



# **PLAN & IMPLEMENT A SMART PROJECT**





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**Course Date: 14/07/2025**

**Programme:**

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## Introduction and Client Requirements

You work for an IT department within Just IT. The company has purchased a new office space and has tasked you to project manage it. The new office space will need to be setup with both traditional workspace networked devices and smart IoT devices. You need to be able to install and configure the new office network meeting the needs of the client. The project needs to be completed within 4 days and requires the following:

- **Planning** – you **MUST** create a plan on how your project will progress. This can be done using Gantt chart and Kanban Boards.
- **Design** – you **MUST** use the below template to decide on the logical configuration of your network.
- **Implementation** – you **MUST** use the Packet Tracer to set up and configure your network. This **MUST** also include the IoT devices.
- **Testing** – you **MUST** show that your network and IoT equipment works by carrying out variety of tests.
- **Documenting** – you **MUST** use this document to record your activities. You **MUST** also create a User Guide on how to use IoT Server, Wireless DHCP Router, and how to manually and dynamically assign IP to network devices.
- **Reviewing** – you **MUST** review your project upon its completion.

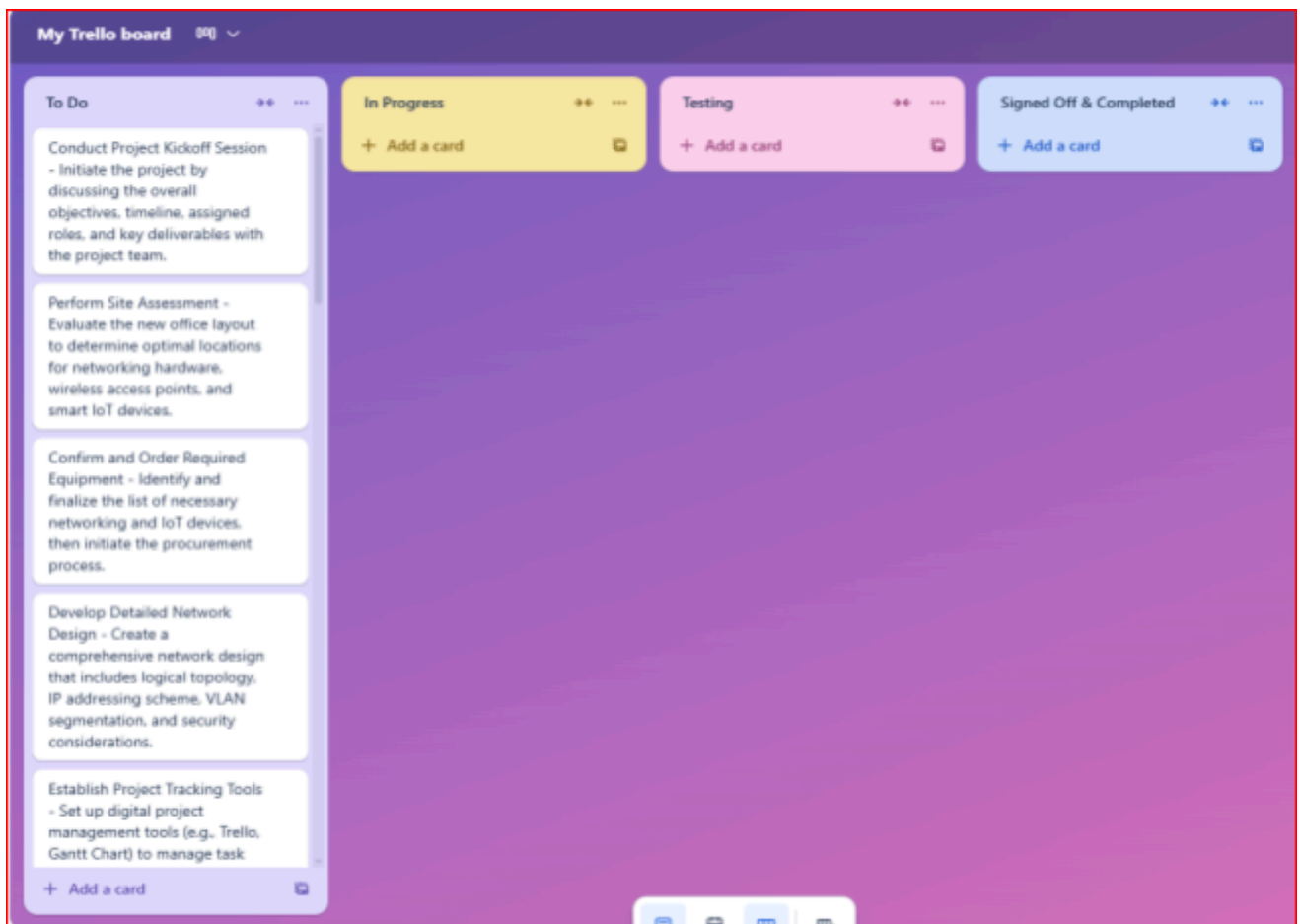
## Planning

You need to use Gantt Chart and Kanban boards to plan your project. The project needs to be completed within 4 days, and you must decide on the activities that you will complete on each day. Once you have created your Gantt chart and Kanban boards, paste the screenshot evidence of each below.

### Gantt Chart



### Kanban Boards



## Design

Once you have planned out your project using the Planning stage, you need to decide on the design, layout and configuration of your network, including any IoT devices you may use.

### *Design Brief*

The new office space requires the following: A total of 8 members of staff, 4 who are permanently in the office and 4 who are only in the office occasionally, (4 hot desks will therefore need to be set up for their devices). Each staff member requires a smart phone (you only need to include one in this project), and the ability to print using both a wireless and a wired printer. The business also wants you to add IoT devices to the network, such as, a coffee machine, a fan, a motion detector and a light. The IoT devices need to be connected to the IoT Server and managed via IoT Monitor App.

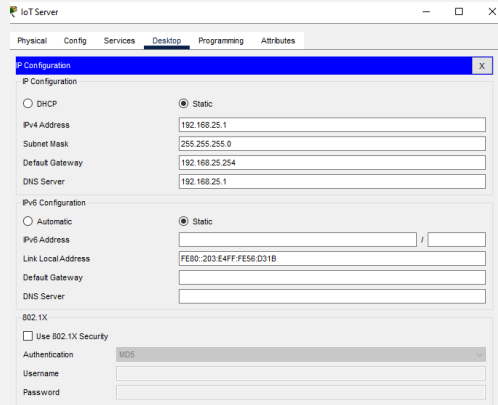
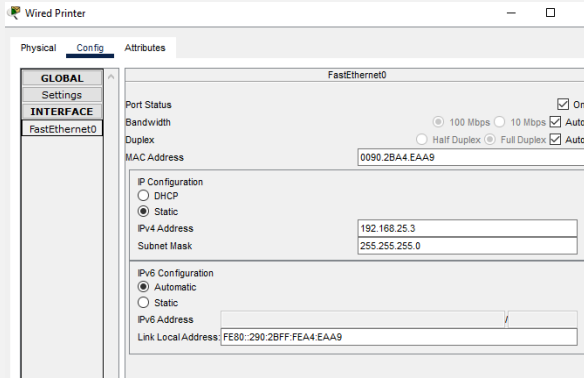
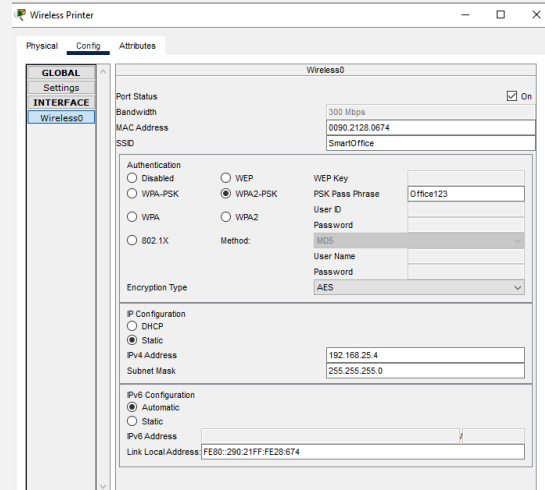
Below is the breakdown of required equipment. You must decide on whether each equipment is dynamically or statically configured.

#### ***The network needs to consist of:***

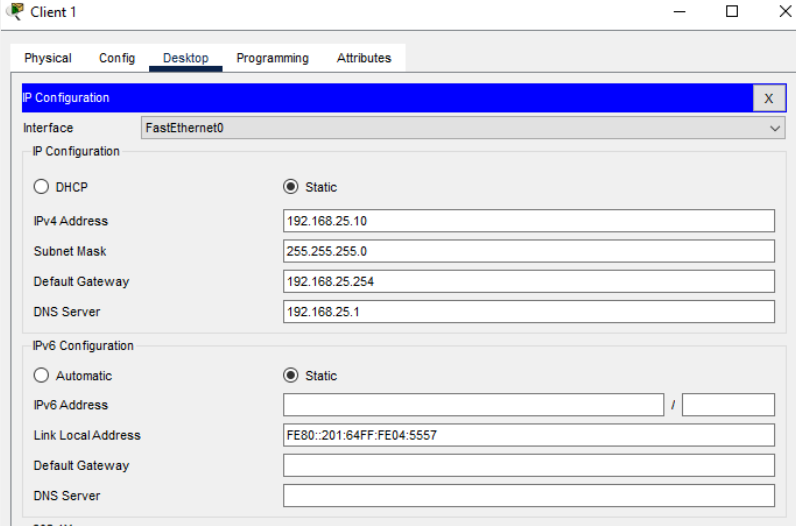
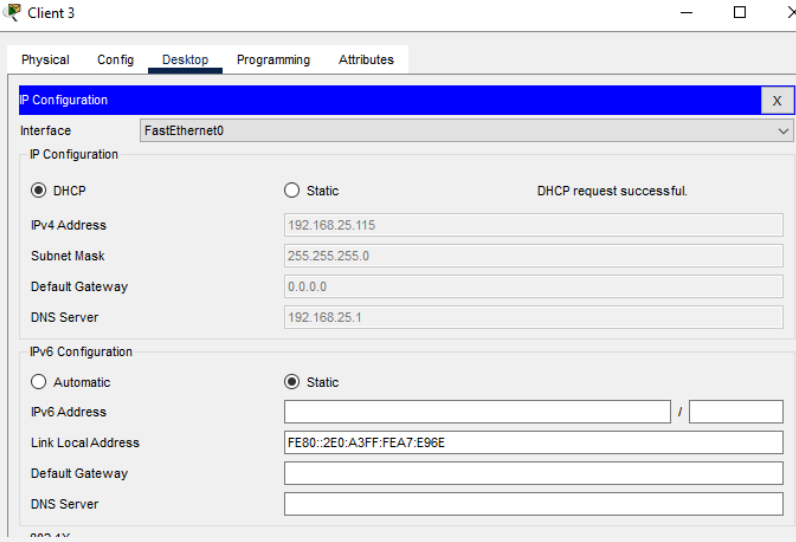
4 desktop PCs (CLIENTS) – 2 with static IP addresses and 2 with DHCP IP addresses	2 printers (one must be wireless)
4 laptops with wireless connections to the network	1 switch
All staff need wireless connections for their phones	1 wireless AP (Access Point) SSID: SmartOffice Passphrase: Office123
1 IoT Server (Also a DHCP server): Start Address: 192.168.25.15 Number of hosts: 20	4 IoT devices



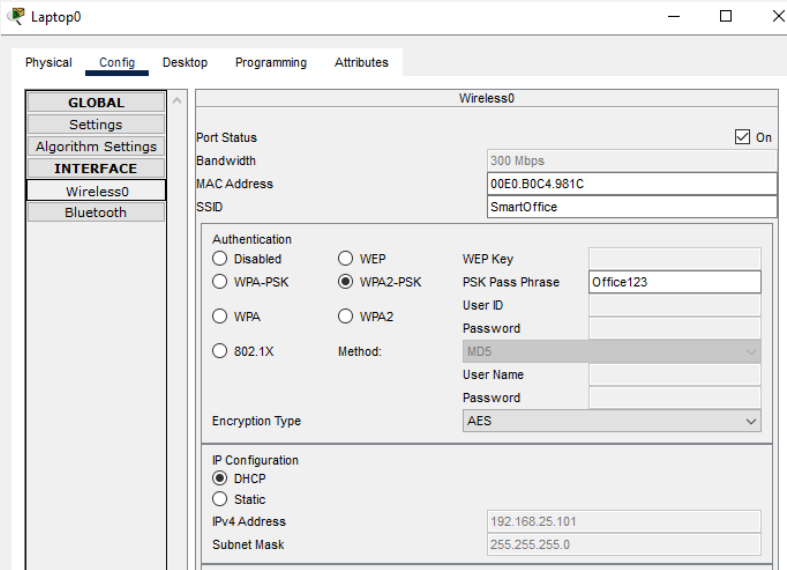
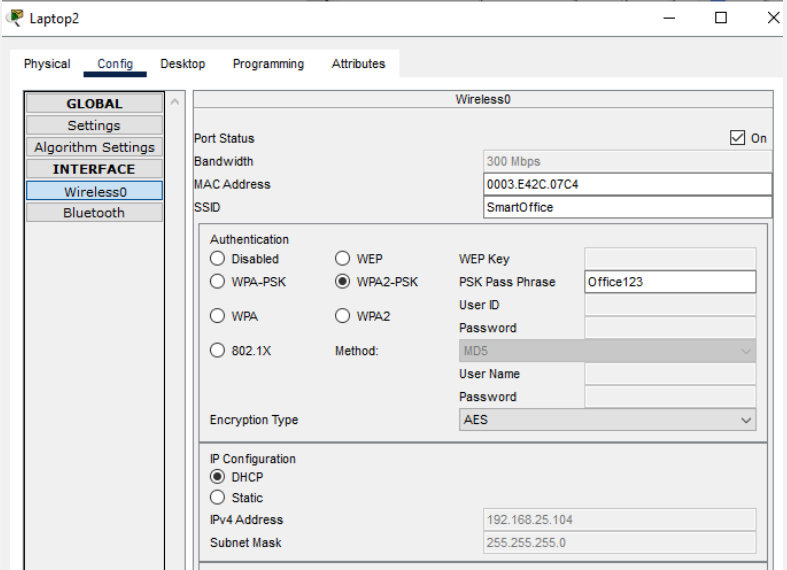
## Configuration Plan

Device	IoT Server	Printer 1	Printer 2
IPv4 address	192.168.25.1	192.168.25.3	192.168.25.4
Subnet Mask	255.255.255.0	255.255.255.0	255.255.255.0
DNS Server	192.168.25.1	192.168.25.1	192.168.25.1
Gateway	192.168.25.254	192.168.25.254	192.168.25.254
Connection type	Cat 5e (Ethernet)	Cat 5e (Ethernet)	Wi-Fi
Snip of IP configuration	<p><i>Place your snip here of IoT Server configuration</i></p>  <p><i>Annotation</i> <i>Setting up the static IP configuration for the IoT Server</i></p>	<p><i>Place your snip here of printer configuration</i></p>  <p><i>Annotation</i> <i>Setting up the static IP configuration for the wired printer 1.</i></p>	<p><i>Place your snip here of printer configuration</i></p>  <p><i>Annotation</i> <i>Setting up a static IP configuration for the wireless printer 2.</i></p>

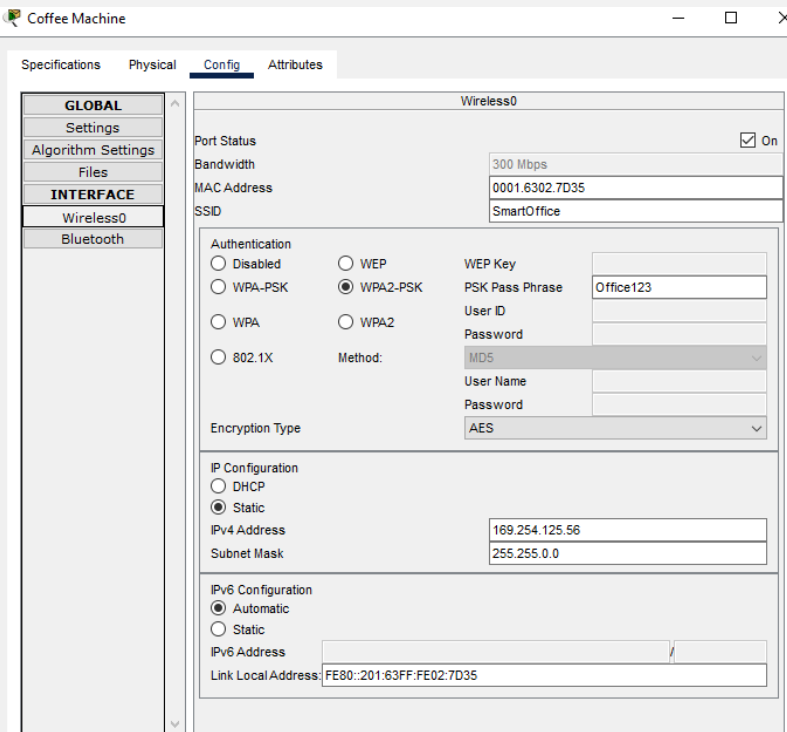
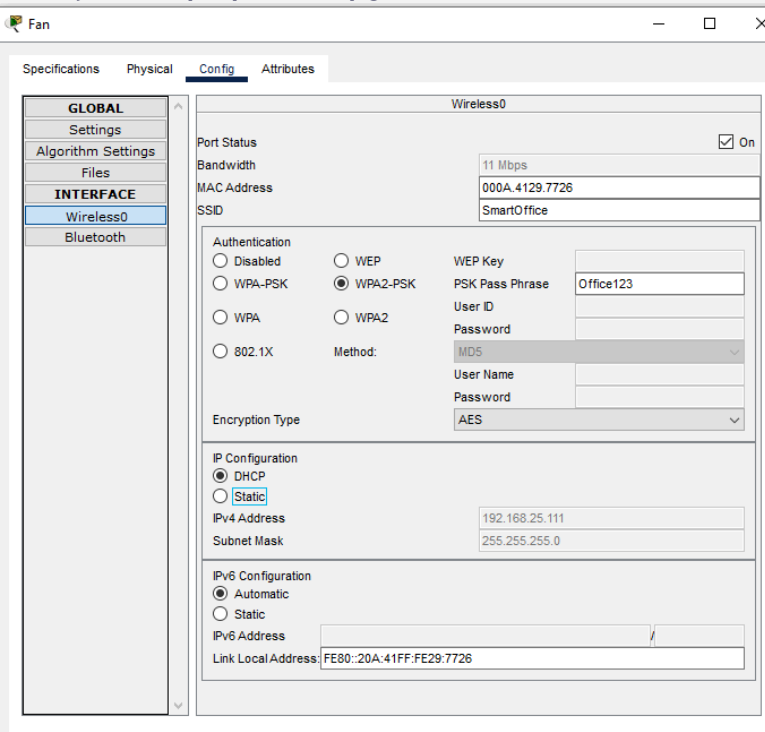


Device	Client 1	Client 2	Client 3	Client 4
IPv4 address	192.168.25.10	192.168.25.11	DHCP	DHCP
Subnet Mask	255.255.255.0	255.255.255.0		
DNS Server	192.168.25.1	192.168.25.1	192.168.25.1	192.168.25.1
Gateway	192.168.25.254	192.168.25.254	192.168.25.254	192.168.25.254
Connection type	Cat 5e (Ethernet)	Cat 5e (Ethernet)	Cat 5e (Ethernet)	Cat 5e (Ethernet)
	<p><i>Place your snip of client 1 IP configuration</i></p>  <p><i>Annotation</i></p> <p><i>Setting up a static IP configuration for the Client 1 - Pc0</i></p>		<p><i>Place your snip of client 3 IP configuration</i></p>  <p><i>Annotation</i></p> <p><i>Setting up a dynamic IP configuration for the Client 3 - Pc2</i></p>	



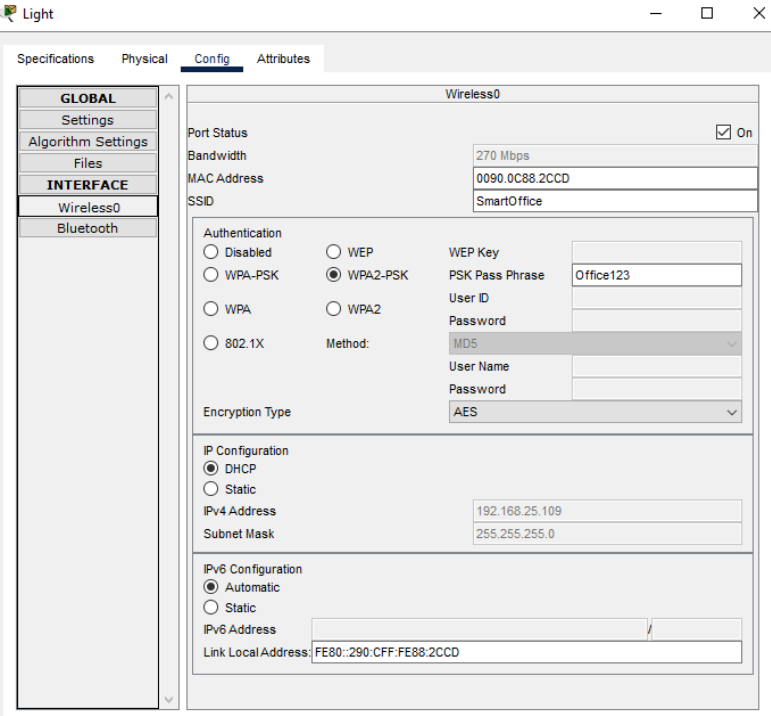
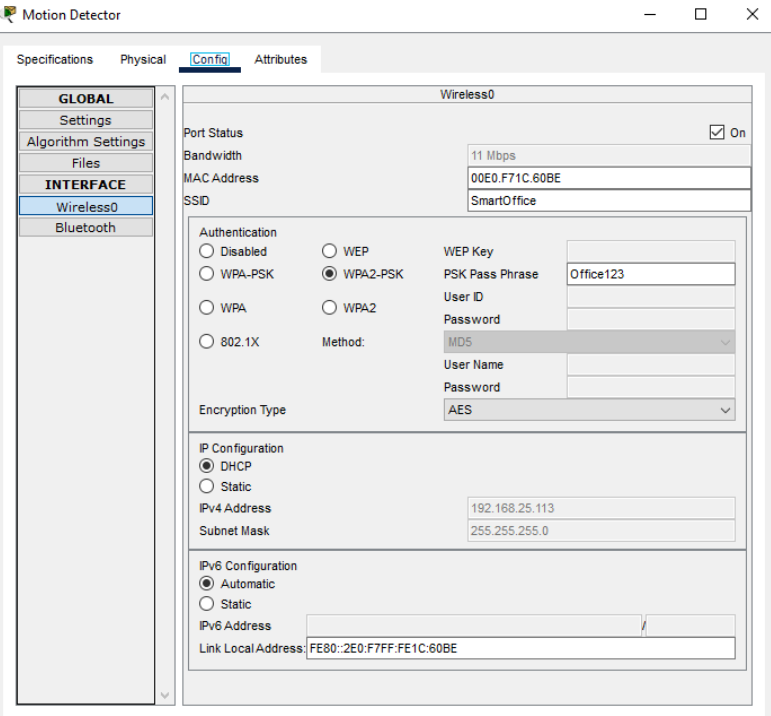
Wireless Devices	Laptops	Smart Phones
IPv4 address	DHCP	DHCP
Subnet Mask	255.255.255.0	255.255.255.0
Connection type	Wi-Fi	Wi-Fi
	<p><i>Place your snip of laptop IP configuration</i></p>  <p><i>Annotation</i> <i>Setting up a wireless IP configuration for the Laptop 0</i></p>	<p><i>Place your snip of SMART phone IP configuration</i></p>  <p><i>Annotation</i> <i>Setting up a wireless IP configuration for the Smartphone</i></p>



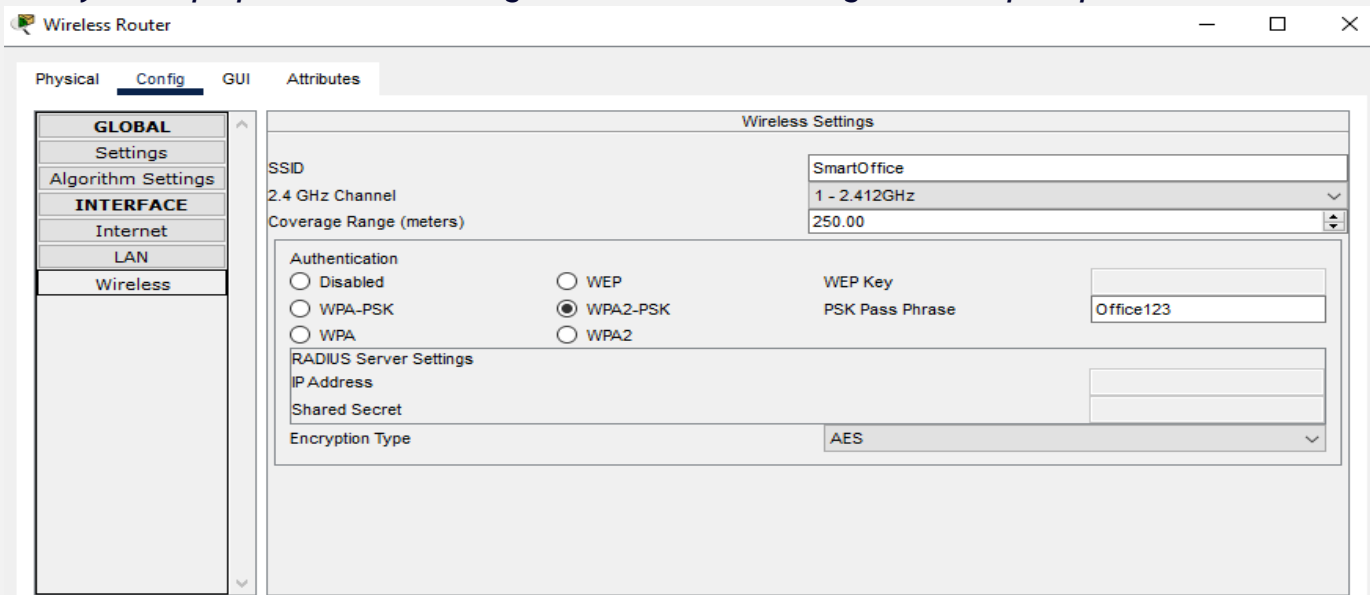
Wireless Devices	IoT Device 1	IoT Device 2
IPv4 address	DHCP	DHCP
Subnet Mask	255.255.255.0	255.255.255.0
Connection type	Wi-Fi	Wi-Fi
	<p><i>Place your snip of IoT configuration</i></p>  <p><i>Annotation</i></p>	<p><i>Place your snip of IoT configuration</i></p>  <p><i>Annotation</i></p> <p><i>Setting up a wireless configuration providing SSID and passkey for the Ceiling Fan</i></p>



	<i>Setting up a wireless configuration providing SSID and passkey for the Coffee Machine</i>	
--	--	--

Wireless Devices	IoT Device 3	IoT Device 4
IPv4 address	DHCP	DHCP
Subnet Mask	255.255.255.0	255.255.255.0
Connection type	Wi-Fi	Wi-Fi
	<div>Place your snip of IoT configuration</div>  <div>Annotation Setting up a wireless configuration providing SSID and passkey for the Lamp</div>	<div>Place your snip of IoT configuration</div>  <div>Annotation Setting up a wireless configuration providing SSID and passkey for the Motion Detector</div>



Wireless Devices	Wireless Router – Wireless Settings (SSID and Pass Phrase)
Connection type	Wireless
	<p><i>Place your snip of the wireless settings on the router including SSID and pass phrase</i></p> 



Wireless Router

Physical Config GUI Attributes

GLOBAL

Settings

Algorithm Settings

INTERFACE

Internet

LAN

Wireless

LAN Settings

IP Configuration

IPv4 Address

192.168.25.254

Subnet Mask

255.255.255.0

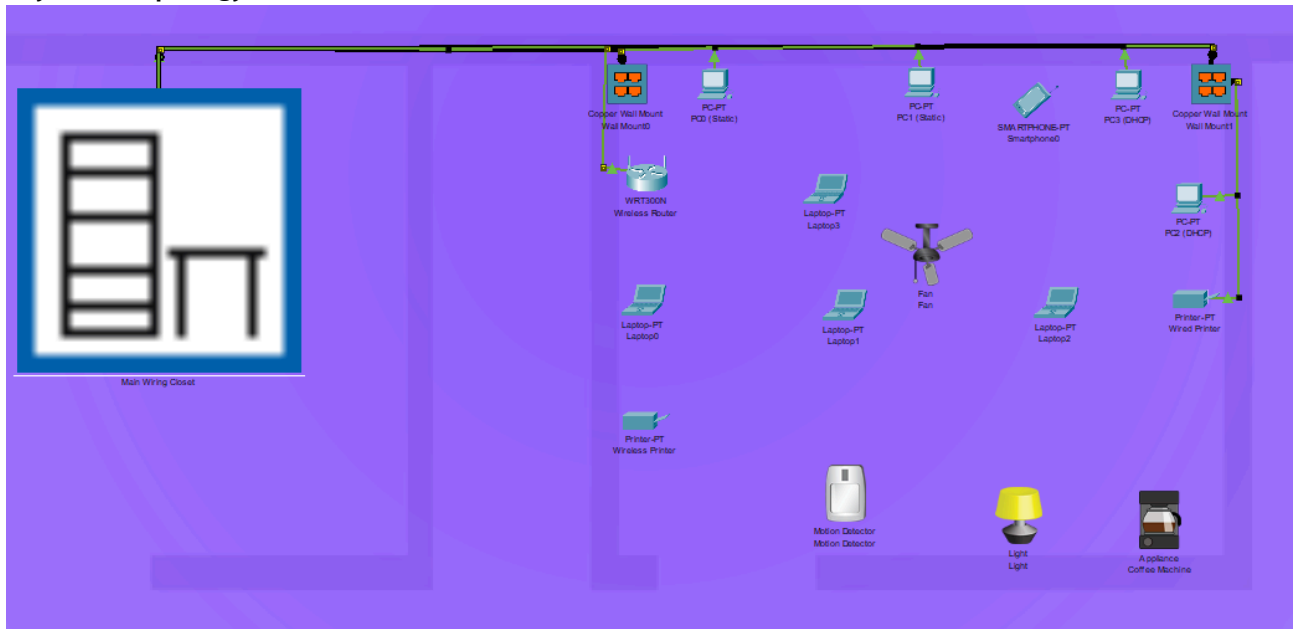
Annotation

Setting up a wireless configuration providing SSID and passkey for the Wireless Router

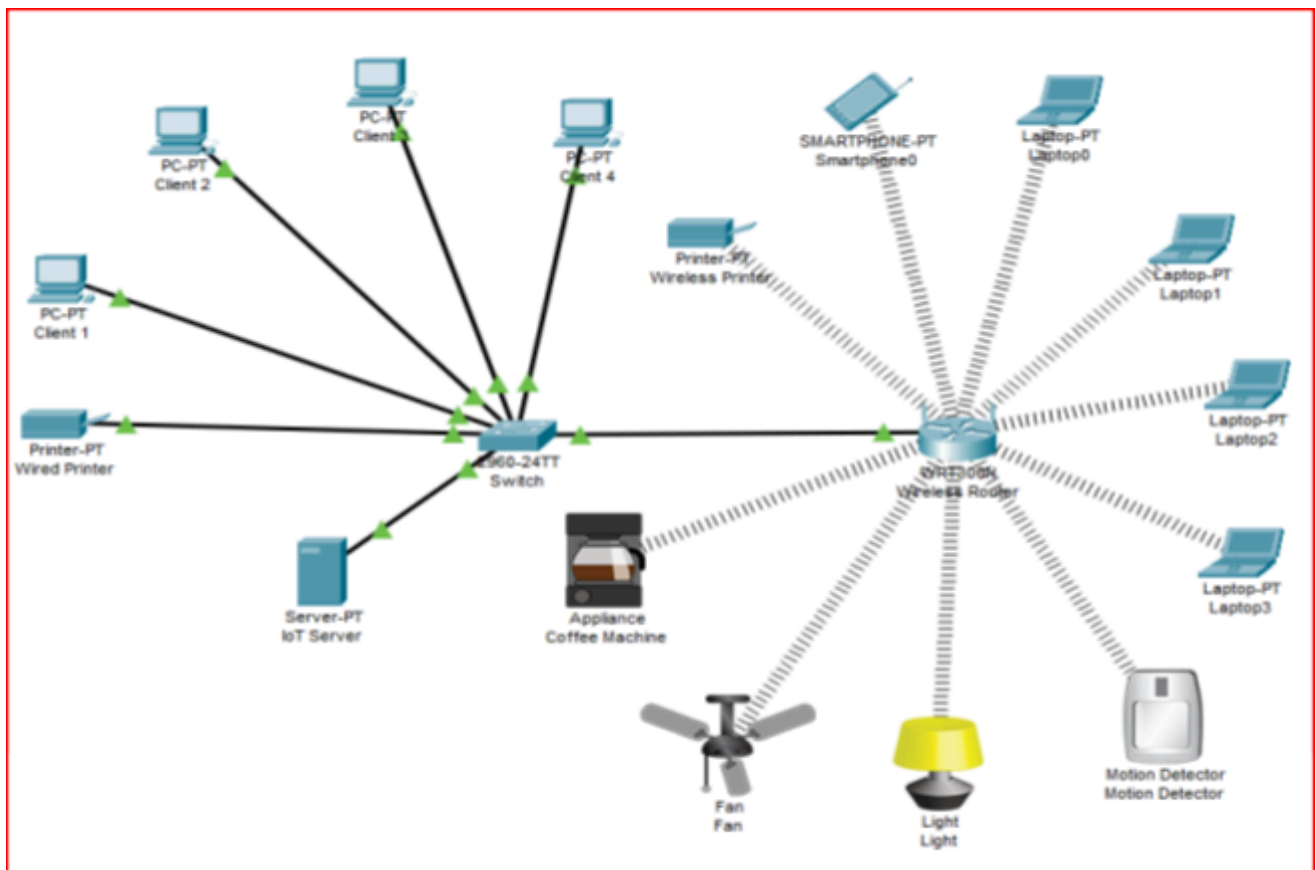
## Implementation

Once you have set up and configured your network using Packet Tracer, take a screenshot of it and paste it below.

## Physical Topology



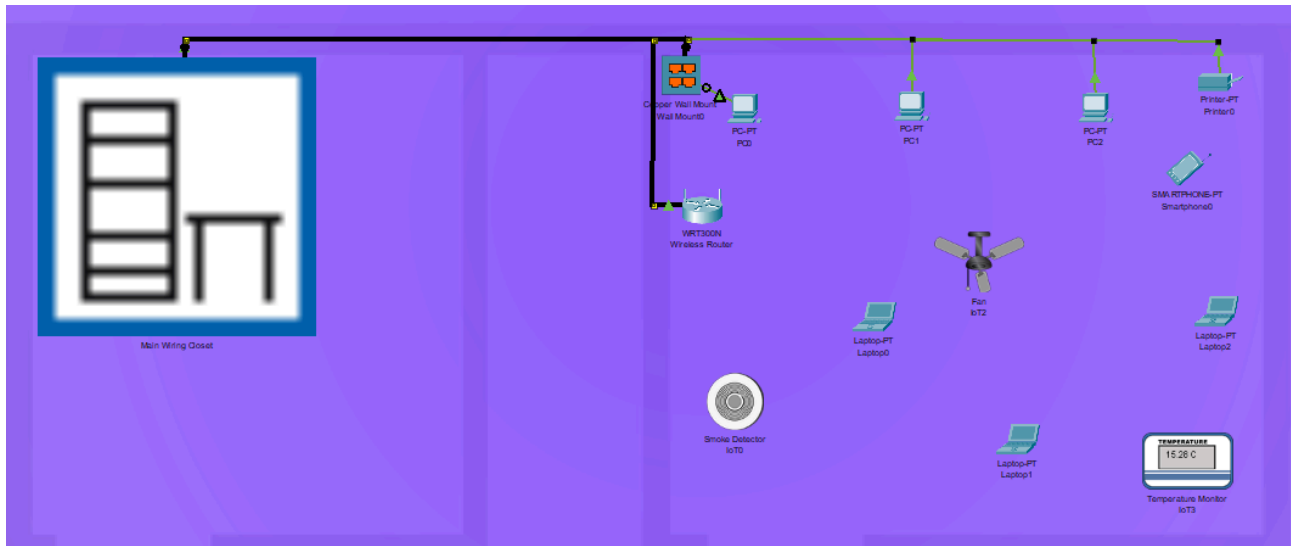
## Logical topology



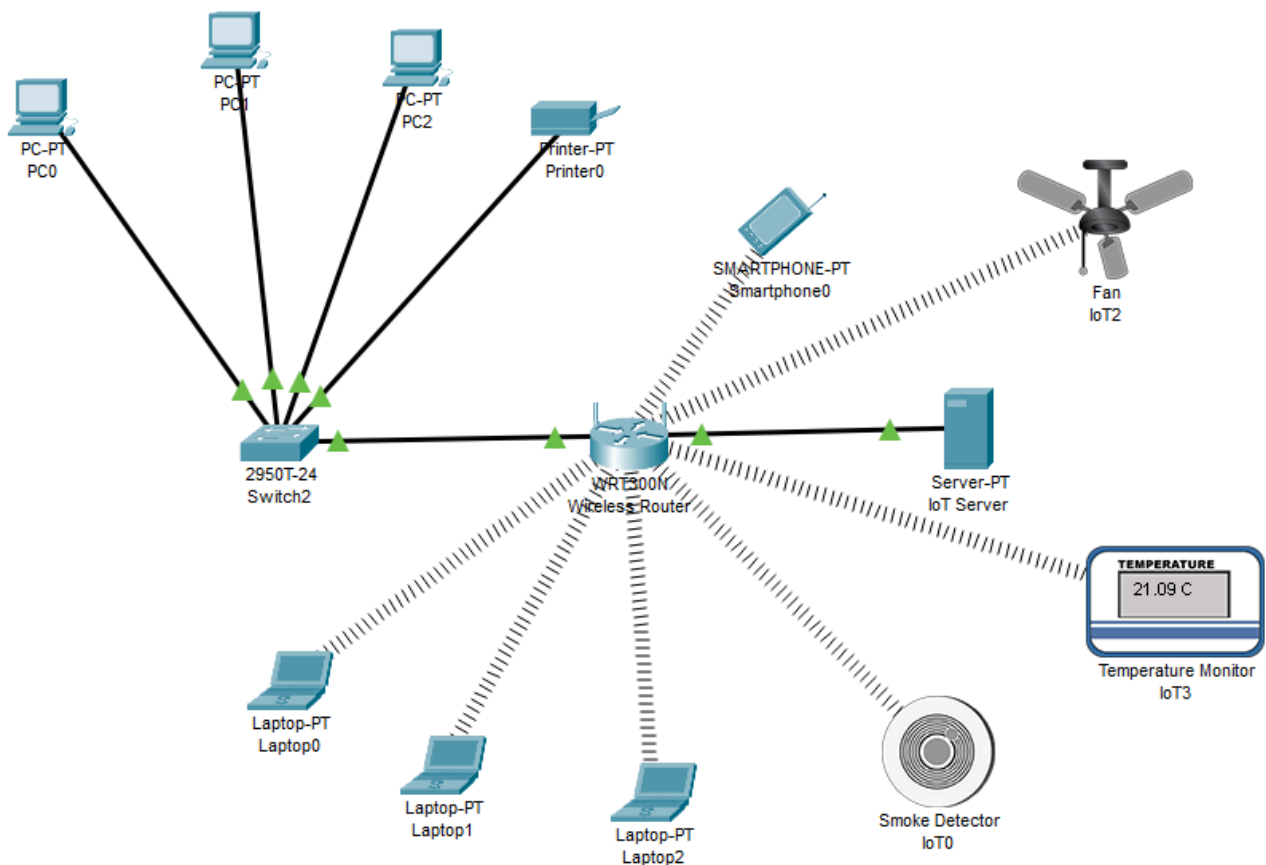
## Extension Task

The company are opening another satellite office with 3 office-based staff and 3 remote staff. Replicate what you have done for the first office, for this satellite office; including the IoT devices, server and app. This network must be on a different sub-net.

### Physical Topology



### Logical topology

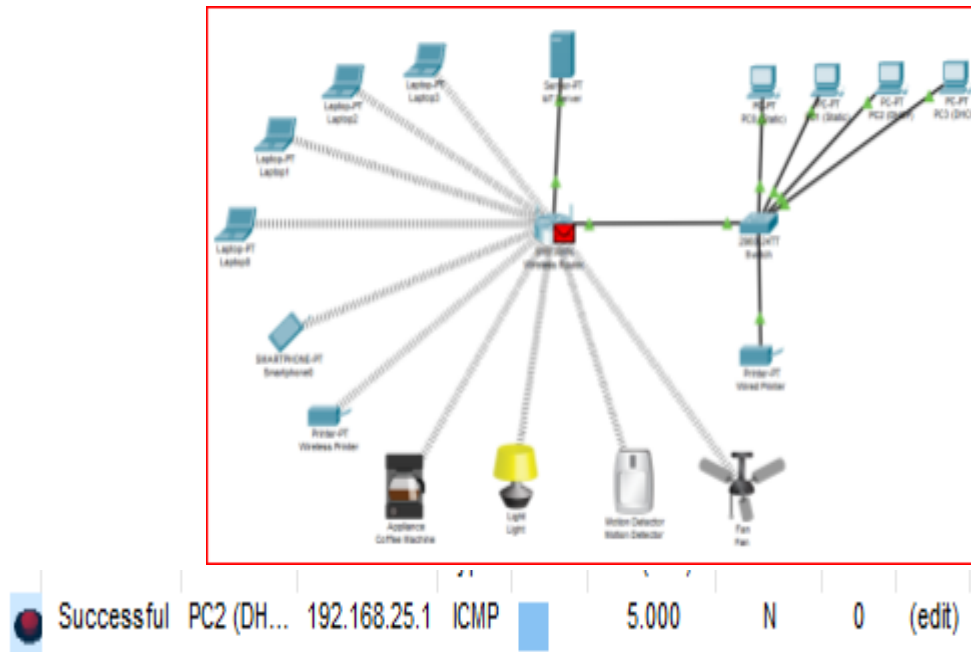




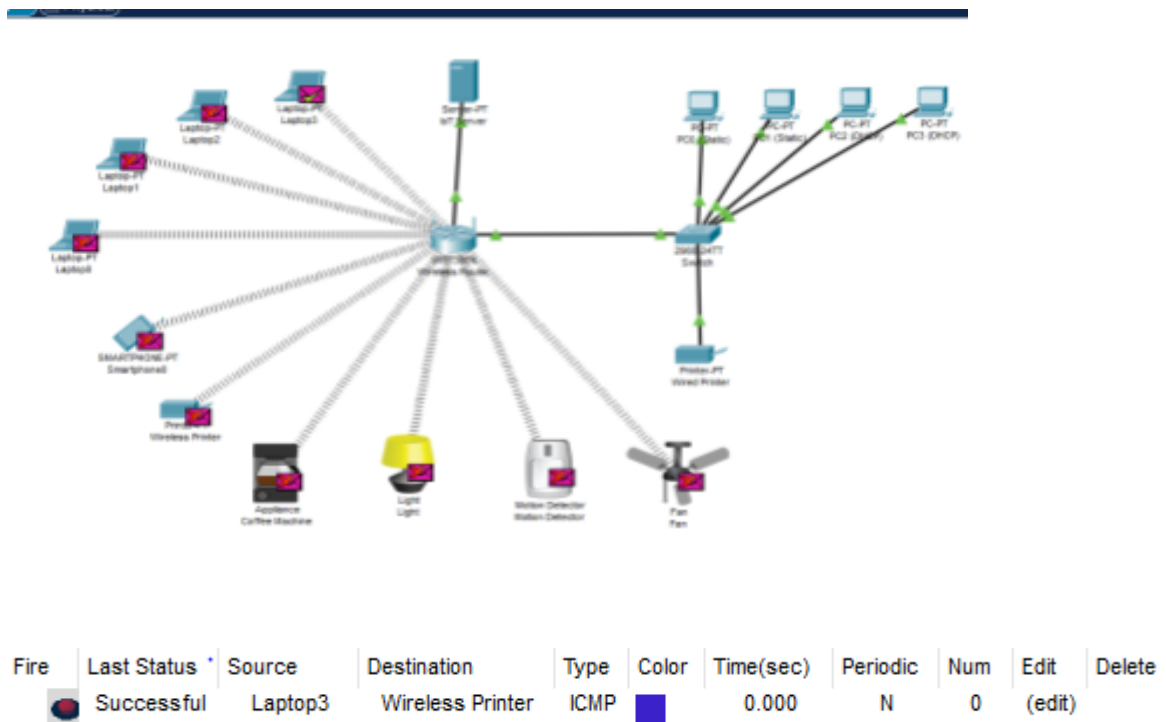
## Testing

You must test all functionality of your network. This you must demonstrate using both PING, TRACERT and PDU methods.


PDU Test 1 - I have added a complex PDU from PC 2 to the Server and it was successful.

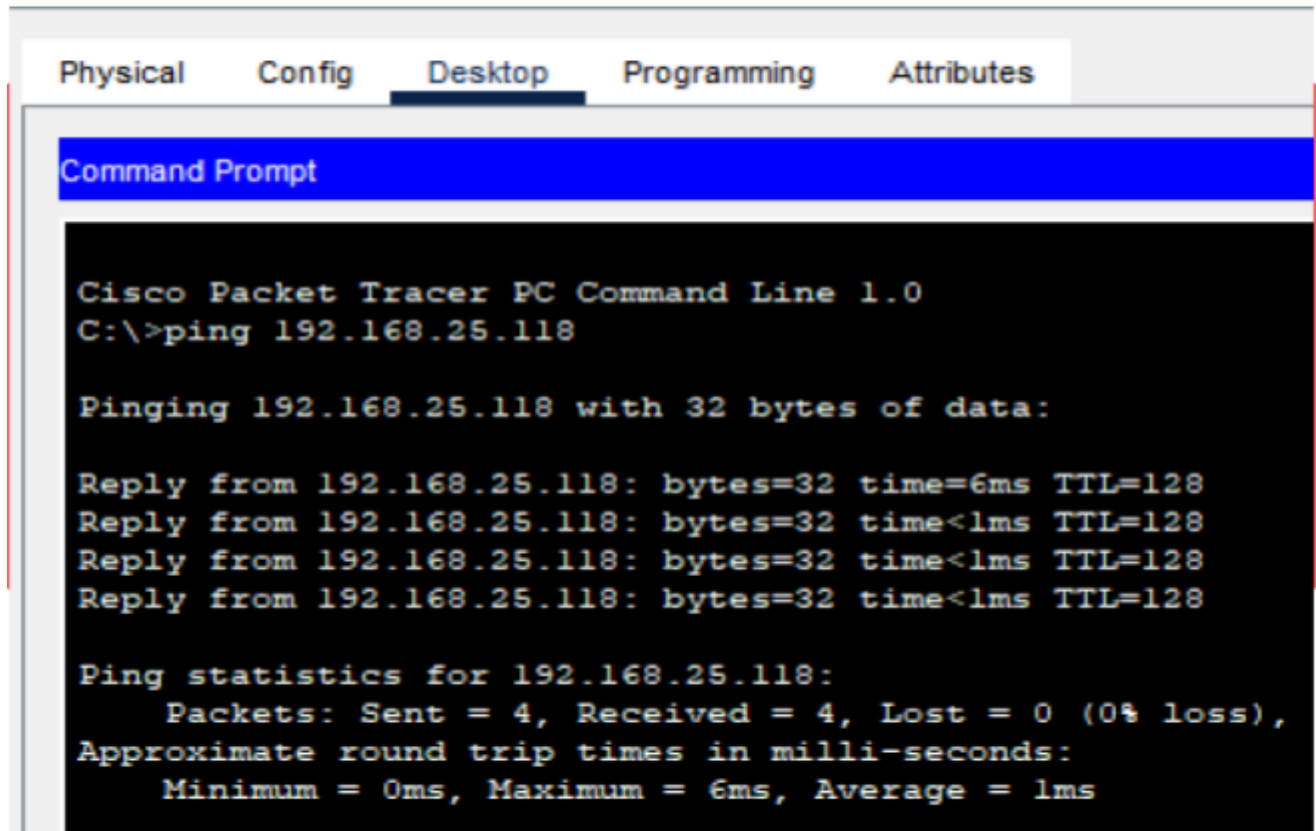


PDU Test 2 - I have successfully added a simple PDU from Laptop 3 to the wireless printer.



Ping Test 1 - I pinged PC3 from PC0 and all the sent packets were received successfully.

 PC0 (Static)



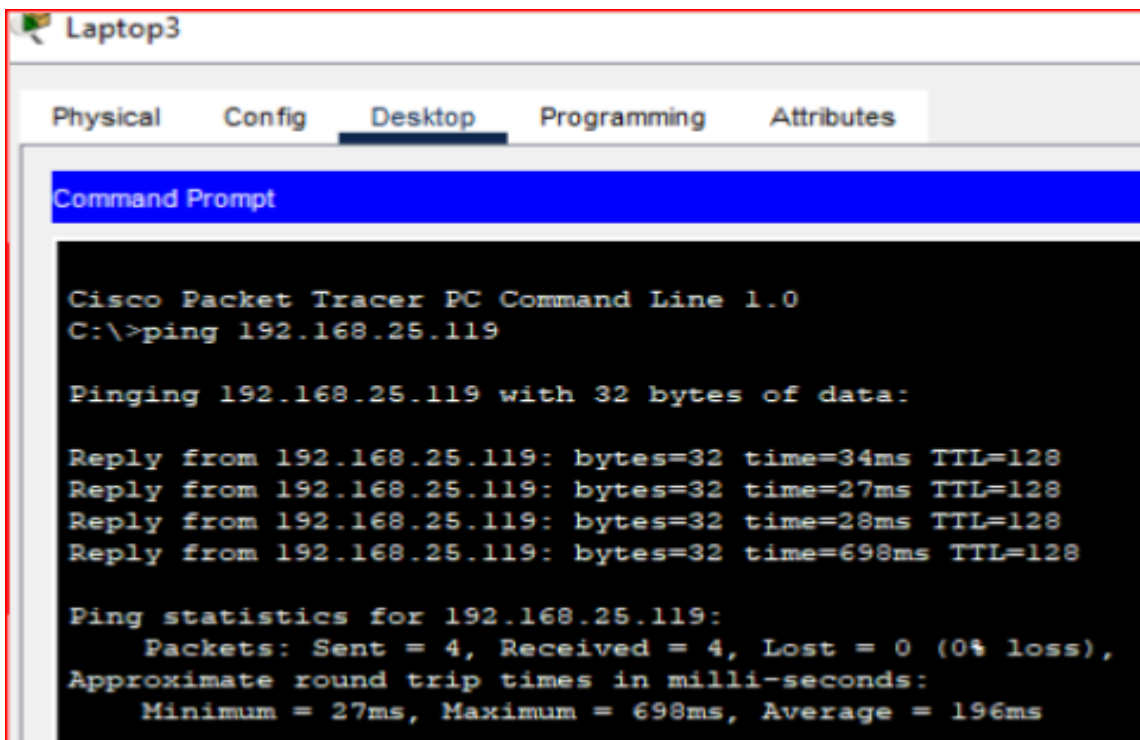
```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.25.118

Pinging 192.168.25.118 with 32 bytes of data:

Reply from 192.168.25.118: bytes=32 time=6ms TTL=128
Reply from 192.168.25.118: bytes=32 time<1ms TTL=128
Reply from 192.168.25.118: bytes=32 time<1ms TTL=128
Reply from 192.168.25.118: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.25.118:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 6ms, Average = 1ms
```

Ping Test 2 - I have pinged PC2 from Laptop3 and all the sent packets were received successfully.



```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.25.119

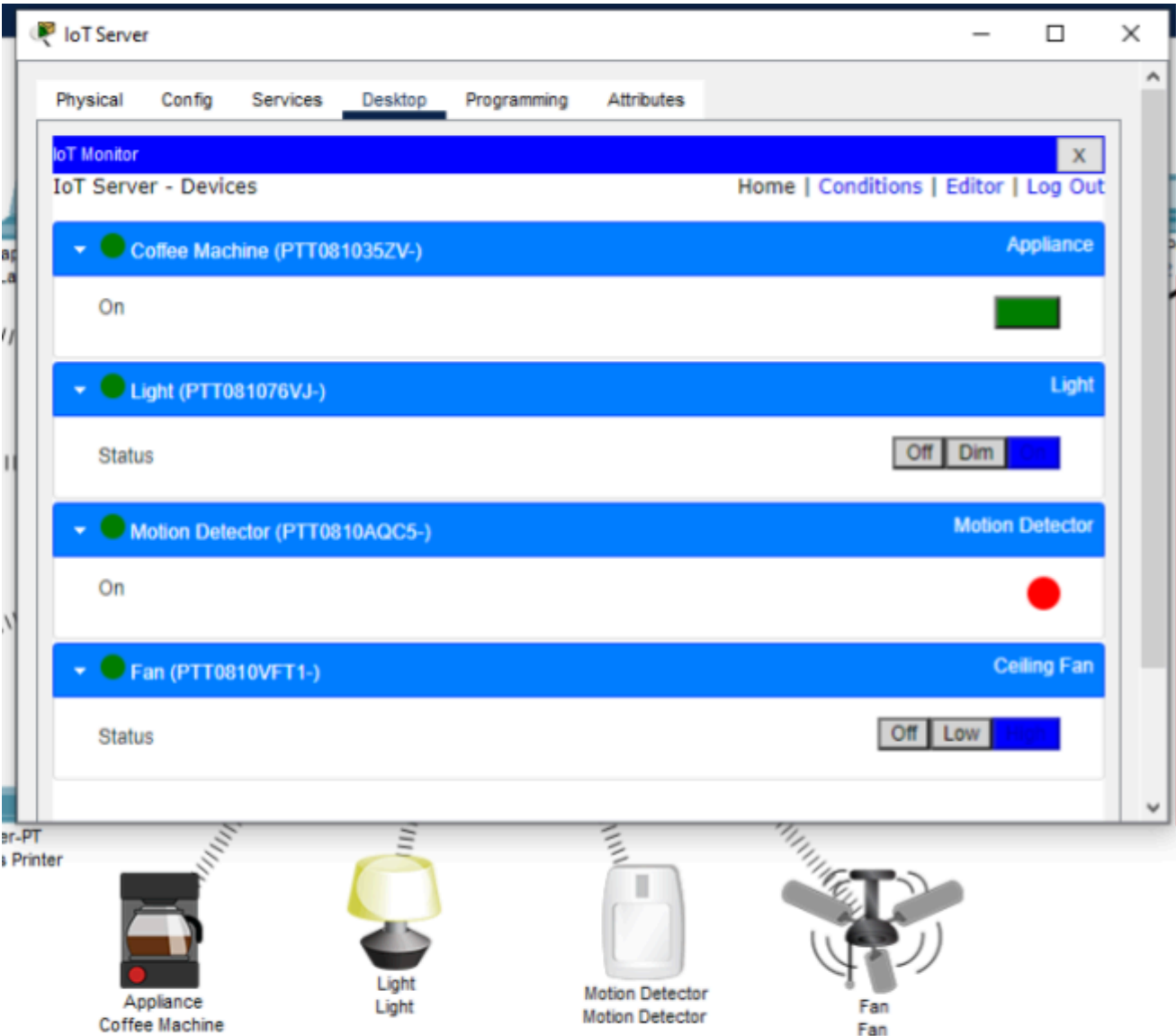
Pinging 192.168.25.119 with 32 bytes of data:

Reply from 192.168.25.119: bytes=32 time=34ms TTL=128
Reply from 192.168.25.119: bytes=32 time=27ms TTL=128
Reply from 192.168.25.119: bytes=32 time=28ms TTL=128
Reply from 192.168.25.119: bytes=32 time=698ms TTL=128

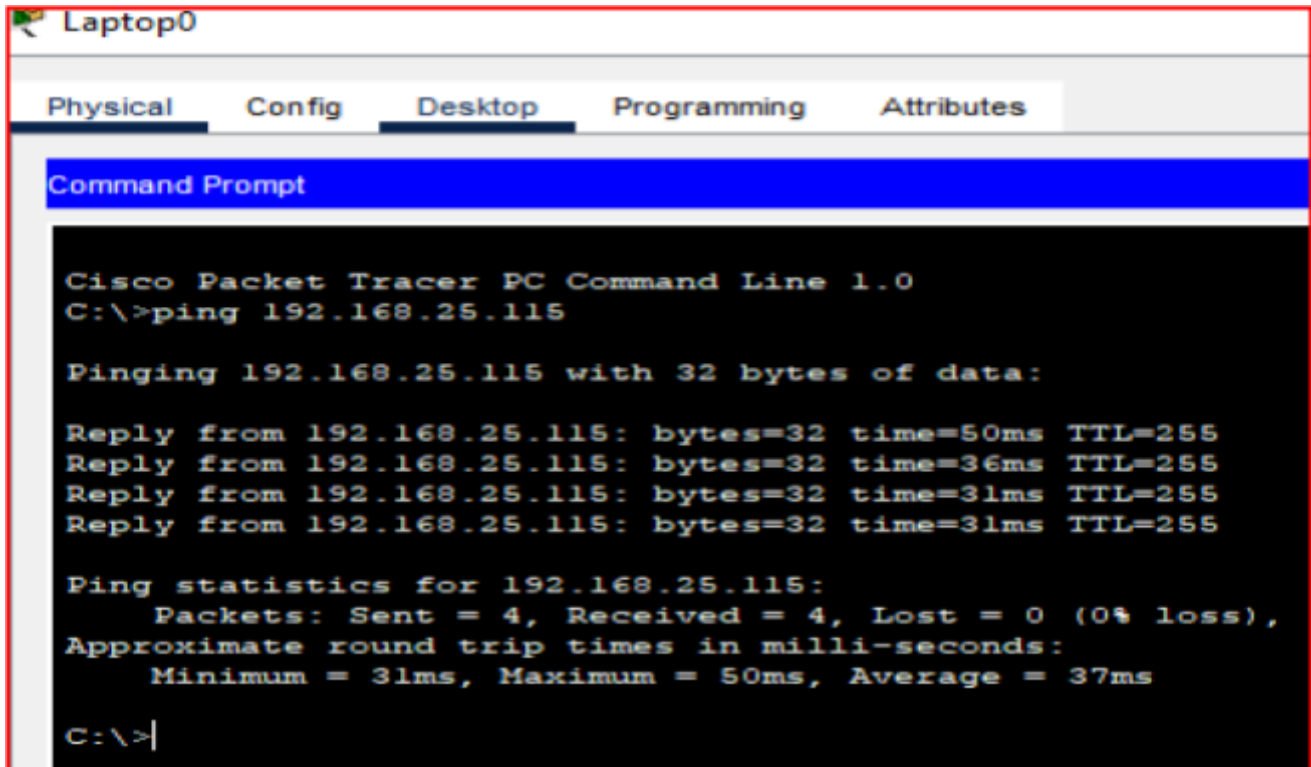
Ping statistics for 192.168.25.119:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 27ms, Maximum = 698ms, Average = 196ms
```



IoT Test 1 - I have checked that all the IoT devices are working as expected.



IoT Test 2 - I tested the motion detector through a ping command to confirm that it receives



The screenshot shows the 'Laptop0' window with the 'Desktop' tab selected. The Command Prompt displays the output of a ping command to 192.168.25.115. The output shows four successful replies with varying times (50ms, 36ms, 31ms, 31ms) and a TTL of 255. The ping statistics show 4 packets sent, 4 received, and 0% loss, with an average round trip time of 37ms.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.25.115

Pinging 192.168.25.115 with 32 bytes of data:

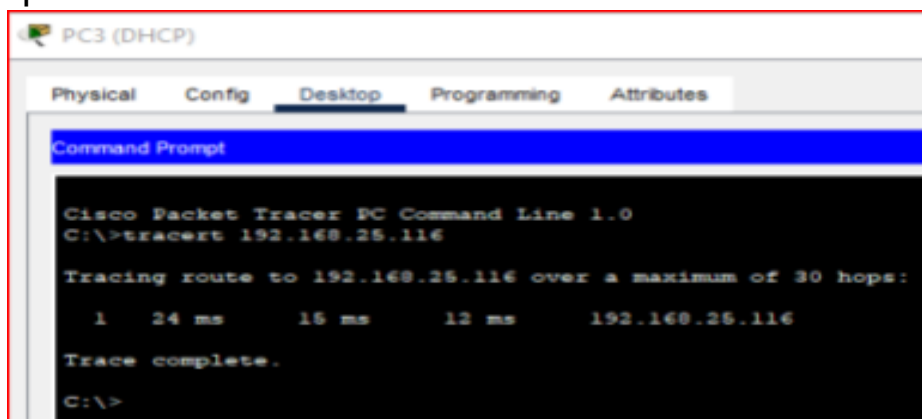
Reply from 192.168.25.115: bytes=32 time=50ms TTL=255
Reply from 192.168.25.115: bytes=32 time=36ms TTL=255
Reply from 192.168.25.115: bytes=32 time=31ms TTL=255
Reply from 192.168.25.115: bytes=32 time=31ms TTL=255

Ping statistics for 192.168.25.115:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 31ms, Maximum = 50ms, Average = 37ms

C:\>
```

packets successfully.

Tracert 1 - I used the tracert command to trace the route taken by the packet from PC3 to the smartphone.



The screenshot shows the 'PC3 (DHCP)' window with the 'Desktop' tab selected. The Command Prompt displays the output of a tracert command to 192.168.25.116. The output shows a single hop with a time of 24 ms, and the trace is complete.

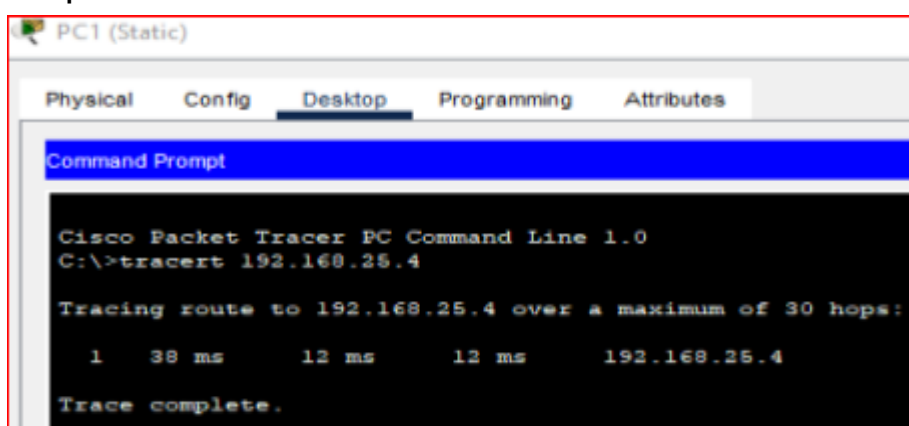
```
Cisco Packet Tracer PC Command Line 1.0
C:\>tracert 192.168.25.116

Tracing route to 192.168.25.116 over a maximum of 30 hops:

  0  24 ms    16 ms    12 ms    192.168.25.116
Trace complete.

C:\>
```

Tracert 2 - I used the tracert command to trace the route taken by the packet from PC1 to the wireless printer.



The screenshot shows the 'PC1 (Static)' window with the 'Desktop' tab selected. The Command Prompt displays the output of a tracert command to 192.168.25.4. The output shows a single hop with a time of 38 ms, and the trace is complete.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>tracert 192.168.25.4

Tracing route to 192.168.25.4 over a maximum of 30 hops:

  0  38 ms    12 ms    12 ms    192.168.25.4
Trace complete.

C:\>
```



## Extension Task

Join to the two office networks together (the main project network and satellite office network) and conduct your own tests to show connectivity between the two networks.

**Test 1 - I have pinged Laptop3 on the 192.168.25 network from Laptop 2 on the 192.168.30 network, and it is successful.**

```
Pinging 192.168.25.112 with 32 bytes of data:

Reply from 192.168.25.112: bytes=32 time=29ms TTL=127
Reply from 192.168.25.112: bytes=32 time=59ms TTL=127
Reply from 192.168.25.112: bytes=32 time=47ms TTL=127
Reply from 192.168.25.112: bytes=32 time=51ms TTL=127

Ping statistics for 192.168.25.112:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 29ms, Maximum = 59ms, Average = 46ms
```

**Test 2 - I used the tracert command to trace the route taken by the packet from Laptop 2 to Laptop3 on the other network.**

```
C:\>tracert 192.168.25.112

Tracing route to 192.168.25.112 over a maximum of 30 hops:

  0  0 ms    0 ms    0 ms    192.168.30.1
  1  23 ms   12 ms   19 ms   192.168.30.1
  2  29 ms   22 ms   32 ms   192.168.25.112

Trace complete.
```

**Test 3 - I have pinged Laptop 2 on the 192.168.30 network from Laptop1 on the 192.168.25 network, and it is successful.**

```
C:\>ping 192.168.30.104

Pinging 192.168.30.104 with 32 bytes of data:

Reply from 192.168.30.104: bytes=32 time=35ms TTL=127
Reply from 192.168.30.104: bytes=32 time=58ms TTL=127
Reply from 192.168.30.104: bytes=32 time=26ms TTL=127
Reply from 192.168.30.104: bytes=32 time=49ms TTL=127

Ping statistics for 192.168.30.104:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 26ms, Maximum = 58ms, Average = 42ms
```



Test 4 – I used the tracert command to trace the route taken by the packet from Laptop1 on the 192.168.25 network to Laptop3 on the 192.168.30 network.

```
C:\> tracert 192.168.30.100

Tracing route to 192.168.30.100 over a maximum of 30 hops:

  1  14 ms    24 ms    13 ms    192.168.25.254
  2  43 ms    31 ms    48 ms    192.168.30.100

Trace complete.
```

## Documentation

You need to create a simple user guide for a new staff member to be trained on how to use and operate the network devices including the IoT devices. Your user guide should include the following:

- How to add devices to the network, using static and dynamic methods.
- How to connect a device to the network, using a cable and a wireless method.
- How to set up a device using SSID and passphrase.
- How to add and configure IoT device to the network.
- How to operate the IoT device using the IoT Management App.

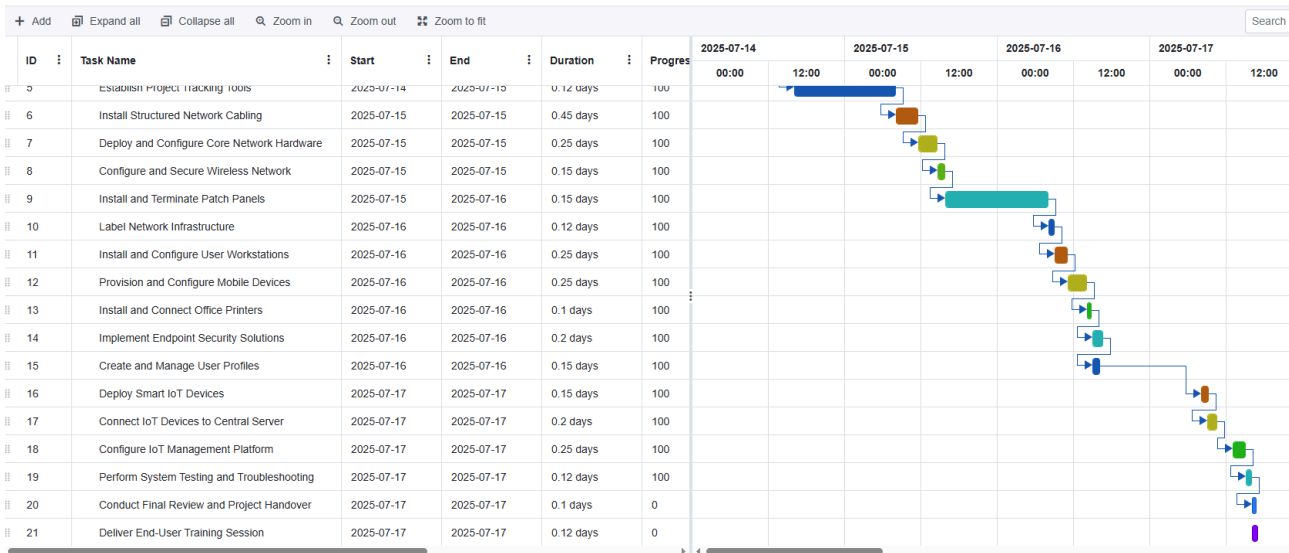
<https://docs.google.com/document/d/15MxfhW0jqN8jITzhjhMhUobWmVhSVaFhQhoYX6UBB3A/edit?usp=sharing>



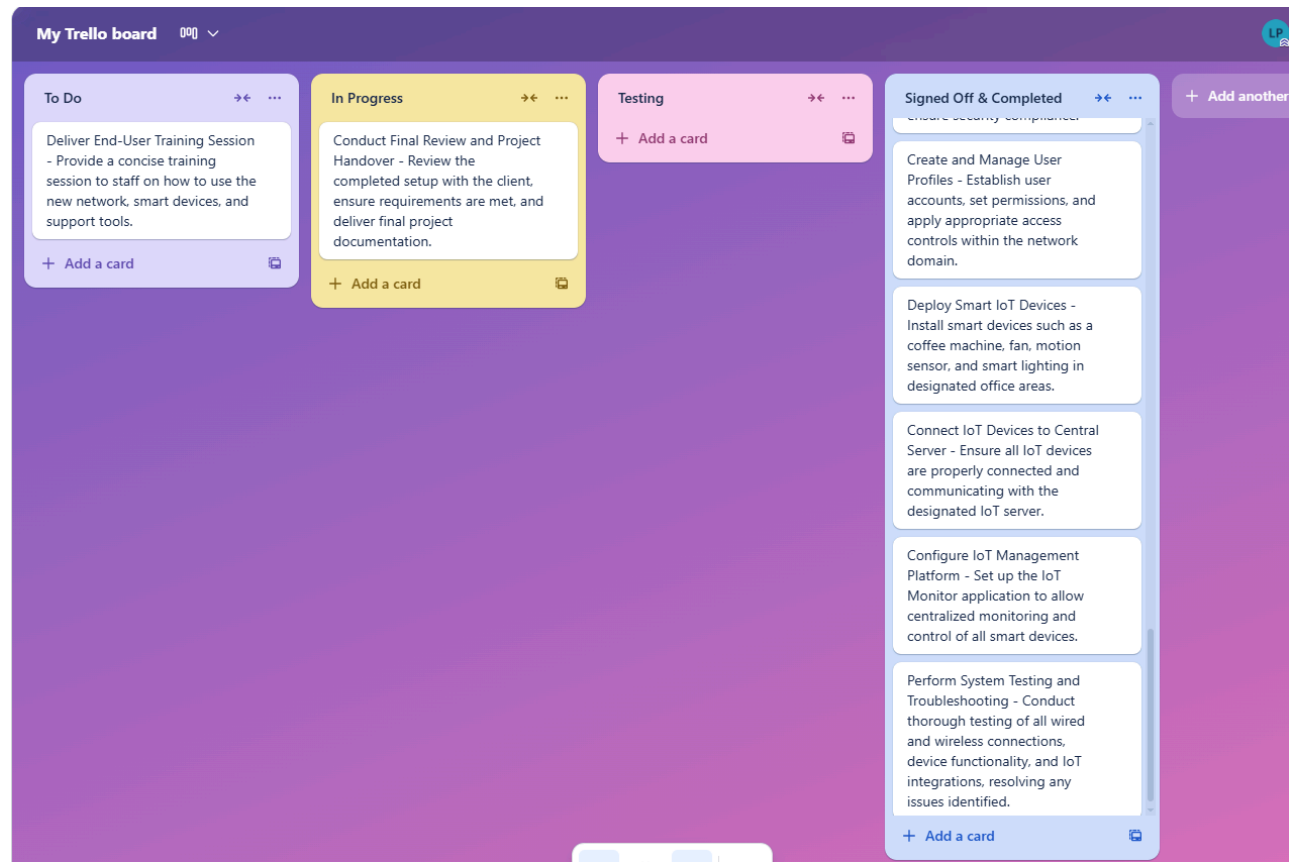
# Monitor & Control

You need to update your Gantt Chart and Kanban boards to show the monitoring of your project. The tools should show tasks being completed within specified time frames.

## Gantt Chart



## Kanban Boards





## Post Project Evaluation

Once you have completed the Project, you need to provide an evaluation on whether it has met the business requirements, the strengths and areas for development of the project, and how you would improve your own performance if you were to undertake the project again.

### Client Requirements

Has the client requirements have been met, and if so, how?

Yes, the project has successfully met the business requirements based on the following:

- **Network Setup:** A functional network infrastructure has been set up to connect all the necessary devices, including desktops, printers and IoT devices.
- **Staff Allocation:**
  - 4 permanent workstations were set up with PCs and network access
  - 4 hot desks were configured for part-time staff, supporting device connectivity via both wired and wireless access.
- **Smartphone access:** At least one smartphone was added to the network to demonstrate wireless connectivity and access to business services.
- **Printing:** Both wired and wireless printers were installed and tested to enable printing across the network.
- **IoT integration:**
  - IoT devices, including a smart coffee machine, fan, motion detector and smart light, were added.
  - The devices were successfully connected to the IoT server.
  - All IoT devices can be managed via the IoT Monitor app, enabling control, automation and status monitoring.

### Strengths

What are the strengths of the project?

- **Full Functional Coverage:** All core devices and services were implemented in accordance with the client's specifications.
- **IoT Management:** The IoT Monitor App was used effectively for real-time device control and interaction.
- **Scalable network design:** The network layout supports expansion with DHCP and static IP configurations as required.
- **User accessibility:** The guide and network setup facilitate connection and interaction with devices for non-technical users.
- **Redundancy support:** Both wireless and wired methods are in place for critical devices such as printers and PCs.





## Areas for Development

What are the areas for development of the project?

- **User Authentication:** Security could be improved by implementing individual user logins or access control lists (ACLs) for staff and IoT device interactions.
- **Smartphone Integration:** Only one smartphone was included. Future versions should simulate multiple mobile devices to test load and reliability.
- **Monitoring and Alerts:** The IoT server could be enhanced with automated alerting or notifications for device failures or unusual activity.
- **Hot Desk Automation:** Consider automating desk availability or providing IoT-based check-in systems for hot desk users.

## Own improvements

If you were to complete this project again, what would you do differently, (this can include time management, upskilling, communication, delegation, etc)

- **Better Time Management**

While the core tasks were completed, some stages such as troubleshooting and documentation took longer than expected.

**Improvement:** To stay on track and avoid last-minute rushes, follow the structured project plan implemented in the Gantt and Kanban chart and work within the time estimates set for each phase.

- **Deepen Technical knowledge:**

Additional research was required for some configuration aspects, such as integrating IoT security and automation.

**Improvement:** Allow time before the project to review advanced networking topics.

