

Packet Tracer - Implement Physical Security with IoT Devices

Objectives

Part 1: Connect IoT Devices to the Network

Part 2: Add IoT Devices to the Registration Server

Part 3: Explore IoT Security Device Functionality

Background / Scenario

In an attempt to increase the physical security of your home, you have decided to install some Internet of Things (IoT) devices to allow you to remotely monitor your home while you are away. In this Packet Tracer activity, you will install an IoT device to enhance home security. You will then configure all the IoT devices to connect to the wireless network and communicate with a remote IoT registration server.

Instructions

Part 1: Connect IoT Devices to the Network

In this part, you will connect IoT devices to the wireless network and implement MAC address filtering.

Step 1: Connect the Siren to the Door

- Click **Home** and locate the **Home_Siren** and **Home Doors** in the living room.
- In the toolbar at the bottom, click **Connections > IoT Custom Cable**, which is the second to last option.
- Click **Home_Siren > DO** interface, and then click **Home Doors > DO** interface.
- Press and hold the **ALT** key and then click the door to open and close it. Notice that opening the door will now activate the siren.

Step 2: Associate all IoT Devices to HomeNet wireless network.

The **Home Wireless Router** is pre-configured to use WPA2-PSK and MAC Address filtering to control who can associate with the network and which devices can use the network to transfer traffic. All new devices must conform to the current configuration.

- Locate the four wireless IoT devices:
 - Home_Siren**
 - Home Doors**
 - Home_Motion_Sensor** (home office windows)
 - Home_Webcam** (home office bookshelf)
- Click **Home_Siren**, and then **Config** tab > **Wireless0**.
- Configure the **SSID** and **Authentication** mode.
 - SSID: HomeNet
 - Authentication: **WPA2-PSK**
 - Pass Phrase: **ciscorocks**

- d. In **IP Configuration**, click **DHCP**. Verify the device received an IP address from the 192.168.0.0/24 network.
Note: It may be necessary to toggle between **Static** and **DHCP** to force Packet Tracer to converge on your settings.
- e. Record the MAC address for the IoT device. Format the addresses with colons between each two hexadecimal numbers instead of a period between each four hexadecimal numbers. This format is required for the next step when you will apply MAC address filtering.
 - o Home_Siren
 - o Home_Doors
 - o Home_Motion_Sensor
 - o Home_Webcam
- f. Repeat these steps for each IoT device.

Step 3: Configure MAC address filtering to allow the IoT devices.

- a. Click **Home Office PC > Desktop tab > Web Browser**.
- b. Login to the **Home Wireless Router** at 192.168.0.1. Use **admin** as both the username and password.
- c. Click **Home Wireless Router > GUI tab**.
- d. Click **Wireless**, and then **Wireless MAC Filter**.
- e. Verify that the filter is enabled for the 2.4 GHz wireless port and that it is set to permit PCs to access the wireless network.
- f. Add the four IoT device MAC addresses to the table.
- g. Scroll to the bottom and click **Save Settings**.
- h. The **Home Wireless Router** will reboot. Close the **Web Browser**, and then click **IP Configuration**. If necessary, toggle the **DHCP** and **Static** buttons to renew the IP configuration so that **Home Office PC** has an IP address from the 192.168.0.0/24 network.

Part 2: Add IoT Devices to the Registration Server

In this Part, you will sign up for an account with a IoT remote monitoring service. You will then register the IoT devices to communicate with the service. This will allow you to remotely monitor the IoT devices through a web portal.

Step 1: Create an account on the ISP IoT Registration Server.

- a. On **Home Office PC**, close **IP Configuration**, and then click **Web Browser**.
- b. Navigate to **http://10.3.0.125**.
- c. Click **Sign up now** and create a new account with username **HomeUser** and password **Pa\$\$w0rd**.

Step 2: Register each IoT device with the Registration Server

Each of the four IoT devices must be registered with a registration server to remotely monitor and manage the device. Repeat the following steps for each IoT device.

- a. Click the device > **Config** tab > **Settings** under **GLOBAL**.
- b. Scroll to the **IoT section** at the bottom of the page and enter the following information:
 - o Select **Remote Server**
 - o Server Address: **10.3.0.125**
 - o User Name: **HomeUser**
 - o Password: **Pa\$\$w0rd**
- c. Click **Connect** button. The button will change to **Connecting** and then to **Refresh** in a few seconds. The IoT device is now registered with the server.

Note: If it does not change to **Refresh** then you may have entered the information incorrectly. Therefore, re-enter the information and repeat this step.
- d. Repeat the above steps to register all the IoT devices.

Step 3: Verify all devices are registered.

- a. Return to the **Web Browser** on the **Home Office PC**. If necessary, browse to 10.3.0.125 and login with username **HomeUser** and password **Pa\$\$w0rd**.
- b. Verify all four IoT devices are registered on the server.

Part 3: Explore IoT Security Device Functionality

In this part, you will explore the functionality of the IoT devices and monitor their states on the IoT Registration Server.

Step 1: Observe and control IoT devices from the registration server.

- a. From the **Web Browser** on the **Home Office PC**, click each section for each IoT device to display device details.

What is the status of each device?

- b. Click the red rectangle under **Home Doors** to activate it.

What happened?

- c. Click the door rectangle again to deactivate the device.

What happened?

- d. Click the green rectangle for **Home_Webcam**.

What happened?

- e. Click the green rectangle again to turn on the **Home_Webcam**.

- f. Click the red circle for **Home_Motion_Sensor**. Nothing will happen because the motion sensor only sends information to the registration server. This is an example of a device that can be monitored only.

Step 2: Interact with the sensors in the home.

In Packet Tracer, the IoT devices can normally be activated by holding down the ALT key and then clicking the device (ALT-click). The Motion sensor is activated by holding down the ALT key and moving the mouse over the sensor. Have the IoT registration server screen visible for these actions.

- a. ALT-Click on the door.

What happened?

- b. ALT-Click on the webcam.

What happened?

- c. Depress the ALT key and move your mouse over the motion sensor.

What happened?

Reflection Questions

1. What advantages do IoT enabled devices provide for home security?
2. What is the advantage of using a registration server for IoT enabled devices?
3. Search the internet to find what types of IoT enabled devices are used for home security?

Answer Key

Part 1: Connect IoT Devices to the Network

Step 1: Connect the Siren to the Door

Step 2: Associate all IoT Devices to HomeNet wireless network.

Home_Siren

00:90:2B:C8:C6:E2

Home Doors

00:0A:F3:DB:2E:37

Home_Motion_Sensor

00:40:0B:39:21:24

Home_Webcam

00:D0:58:D1:C4:11

Step 3: Configure MAC address filtering to allow the IoT devices.

Part 2: Add IoT Devices to the Registration Server

Step 1: Create an account on the ISP IoT Registration Server.

Step 2: Register each IoT device with the Registration Server

Step 3: Verify all devices are registered.

Part 3: Explore IoT Security Device Functionality

Step 1: Observe and control IoT devices from the registration server.

What is the status of each device?

All devices should show "On" indicating they have an active connection to the IoT registration server.

Click the red rectangle under **Home Doors** to activate it. What happened?

The siren and door rectangles simultaneously changed to green indicating that they are now active. This also confirms that they are linked. In the living room, the door is open and the siren is red.

Click the door rectangle again to deactivate the device. What happened?

The siren and door rectangles simultaneously turned red indicating that they are no longer active.

Click the green rectangle for **Home_Webcam**. What happened?

The video feedback was turned off.

Step 2: Interact with the sensors in the home.

ALT-Click on the door. What happened?

The images for both the door and the siren changed indicating they were active. At the same time this information was sent to the registration server which showed both had been activated.

ALT-Click on the webcam. What happened?

The display light on the webcam extinguished indicating it was turned off. This same information was reflected on the registration server.

Depress the ALT key and move your mouse over the motion sensor. What happened?

The activity light illuminated when the sensor detected motion. This was also shown on the registration server by the activity light turning green while the sensor showed active.

Reflection Questions

1. What advantages do IoT enabled devices provide for home security?

IoT devices are easy to install and configure. They can also make use of existing home network security techniques to enhance their security.

2. What is the advantage of using a registration server for IoT enabled devices?

The registration server allows IoT devices to be remotely monitored and controlled. This allowed such things as video surveillance and monitoring of important services from remote locations.

3. Search the internet to find what types of IoT enabled devices are used for home security?

Answers will vary but may include such things as fire alarms, video monitoring devices, entry alarms, motion sensors, water sensors, device monitoring, etc.