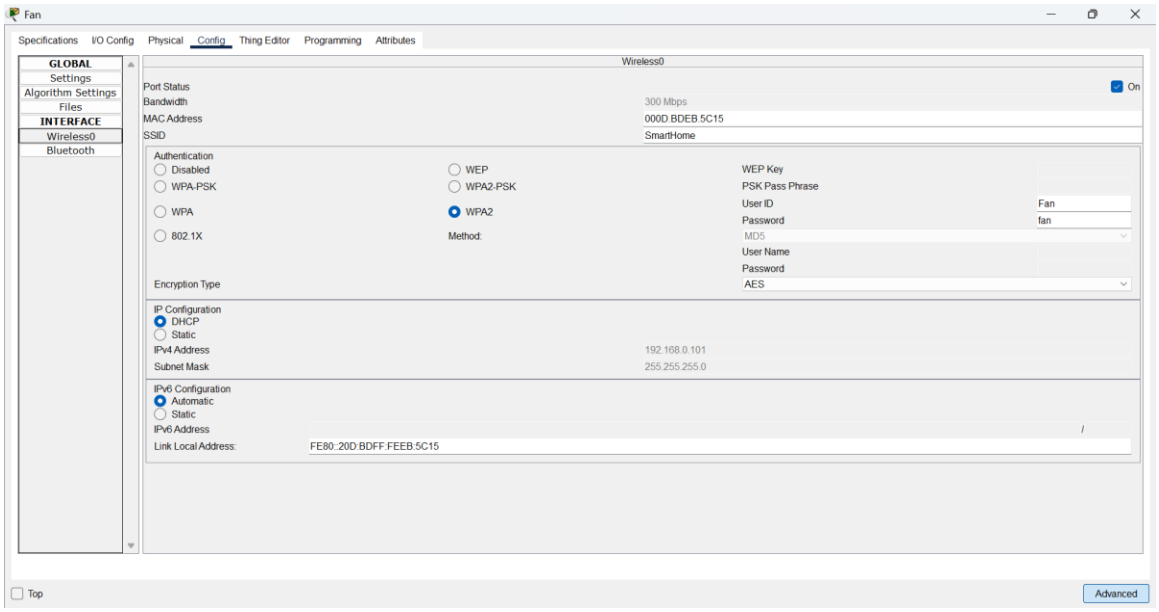
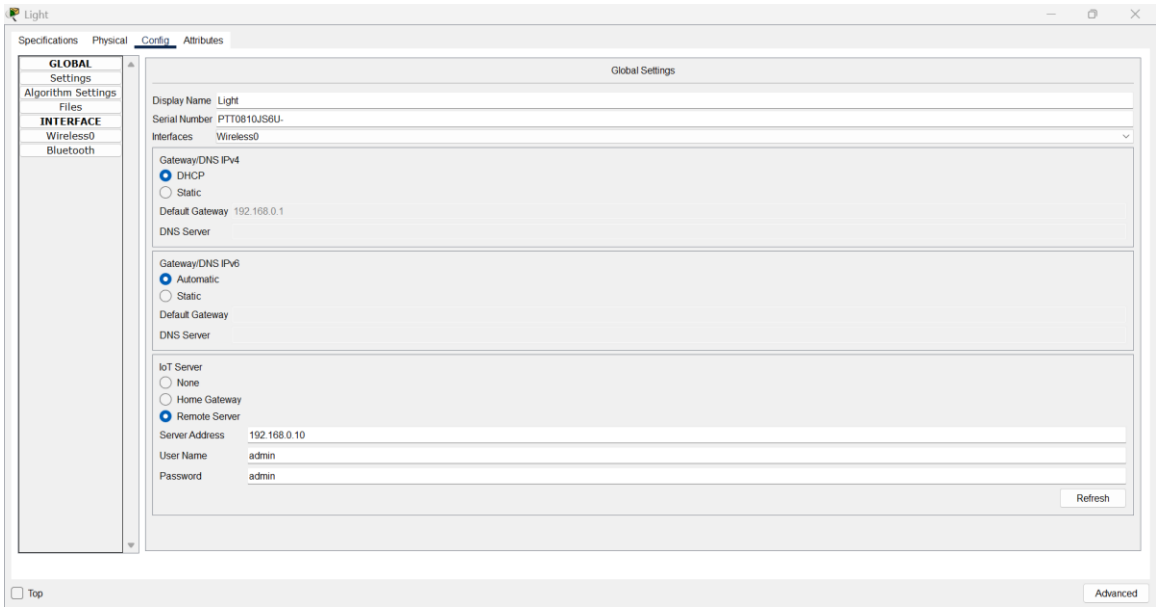
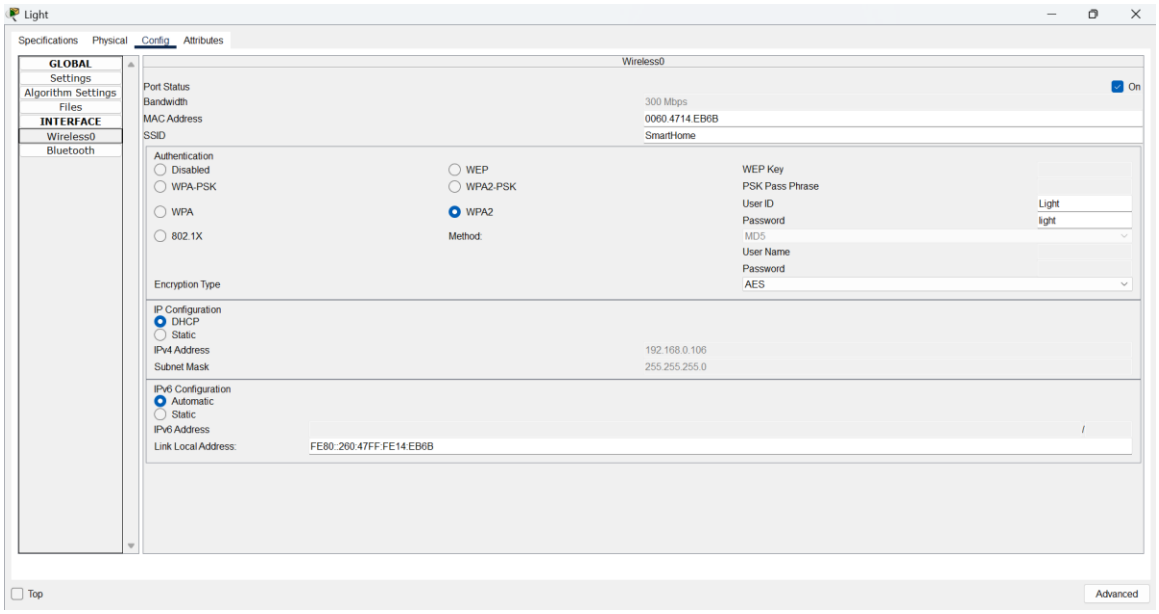
Specifications
Physical
Config
Attributes
GLOBAL
Settings
Algorithm Settings
Files
INTERFACE
Wireless0
Bluetooth
Global Settings
Display Name Door
Serial Number PTT0810139Y-
Interfaces Wireless0
Gateway/DNS IPv4
DHCP
Static
Default Gateway 192.168.0.1
DNS Server
Gateway/DNS IPv6
Automatic
Static
Default Gateway
DNS Server
IoT Server
None
Home Gateway
Remote Server
Server Address 192.168.0.10
User Name admin
Password admin
Refresh
Top
Advanced

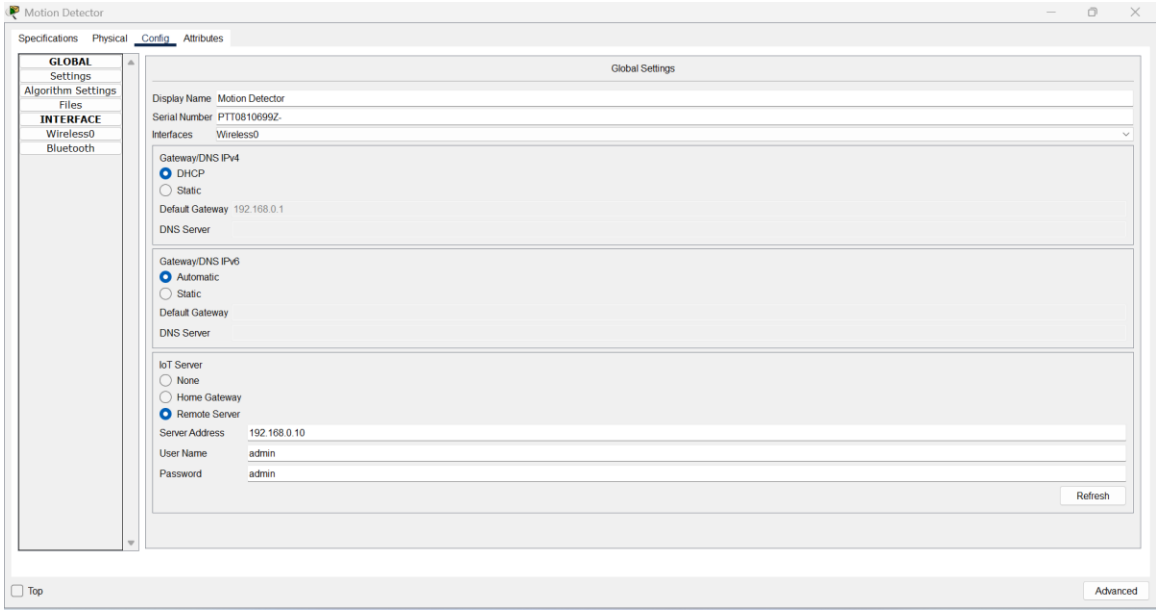

Door
Specifications
Physical
Config
Attributes
GLOBAL
Settings
Algorithm Settings
Files
INTERFACE
Wireless0
Bluetooth
Wireless0
Port Status
On
Bandwidth 300 Mbps
MAC Address 00E0.F953.A563
SSID SmartHome
Authentication
Disabled
WPA-PSK
WPA
802.1X
WEP
WPA2-PSK
WPA2
Method:
WEP Key
PSK Pass Phrase
User ID Door
Password door
MD5
User Name
Password
Encryption Type AES
IP Configuration
DHCP
Static
IPv4 Address 192.168.0.111
Subnet Mask 255.255.255.0
IPv6 Configuration
Automatic
Static
IPv6 Address /
Link Local Address: FE80::2E0:F9FF:FE53:A563
Top
Advanced

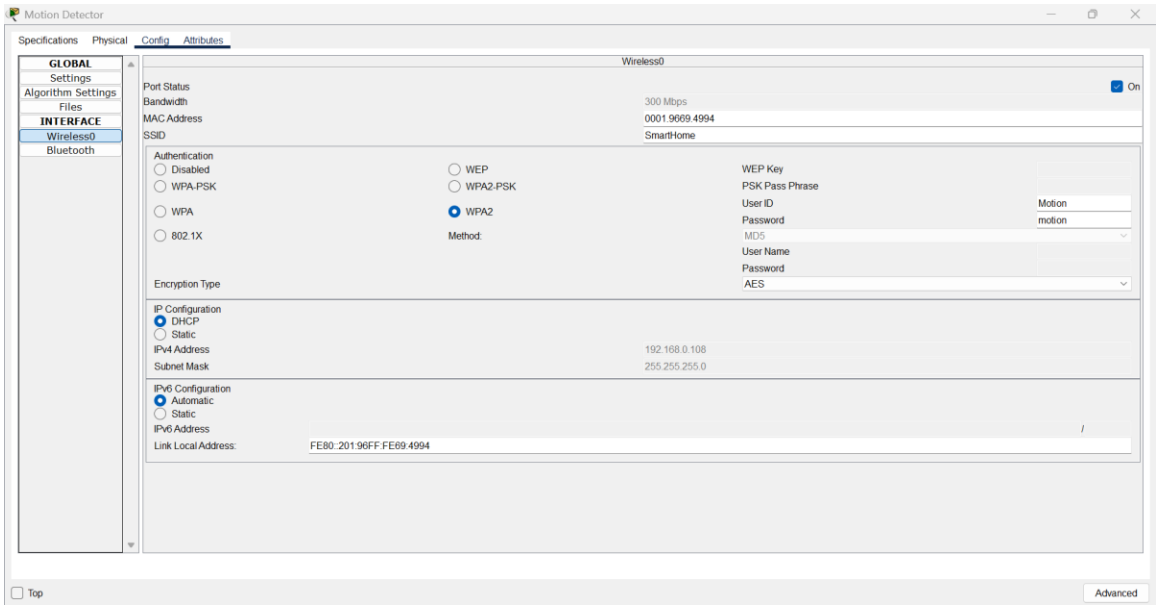

Fan
Specifications
I/O Config
Physical
Config
Thing Editor
Programming
Attributes
GLOBAL
Settings
Algorithm Settings
Files
INTERFACE
Wireless0
Bluetooth
Global Settings
Display Name
Fan
Serial Number
PTT0810N6M6-
Interfaces
Wireless0
Gateway/DNS IPv4
DHCP
Static
Default Gateway
192.168.0.1
DNS Server
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


Fan
Specifications
I/O Config
Physical
Config
Thing Editor
Programming
Attributes
GLOBAL
Settings
Algorithm Settings
Files
INTERFACE
Wireless0
Bluetooth
Wireless0
Port Status
On
Bandwidth
300 Mbps
MAC Address
000D.BDEB.5C15
SSID
SmartHome
Authentication
Disabled
WEP
WPA-PSK
WPA2-PSK
WPA
WPA2
802.1X
Method:
MD5
WEP Key
PSK Pass Phrase
User ID
Fan
Password
fan
User Name
Password
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::20D:BDFF:FEEB:5C15
Top
Advanced


Light
Specifications
Physical
Config
Attributes
GLOBAL
Settings
Algorithm Settings
Files
INTERFACE
Wireless0
Bluetooth
Global Settings
Display Name
Light
Serial Number
PTT0810JS6U-
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


Light
Specifications
Physical
Config
Attributes
GLOBAL
Settings
Algorithm Settings
Files
INTERFACE
Wireless0
Bluetooth
Wireless0
Port Status
On
Bandwidth
300 Mbps
MAC Address
0060.4714.EB6B
SSID
SmartHome
Authentication
Disabled
WPA-PSK
WPA
802.1X
WEP
WPA2-PSK
WPA2
Method:
WEP Key
PSK Pass Phrase
User ID
Light
Password
light
MD5
User Name
Password
Encryption Type
AES
IP Configuration
DHCP
Static
IPv4 Address
192.168.0.106
Subnet Mask
255.255.255.0
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address:
FE80::260:47FF:FE14:EB6B
Top
Advanced


Motion Detector
Specifications
Physical
Config
Attributes
GLOBAL
Settings
Algorithm Settings
Files
INTERFACE
Wireless0
Bluetooth
Global Settings
Display Name Motion Detector
Serial Number PTT0810699Z-
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


Motion Detector
Specifications
Physical
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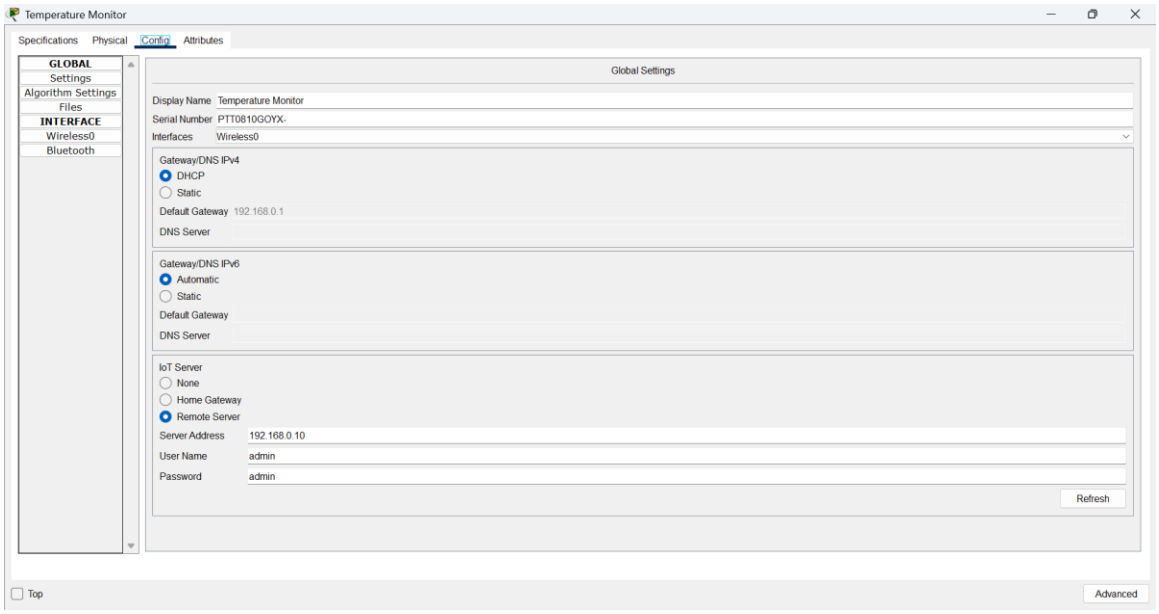
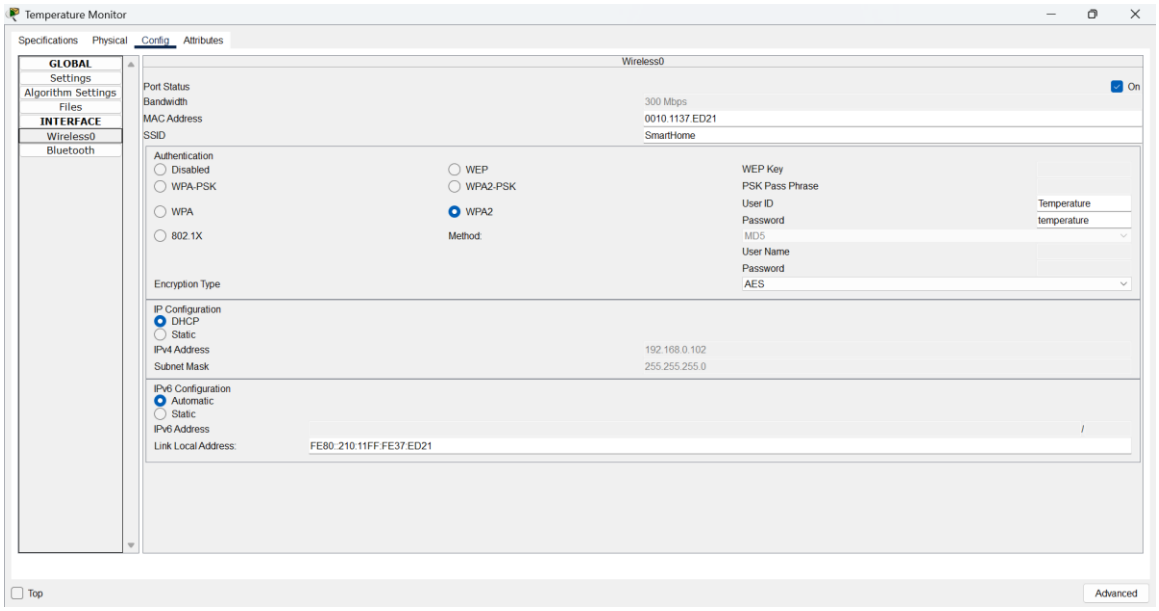
Attributes
GLOBAL
Settings
Algorithm Settings
Files
INTERFACE
Wireless0
Bluetooth
Wireless0
Port Status
On
Bandwidth 300 Mbps
MAC Address 0001.9669.4994
SSID SmartHome
Authentication
Disabled
WEP
WPA-PSK
WPA2-PSK
WPA
WPA2
802.1X
Method:
MD5
WEP Key
PSK Pass Phrase
User ID Motion
Password motion
User Name
Password
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::201:96FF:FE69:4994
Top
Advanced


Temperature Monitor
Specifications
Physical
Config
Attributes
GLOBAL
Settings
Algorithm Settings
Files
INTERFACE
Wireless0
Bluetooth
Global Settings
Display Name
Temperature Monitor
Serial Number
PTT0810GOYX-
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


Temperature Monitor
Specifications
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Config
Attributes
GLOBAL
Settings
Algorithm Settings
Files
INTERFACE
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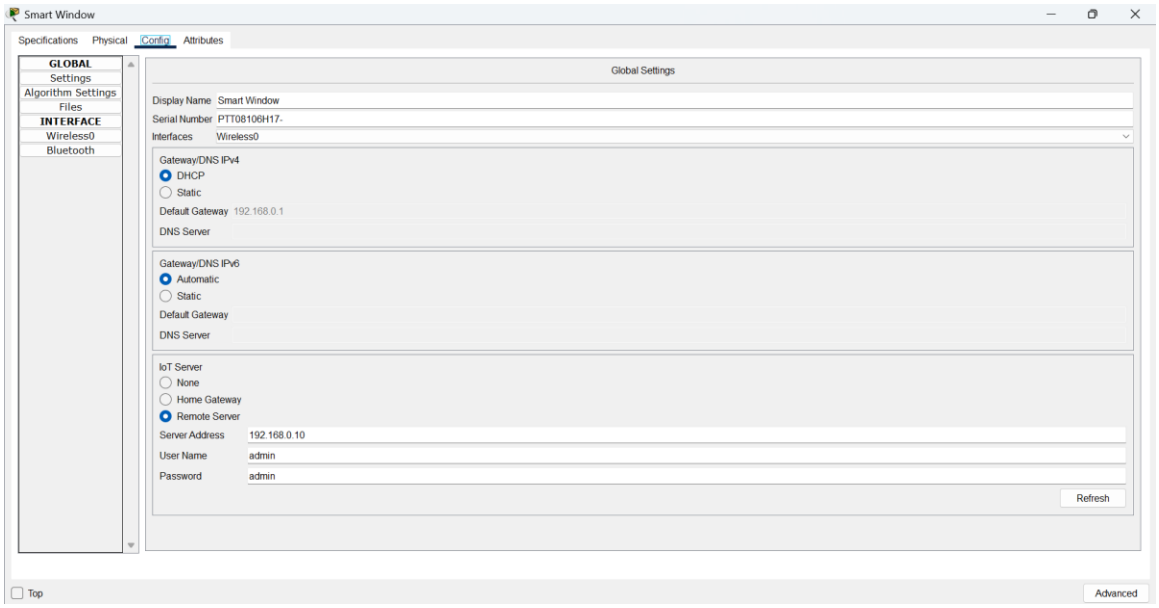
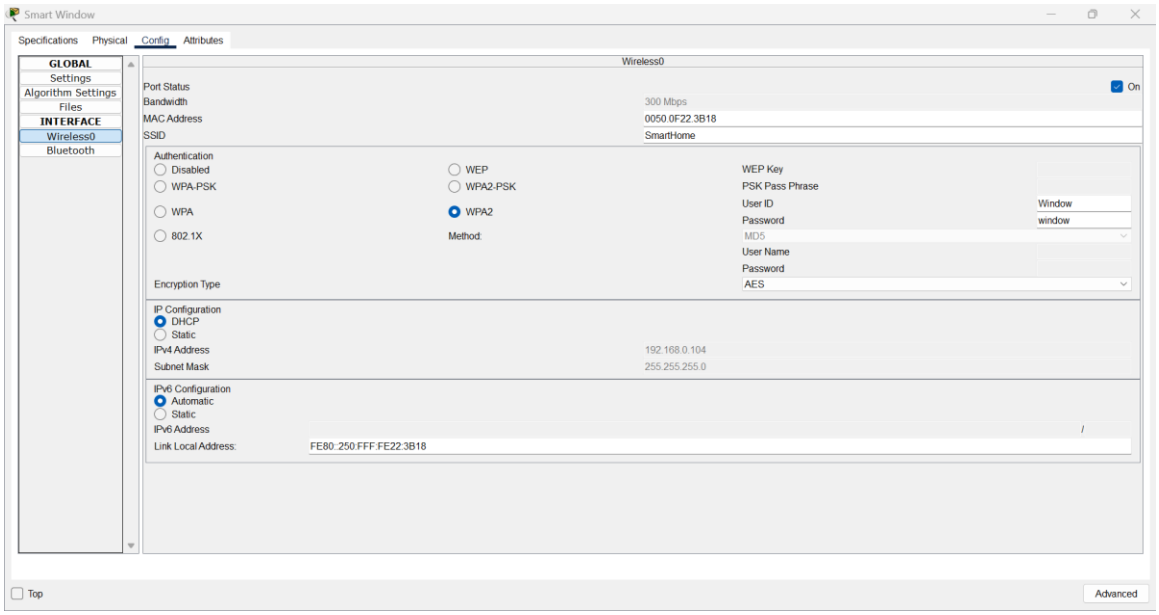
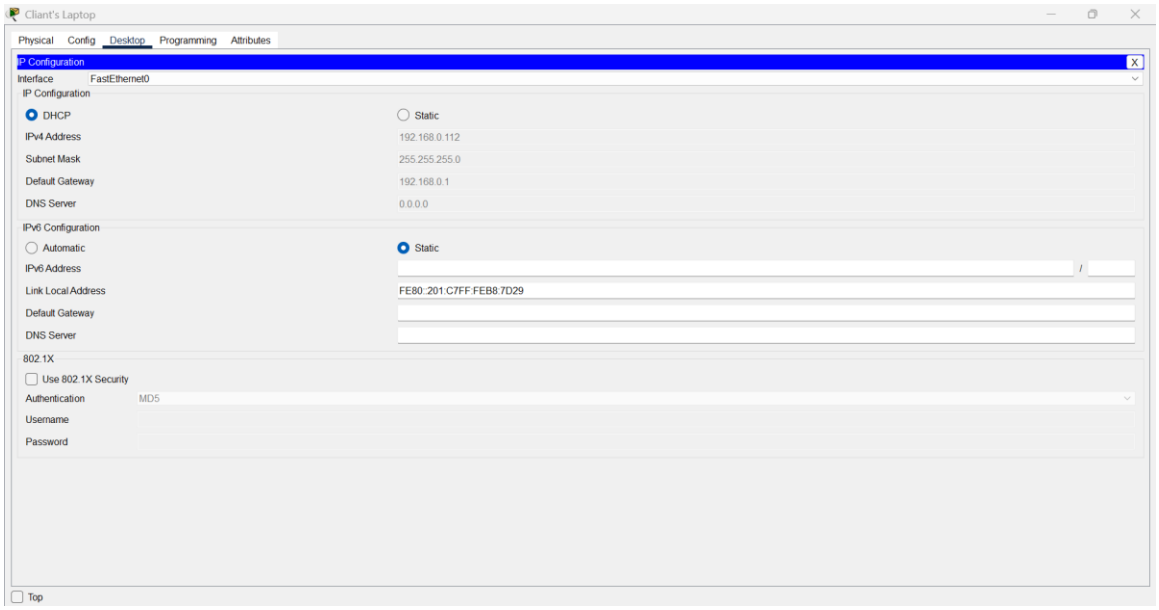
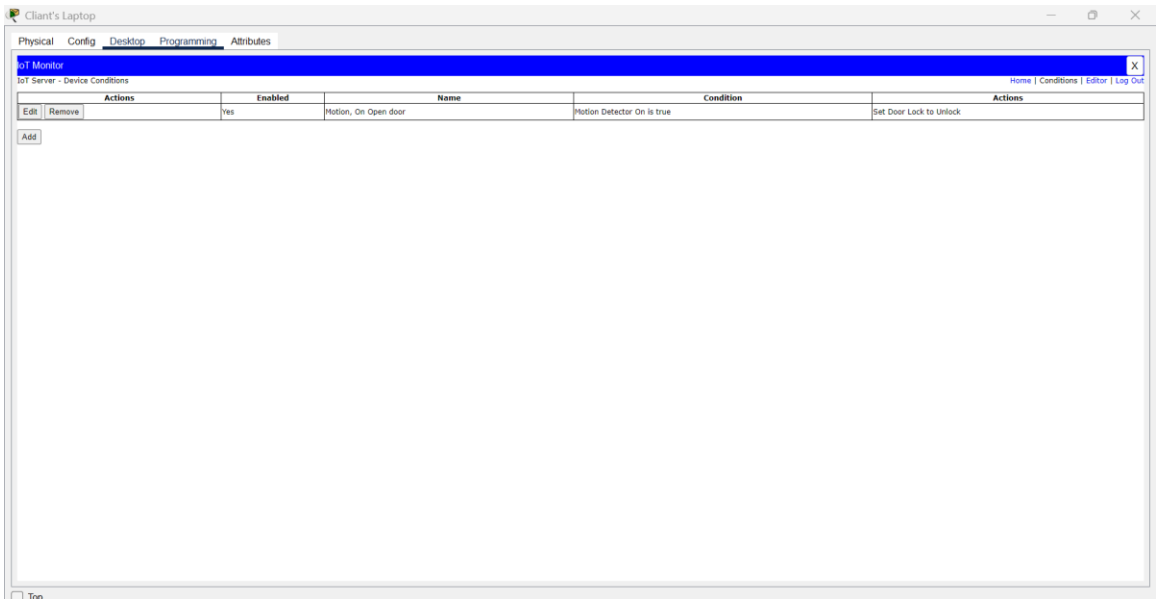
Bluetooth
Wireless0
Port Status
On
Bandwidth
300 Mbps
MAC Address
0010.1137.ED21
SSID
SmartHome
Authentication
Disabled
WPA-PSK
WPA
802.1X
WEP
WPA2-PSK
WPA2
Method:
WEP Key
PSK Pass Phrase
User ID
Temperature
Password
temperature
MD5
User Name
Password
Encryption Type
AES
IP Configuration
DHCP
Static
IPv4 Address
192.168.0.102
Subnet Mask
255.255.255.0
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address:
FE80::210:11FF:FE37:ED21
Top
Advanced

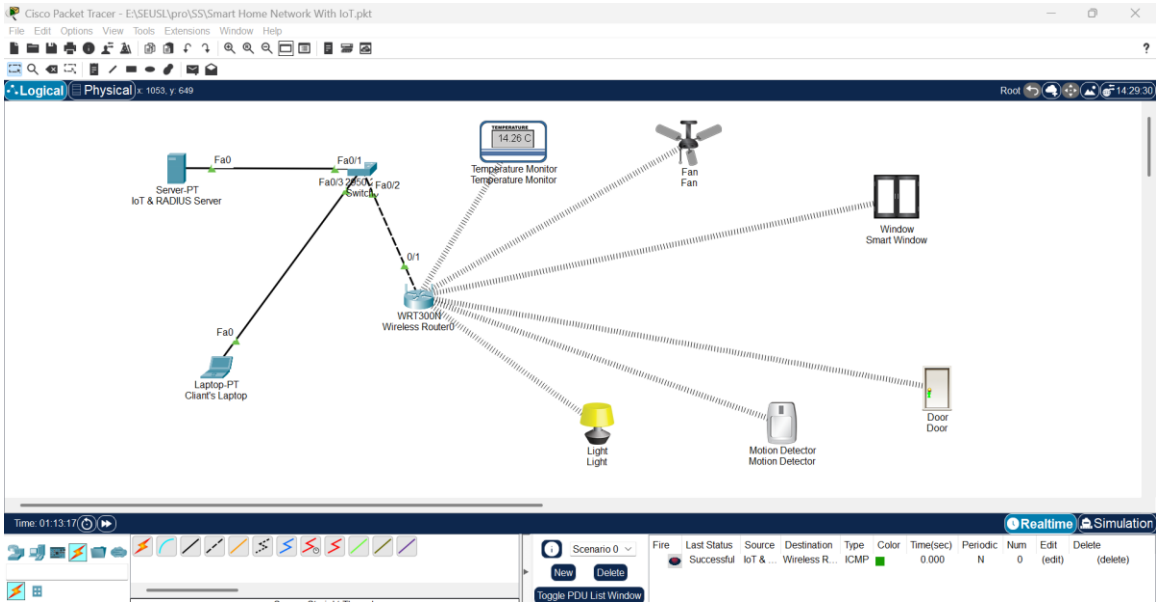

Smart Window
Specifications
Physical
Config
Attributes
GLOBAL
Settings
Algorithm Settings
Files
INTERFACE
Wireless0
Bluetooth
Global Settings
Display Name
Smart Window
Serial Number
PTT08106H17-
Interfaces
Wireless0
Gateway/DNS IPv4
DHCP
Static
Default Gateway
192.168.0.1
DNS Server
Gateway/DNS IPv6
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


Smart Window
Specifications
Physical
Config
Attributes
GLOBAL
Settings
Algorithm Settings
Files
INTERFACE
Wireless0
Bluetooth
Wireless0
Port Status
On
Bandwidth
300 Mbps
MAC Address
0050.0F22.3B18
SSID
SmartHome
Authentication
Disabled
WPA-PSK
WPA
802.1X
WEP
WPA2-PSK
WPA2
Method:
WEP Key
PSK Pass Phrase
User ID
Window
Password
window
MD5
User Name
Password
Encryption Type
AES
IP Configuration
DHCP
Static
IPv4 Address
192.168.0.104
Subnet Mask
255.255.255.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address:
FE80::250:FFF:FE22:3B18
Top
Advanced



Screenshots will be added here in the final version.





10. Conclusion

The IoT Smart Home Network project with RADIUS authentication demonstrates how IoT devices can be securely managed over a network using centralized authentication. The simulation confirms that the design works effectively and meets the stated objectives.