Mini Project Report Cover Sheet

SRM Institute of Science and Technology

College of Engineering and Technology

Department of Electronics and Communication Engineering

18ECC303J COMPUTER COMMUNICATION NETWORKS

Sixth Semester, 2020-21 (Even Semester)

Name **:** Muralidhar B

Register No. **:** RA1811004010206

Title of the project **:** WLAN WPA2 PSK Mini Office Setup

Project team members **:** Kenan Varghese (202), Nithiya Nambi S (203)

Lab Supervisor **:** Dr. V. Nithya

Reg. No →		RA1811004010202	RA1811004010203	RA1811004010206
Mark split up ↓	Maximum Marks	Marks obtained	Marks obtained	Marks obtained
Novelty in the project work / Abstract	**5**			
Level of understanding of the design / Configuration	**10**			
Individual Contribution to the project	**5**			
Report writing	**5**			
Total	**25**			

REPORT VERIFICATION

Lab supervisor Signature with date **:**

WLAN WPA2 PSK Mini Office Setup

Abstract-

Wireless networks have seen unprecedented rise in their size and number of users in recent years. This unprecedented rise is attributed to the rise in the number of mobile computing devices. Moreover, the amount of data that is handled by these wireless networks has increased in recent years. The project is to study and understand the WLAN WPA2 PSK concept and the advantages of using Wireless Local Area Network, how the devices are controlled in this network. We understand the configuration that we use in Cisco packet tracer to build a WLAN WPA2 PSK network using router, switches and access points.

This circuit increases the security level of LAN and hence disallows unidentified devices to connect in this network.

Motivation/Challenge-

Motive of this project is to design a simple network of an office environment with WLAN networking.

Objective-

The primary objective of this project is to design a mini office environment with WLAN WPA2 PSK protected access networking and connect the devices using Wi-Fi under one network.

Software/Hardware Requirements-

Cisco Packet Tracer

Engineering Standards-

WLAN- is a network that allows devices to connect and communicate wirelessly. Unlike a traditional wired LAN, in which devices communicate over Ethernet cables, devices on a WLAN communicate via Wi-Fi. New devices are typically added and configured using DHCP. They can communicate with other devices on the network the same way they would on a wired network. The primary difference is how the data is transmitted. In a LAN, data is transmitted over physical cables in a series of Ethernet packets. In a WLAN, packets are transmitted over the air.

WPA2 PSK- This standard specifies security mechanisms for wireless networks, replacing the short Authentication and privacy clause of the original standard with a detailed Security clause. In the process, the amendment deprecated broken Wired Equivalent Privacy (WEP), while it was later incorporated into the published IEEE 802.11-2007 standard. 802.11i supersedes the previous security specification, Wired Equivalent Privacy (WEP), which was shown to have security vulnerabilities. Wi-Fi Protected Access (WPA) had previously been introduced by the Wi-Fi Alliance as an intermediate solution to WEP insecurities. WPA implemented a subset of a draft of 802.11i. The Wi-Fi Alliance refers to their approved, interoperable implementation of the full 802.11i as WPA2, also called RSN (Robust Security). 802.11i makes use of the Advanced Encryption Standard (AES) block cipher, whereas WEP and WPA use the RC4 stream cipher.

Realistic Constrains-

When an actual network is being designed, they might be some loss of signal and hence the efficiency of the network will be lesser than theoretical efficiency. But here since it is a simulation of a network, Outcomes will be very accurate.

Deliverables-

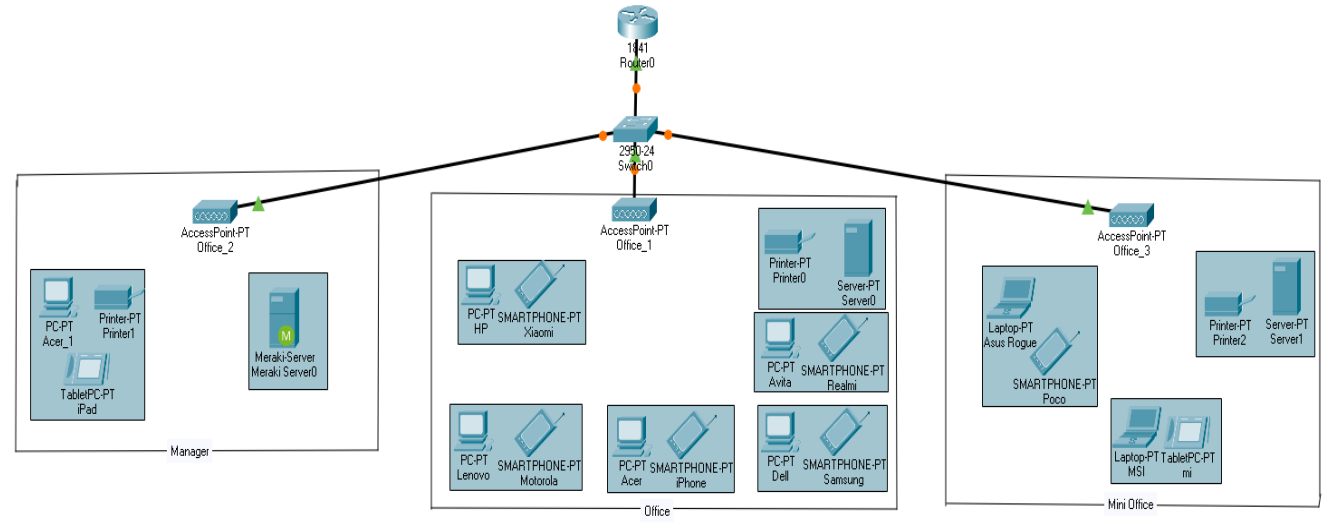
1.WPA2-PSK

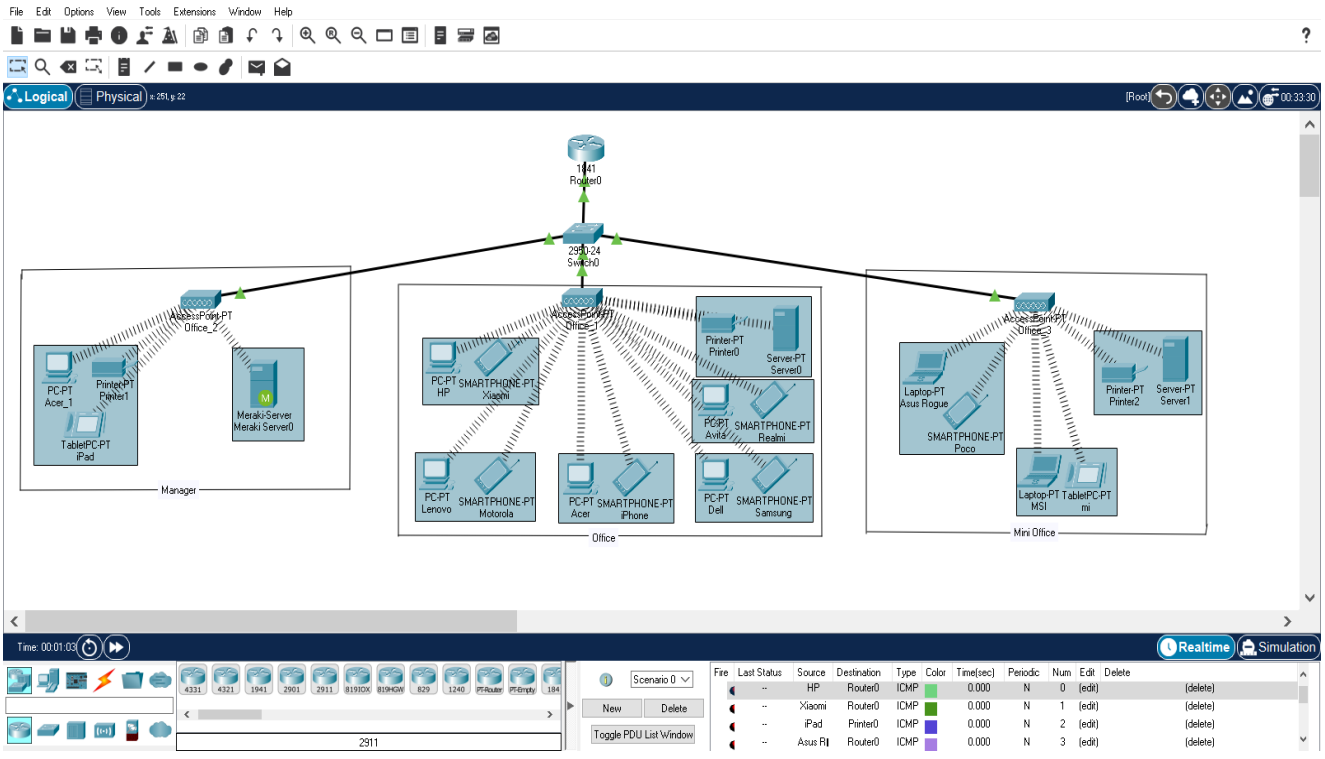
1. In addition to the encryption benefits, WPA2 also adds two enhancements to support fast roaming of wireless clients moving between wireless AP's.
2. PMK caching support – allows for reconnections to AP's that the client has recently been connected without the need to re-authenticate.
3. Pre-authentication support – allows a client to pre-authenticate with an AP towards which it is moving while still maintaining a connection to the AP it's moving away from.
4. PMK caching support and Pre-authentication support enable WPA2 to reduce the roaming time from over a second to less than 1/10th of a second. The ultimate benefit of the fast roaming is that WPA2 can now support timing-sensitive applications like Citrix, video, or VoIP (Voice over IP) which would break without it.

2.WLAN

1. It's a reliable sort of communication.
2. As WLAN reduces physical wires so it's a versatile way of communication.
3. It provides high rate thanks to small area coverage.

Methodology-





Network Design of a Mini Office

A WLAN, or wireless LAN, is a network that allows devices to connect and communicate wirelessly. Unlike a traditional wired LAN, in which devices communicate over Ethernet cables, devices on a WLAN communicate via Wi-Fi. While a WLAN may look different than a traditional LAN, it functions the same way. New devices are typically added and configured using DHCP. They can communicate with other devices on the network the same way

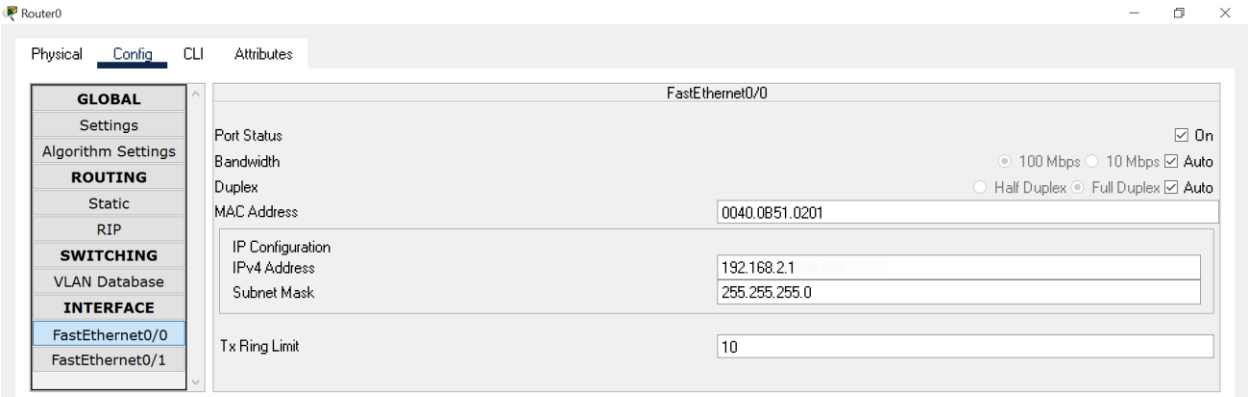
they would on a wired network. The primary difference is how the data is transmitted. In a LAN, data is transmitted over physical cables in a series of Ethernet packets. In a WLAN, packets are transmitted over the air.

WPA stands for "Wi-Fi Protected Access", and PSK is short for "Pre-Shared Key."
WPA2-PSK [AES] is the recommended secure method of making sure no one can actually listen to your wireless data while it's being transmitted back and forth between your router and other devices on your network. We use WPA2-PSK protection.
Each device is given its own IP address and configured in such a way to connect it wireless.

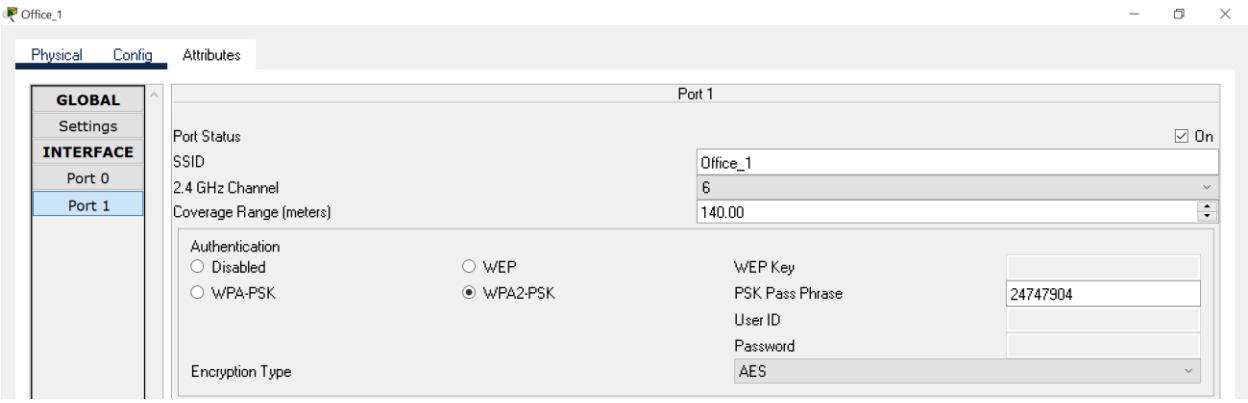
WMP300N module is a wireless adapter module, used in P.C, laptops, printers and servers in order to establish a wireless communication. We have to power of the device first, remove the wired default module and then replace it with this WMP300N wireless module and then power on the device and configure.

The default IP address is 192.168.2.1.

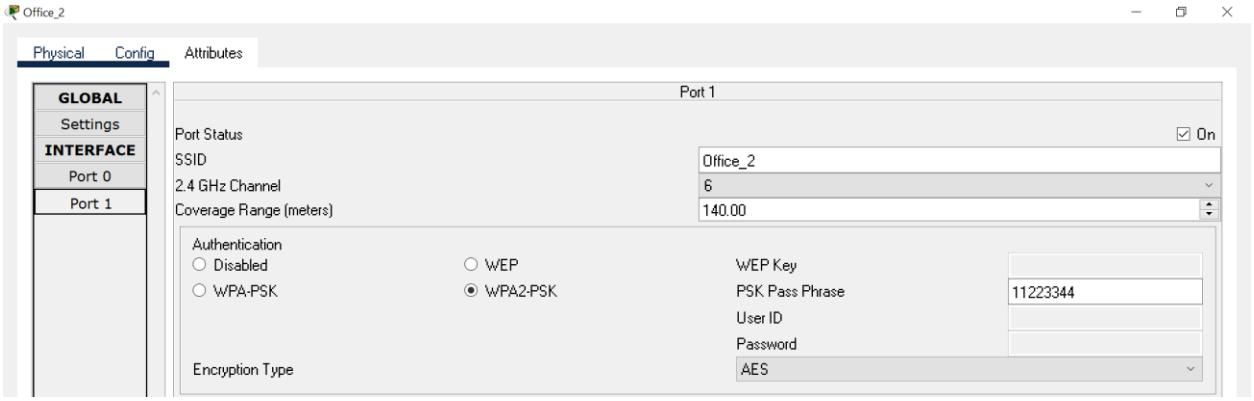
Router 0:



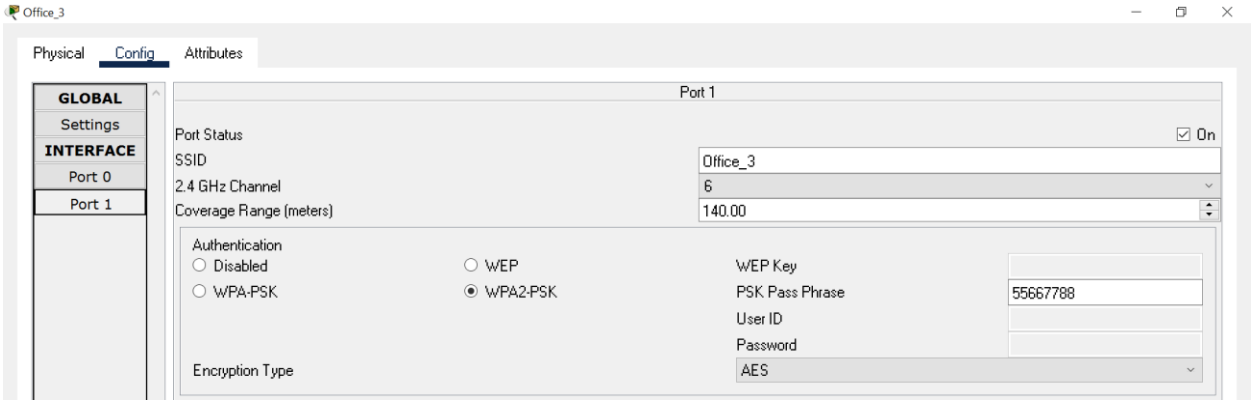
Access Point 1:



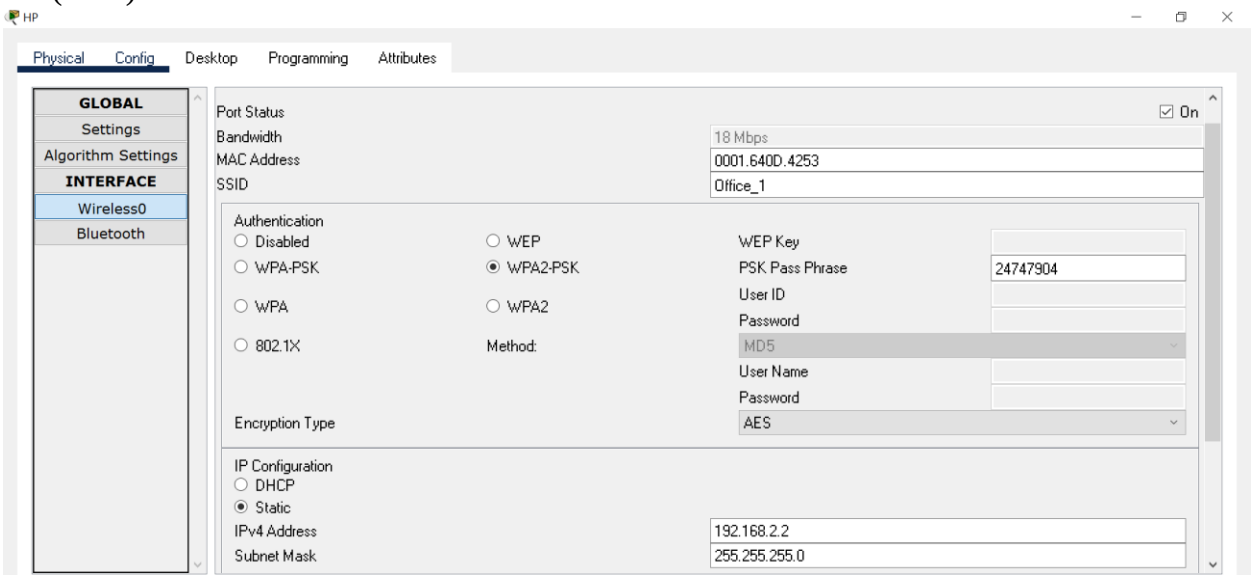
Access Point 2:



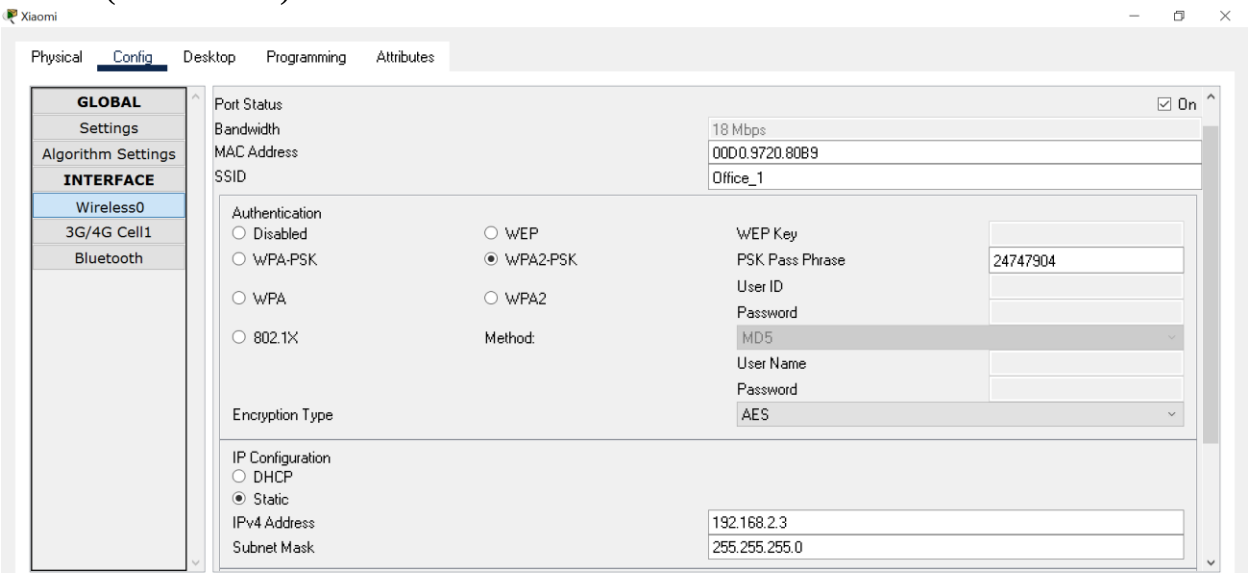
Access Point 3:



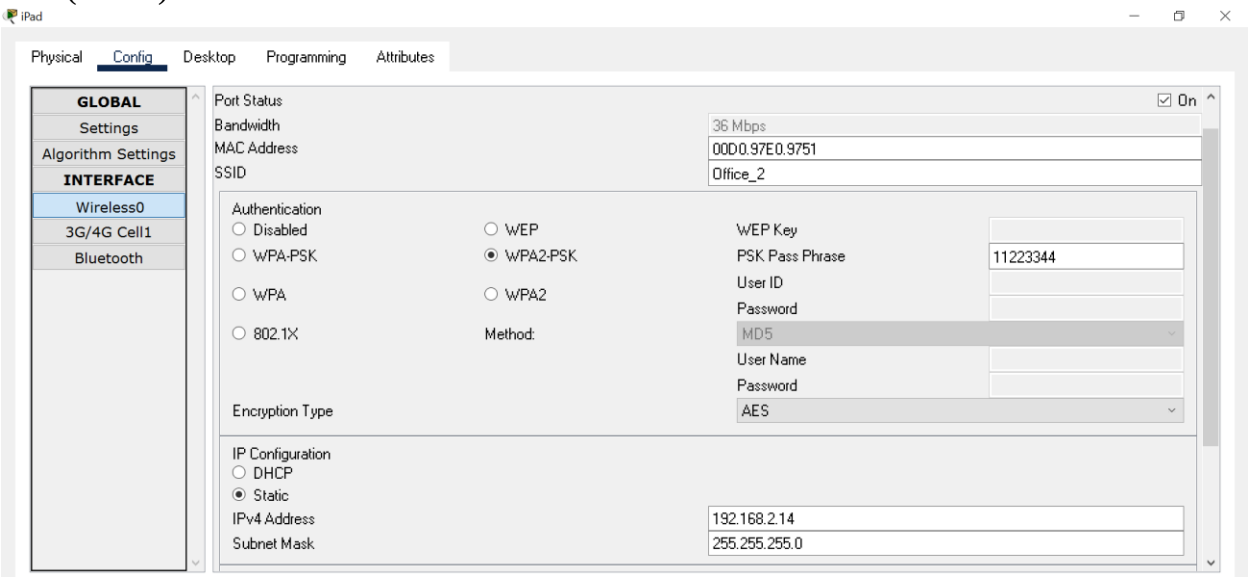
HP (PC 0):



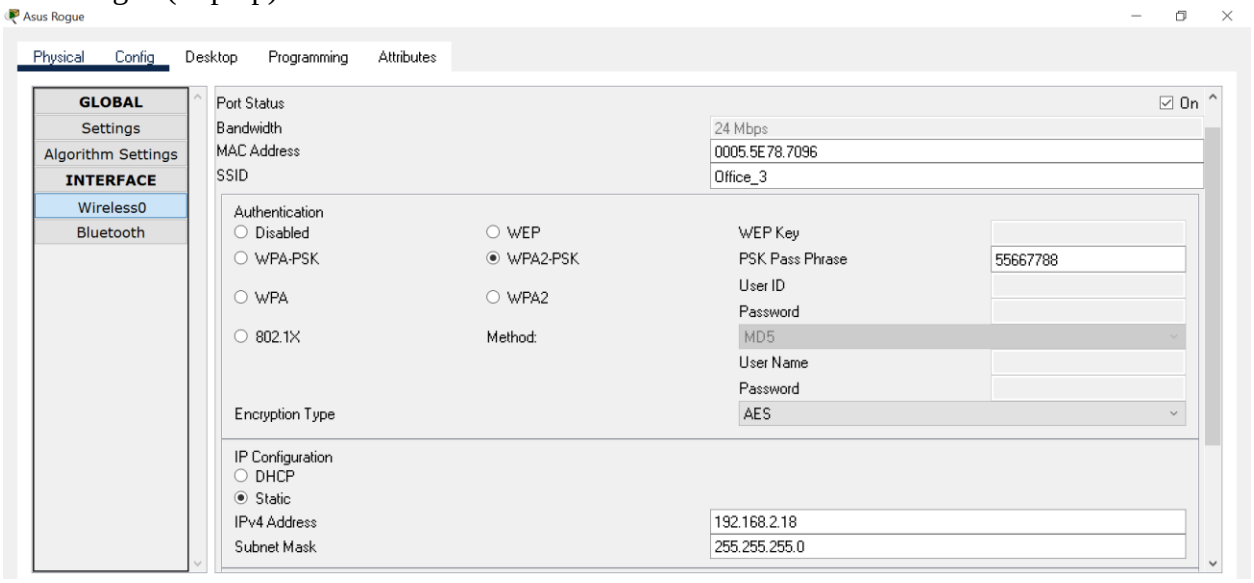
Xiaomi (Smart Phone):



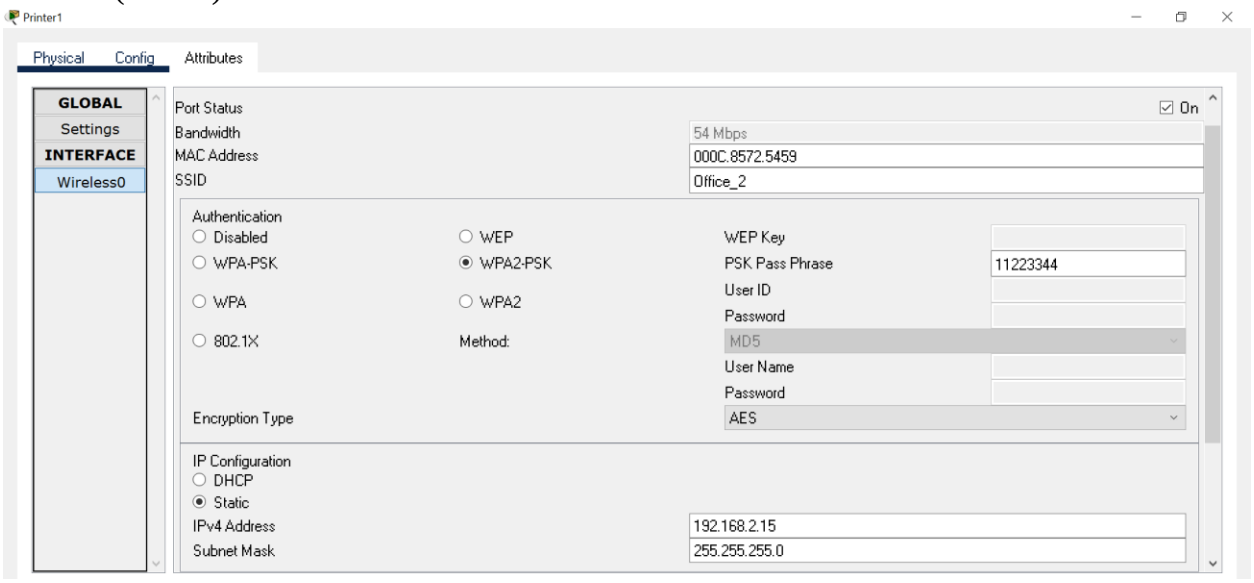
iPad (Tablet):



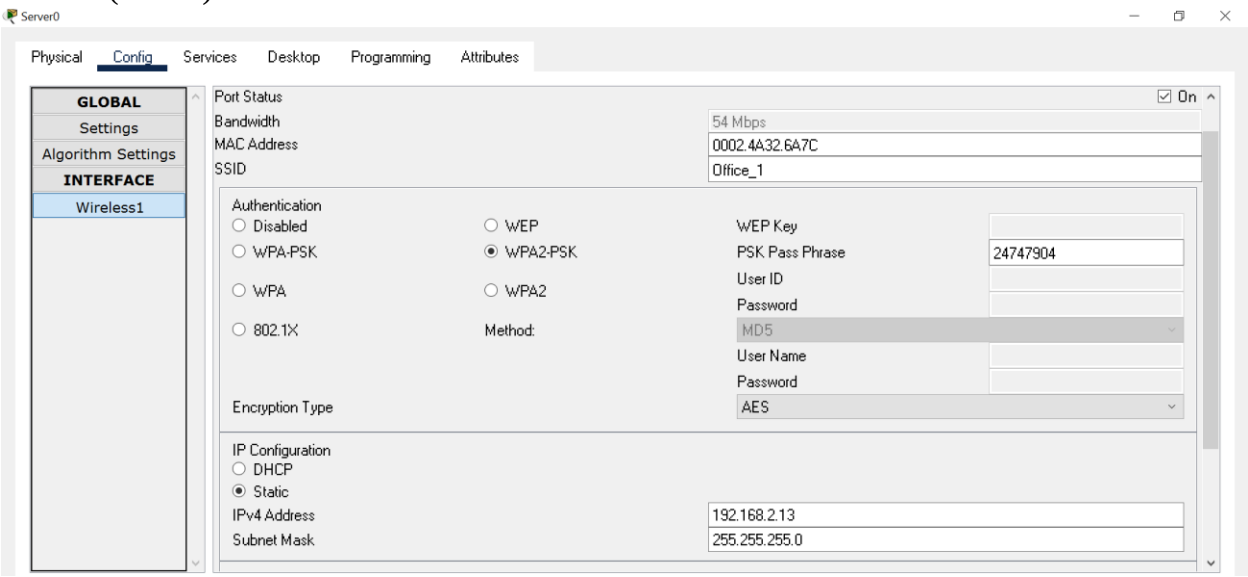
Asus Rogue (Laptop):



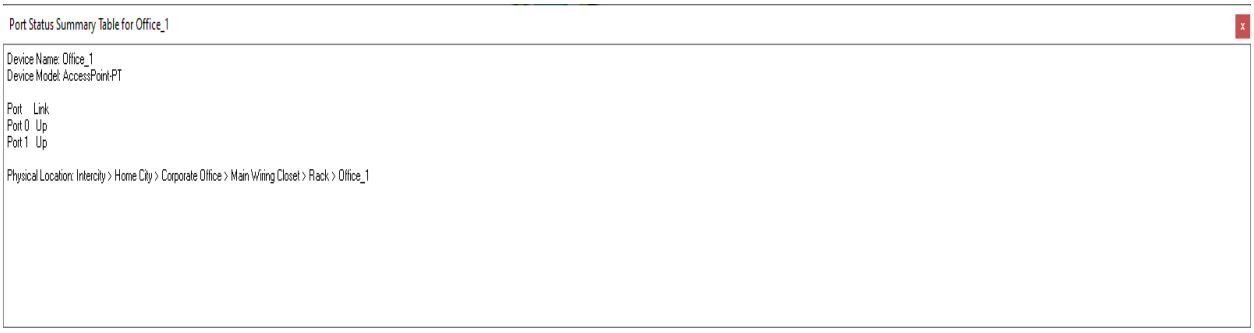
Printer1 (Printer):



Server0 (Server):



Result/Illustration-



Port Status Summary Table for Office_2

Device Name: Office_2
Device Model: AccessPoint-PT

Port	Link
Port 0	Up
Port 1	Up

Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet > Rack > Office_2

Port Status Summary Table for Office_3

Device Name: Office_3
Device Model: AccessPoint-PT

Port	Link
Port 0	Up
Port 1	Up

Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet > Rack > Office_3

Port Status Summary Table for HP

Device Name: HP
Device Model: PC-PT

Port	Link	IP Address	IPv6 Address	MAC Address
Wireless0	Up	192.168.2.2/24	<not set>	0001.640D.4253
Bluetooth	Down	<not set>	<not set>	0001.C7A2.343E

Gateway: 192.168.2.1
DNS Server: <not set>
Line Number: <not set>

Wireless Best Data Rate: 18 Mbps
Wireless Signal Strength: 39%

Physical Location: Intercity > Home City > Corporate Office > HP

Port Status Summary Table for Xiaomi

Device Name: Xiaomi
Device Model: SMARTPHONE-PT

Port	Link	IP Address	IPv6 Address	MAC Address
Wireless0	Up	192.168.2.3/24	<not set>	00D0.9720.80B9
3G/4G Cell1	Up	169.254.222.100/16	<not set>	00D0.FF0A.DE64
Bluetooth	Down	<not set>	<not set>	0001.6348.C619

Gateway: 192.168.2.1
DNS Server: <not set>
Line Number: <not set>

Wireless Best Data Rate: 24 Mbps
Wireless Signal Strength: 43%

Physical Location: Intercity > Home City > Corporate Office > Xiaomi

Port Status Summary Table for Lenovo

Device Name: Lenovo
Device Model: PC-PT

Port	Link	IP Address	IPv6 Address	MAC Address
Wireless0	Up	192.168.2.5/24	<not set>	00E0.F9AA.0D43
Bluetooth	Down	<not set>	<not set>	00D0.BC51.9405

Gateway: 192.168.2.1
DNS Server: <not set>
Line Number: <not set>

Wireless Best Data Rate: 24 Mbps
Wireless Signal Strength: 48%

Physical Location: Intercity > Home City > Corporate Office > Lenovo

Port Status Summary Table for Motorola

Device Name: Motorola
Device Model: SMARTPHONE-PT

Port	Link	IP Address	IPv6 Address	MAC Address
Wireless0	Up	192.168.2.4/24	<not set>	00E0.8F37.A0AC
3G/4G Cell1	Up	169.254.169.214/16	<not set>	0009.7C9E.A9D6
Bluetooth	Down	<not set>	<not set>	0002.16D3.4138

Gateway: 192.168.2.1
DNS Server: <not set>
Line Number: <not set>

Wireless Best Data Rate: 24 Mbps
Wireless Signal Strength: 53%

Physical Location: Intercity > Home City > Corporate Office > Motorola

Port Status Summary Table for Acer

Device Name: Acer
Device Model: PC-PT

Port	Link	IP Address	IPv6 Address	MAC Address
Wireless0	Up	192.168.2.6/24	<not set>	0002.1605.86C7
Bluetooth	Down	<not set>	<not set>	00E0.B0D9.7C95

Gateway: 192.168.2.1
DNS Server: <not set>
Line Number: <not set>

Wireless Best Data Rate: 54 Mbps
Wireless Signal Strength: 59%

Physical Location: Intercity > Home City > Corporate Office > Acer

Port Status Summary Table for iPhone

Device Name: iPhone
Device Model: SMARTPHONE-PT

Port	Link	IP Address	IPv6 Address	MAC Address
Wireless0	Up	192.168.2.7/24	<not set>	000A.419C.5EA0
3G/4G Cell1	Up	169.254.180.59/16	<not set>	0001.C9C2.B43B
Bluetooth	Down	<not set>	<not set>	0040.0BAA.D431

Gateway: 192.168.2.1
DNS Server: <not set>
Line Number: <not set>

Wireless Best Data Rate: 54 Mbps
Wireless Signal Strength: 76%

Physical Location: Intercity > Home City > Corporate Office > iPhone

Port Status Summary Table for Dell

Device Name: Dell
Device Model: PC-PT

Port	Link	IP Address	IPv6 Address	MAC Address
Wireless0	Up	192.168.2.8/24	<not set>	0060.2F79.07C1
Bluetooth	Down	<not set>	<not set>	0050.0FED.DD18

Gateway: 192.168.2.1
DNS Server: <not set>
Line Number: <not set>

Wireless Best Data Rate: 54 Mbps
Wireless Signal Strength: 88%

Physical Location: Intercity > Home City > Corporate Office > Dell

Port Status Summary Table for Samsung

Device Name: Samsung
Device Model: SMARTPHONE-PT

Port	Link	IP Address	IPv6 Address	MAC Address
Wireless0	Up	192.168.2.9/24	<not set>	0030.A312.7ED9
3G/4G Cell1	Up	169.254.195.22/16	<not set>	000D.BDBA.C316
Bluetooth	Down	<not set>	<not set>	00E0.B02D.907A

Gateway: 192.168.2.1
DNS Server: <not set>
Line Number: <not set>

Wireless Best Data Rate: 54 Mbps
Wireless Signal Strength: 100%

Physical Location: Intercity > Home City > Corporate Office > Samsung

Port Status Summary Table for Avita

Device Name: Avita
Device Model: PC-PT

Port	Link	IP Address	IPv6 Address	MAC Address
Wireless0	Up	192.168.2.10/24	<not set>	0001.C941.D911
Bluetooth	Down	<not set>	<not set>	0002.16B1.C5DA

Gateway: 192.168.2.1
DNS Server: <not set>
Line Number: <not set>

Wireless Best Data Rate: 54 Mbps
Wireless Signal Strength: 100%

Physical Location: Intercity > Home City > Corporate Office > Avita

Port Status Summary Table for Realmi

Device Name: Realmi
Device Model: SMARTPHONE-PT

Port	Link	IP Address	IPv6 Address	MAC Address
Wireless0	Up	192.168.2.11/24	<not set>	00D0.9779.3C79
3G/4G Cell1	Up	169.254.73.140/16	<not set>	0040.0BD9.498C
Bluetooth	Down	<not set>	<not set>	0001.4275.3853

Gateway: 192.168.2.1
DNS Server: <not set>
Line Number: <not set>

Wireless Best Data Rate: 54 Mbps
Wireless Signal Strength: 100%

Physical Location: Intercity > Home City > Corporate Office > Realmi

Port Status Summary Table for Printer0

Device Name: Printer0
Device Model: Printer-PT

Port	Link	IP Address	IPv6 Address	MAC Address
Wireless0	Up	192.168.2.12/24	<not set>	0009.7C62.48D4

Gateway: <not set>
DNS Server: <not set>
Line Number: <not set>

Wireless Best Data Rate: 54 Mbps
Wireless Signal Strength: 88%

Physical Location: Intercity > Home City > Corporate Office > Printer0

Port Status Summary Table for Server0

Device Name: Server0
Device Model: Server-PT

Port	Link	IP Address	IPv6 Address	MAC Address
Wireless1	Up	192.168.2.13/24	<not set>	0002.4A32.6A7C

Gateway: <not set>
DNS Server: <not set>
Line Number: <not set>

Wireless Best Data Rate: 54 Mbps
Wireless Signal Strength: 100%

Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet > Rack > Server0

Port Status Summary Table for Acer_1

Device Name: Acer_1
Device Model: PC-PT

Port	Link	IP Address	IPv6 Address	MAC Address
Wireless0	Up	169.254.199.232/16	<not set>	0000.0C00.C7E8
Bluetooth	Down	<not set>	<not set>	00D0.9779.9AAB

Gateway: <not set>
DNS Server: <not set>
Line Number: <not set>

Wireless Best Data Rate: 54 Mbps
Wireless Signal Strength: 76%

Physical Location: Intercity > Home City > Corporate Office > Acer_1

Port Status Summary Table for Printer1

Device Name: Printer1
Device Model: Printer-PT

Port	Link	IP Address	IPv6 Address	MAC Address
Wireless0	Up	192.168.2.15/24	<not set>	000C.8572.5459

Gateway: <not set>
DNS Server: <not set>
Line Number: <not set>

Wireless Best Data Rate: 54 Mbps
Wireless Signal Strength: 67%

Physical Location: Intercity > Home City > Corporate Office > Printer1

Port Status Summary Table for iPad

Device Name: iPad
Device Model: TabletPC-PT

Port	Link	IP Address	IPv6 Address	MAC Address
Wireless0	Up	192.168.2.14/24	<not set>	00D0.97E0.9751
3G/4G Cell1	Up	169.254.161.18/16	<not set>	0060.3E9D.A112
Bluetooth	Down	<not set>	<not set>	00E0.F96E.A9C8

Gateway: 192.168.2.1
DNS Server: <not set>
Line Number: <not set>

Wireless Best Data Rate: 54 Mbps
Wireless Signal Strength: 59%

Physical Location: Intercity > Home City > Corporate Office > iPad

Port Status Summary Table for Asus Rogue

Device Name: Asus Rogue
Device Model: Laptop-PT

Port	Link	IP Address	IPv6 Address	MAC Address
Wireless0	Up	192.168.2.18/24	<not set>	0005.5E78.7096
Bluetooth	Down	<not set>	<not set>	000D.BD57.A0D6

Gateway: 192.168.2.1
DNS Server: <not set>
Line Number: <not set>

Wireless Best Data Rate: 24 Mbps
Wireless Signal Strength: 53%

Physical Location: Intercity > Home City > Corporate Office > Asus Rogue

Port Status Summary Table for Poco

Device Name: Poco
Device Model: SMARTPHONE-PT

Port	Link	IP Address	IPv6 Address	MAC Address
Wireless0	Up	192.168.2.19/24	<not set>	0040.0B29.BA95
3G/4G Cell1	Up	169.254.38.61/16	<not set>	00D0.FFD4.263D
Bluetooth	Down	<not set>	<not set>	000A.F356.BD34

Gateway: 192.168.2.1
DNS Server: <not set>
Line Number: <not set>

Wireless Best Data Rate: 24 Mbps
Wireless Signal Strength: 48%

Physical Location: Intercity > Home City > Corporate Office > Poco

Port Status Summary Table for MSI

Device Name: MSI
Device Model: Laptop-PT

Port	Link	IP Address	IPv6 Address	MAC Address
Wireless0	Up	192.168.2.21/24	<not set>	0006.2A68.28EC
Bluetooth	Down	<not set>	<not set>	0002.4AB9.3412

Gateway: 192.168.2.1
DNS Server: <not set>
Line Number: <not set>

Wireless Best Data Rate: 24 Mbps
Wireless Signal Strength: 43%

Physical Location: Intercity > Home City > Corporate Office > MSI

Port Status Summary Table for mi

Device Name: mi
Device Model: TabletPC-PT

Port	Link	IP Address	IPv6 Address	MAC Address
Wireless0	Up	192.168.2.20/24	<not set>	0005.5E61.674E
3G/4G Cell1	Up	169.254.11.24/16	<not set>	00E0.F759.0B18
Bluetooth	Down	<not set>	<not set>	0006.2A6A.68CA

Gateway: 0.0.0.0
DNS Server: <not set>
Line Number: <not set>

Wireless Best Data Rate: 18 Mbps
Wireless Signal Strength: 39%

Physical Location: Intercity > Home City > Corporate Office > mi

Port Status Summary Table for Printer2

Device Name: Printer2
Device Model: Printer-PT

Port	Link	IP Address	IPv6 Address	MAC Address
Wireless0	Up	192.168.2.22/24	<not set>	000D.BD1B.4555

Gateway: <not set>
DNS Server: <not set>
Line Number: <not set>

Wireless Best Data Rate: 18 Mbps
Wireless Signal Strength: 39%

Physical Location: Intercity > Home City > Corporate Office > Printer2

Port Status Summary Table for Server1

Device Name: Server1
Device Model: Server-PT

Port	Link	IP Address	IPv6 Address	MAC Address
FastEthernet0	Down	<not set>	<not set>	0000.D311.67B7
Wireless1	Up	169.254.92.48/16	<not set>	000D.BAA3.5C30

Gateway: 192.168.2.1
DNS Server: <not set>
Line Number: <not set>

Wireless Best Data Rate: 54 Mbps
Wireless Signal Strength: 100%

Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet > Rack > Server1

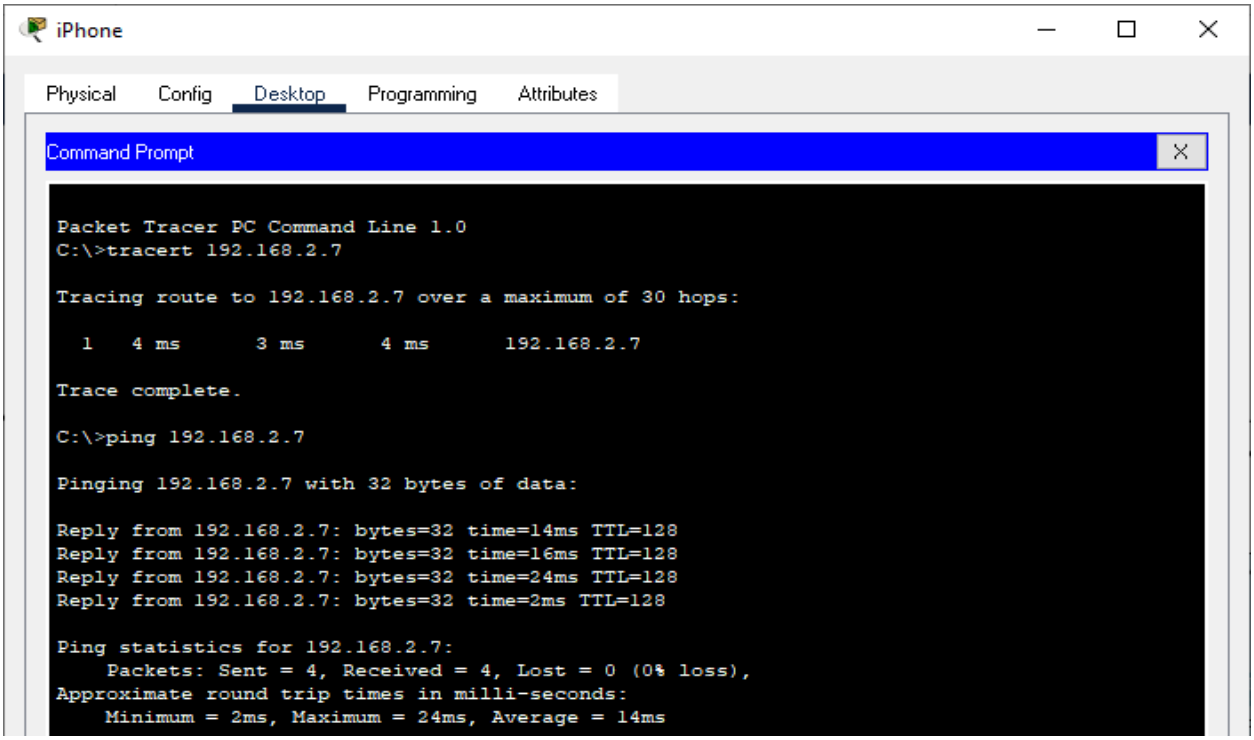
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	HP	Router0	ICMP		0.000	N	0	(edit)	(delete)
	Successful	Xiaomi	Router0	ICMP		0.000	N	1	(edit)	(delete)
	Successful	iPad	Printer0	ICMP		0.000	N	2	(edit)	(delete)
	Successful	Asus R	Router0	ICMP		0.000	N	3	(edit)	(delete)

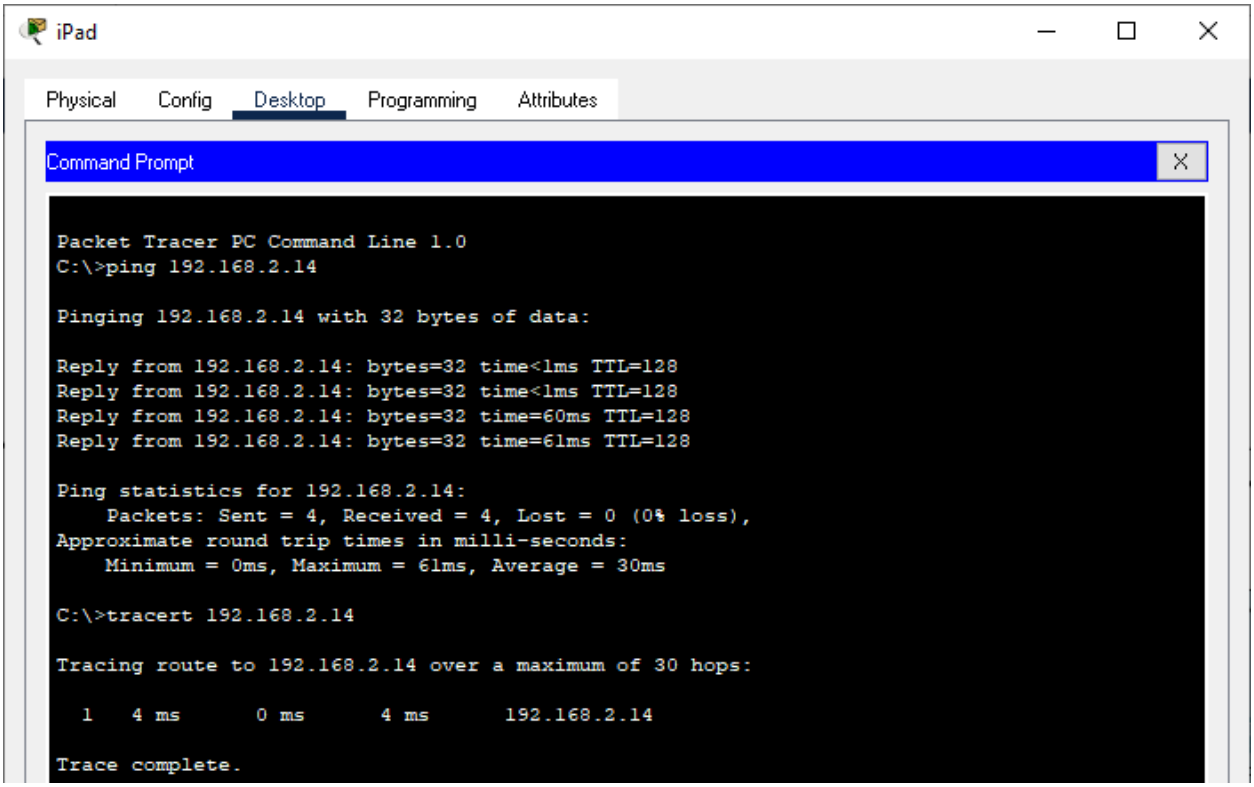
Asus Rogue

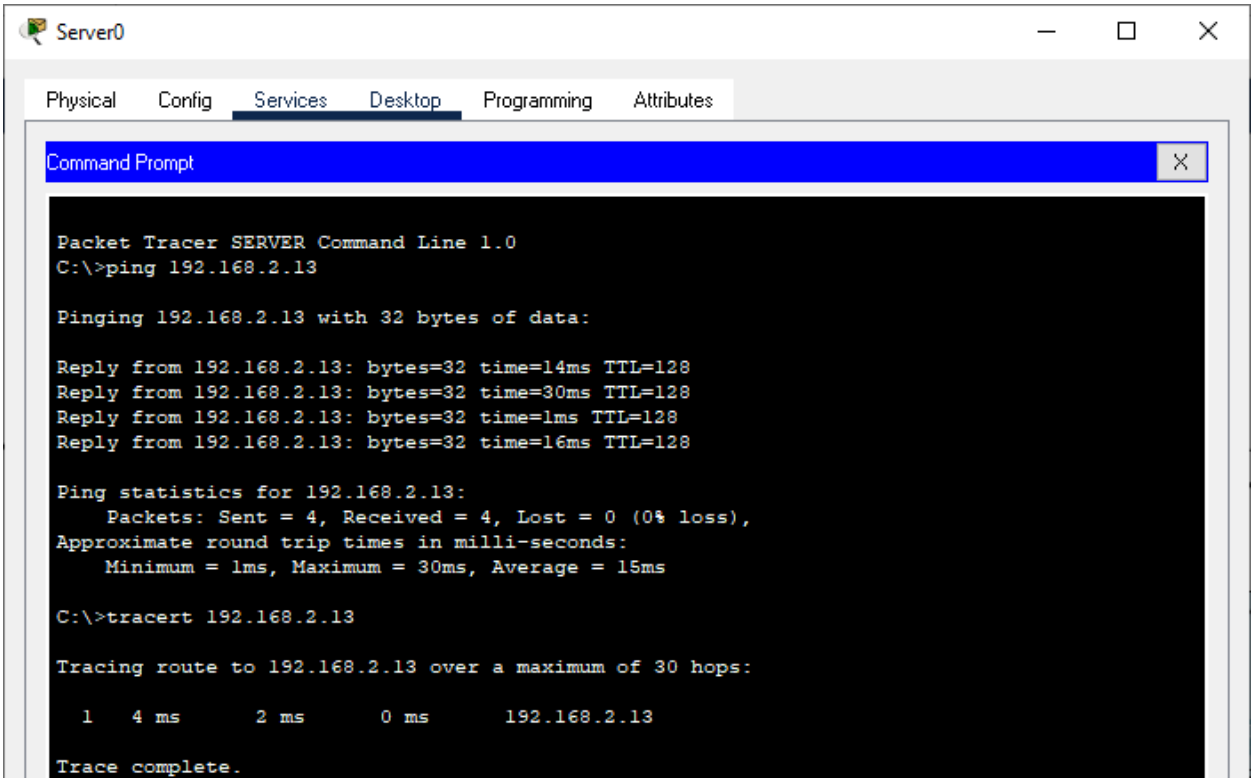
Physical | Config | Desktop | Programming | Attributes

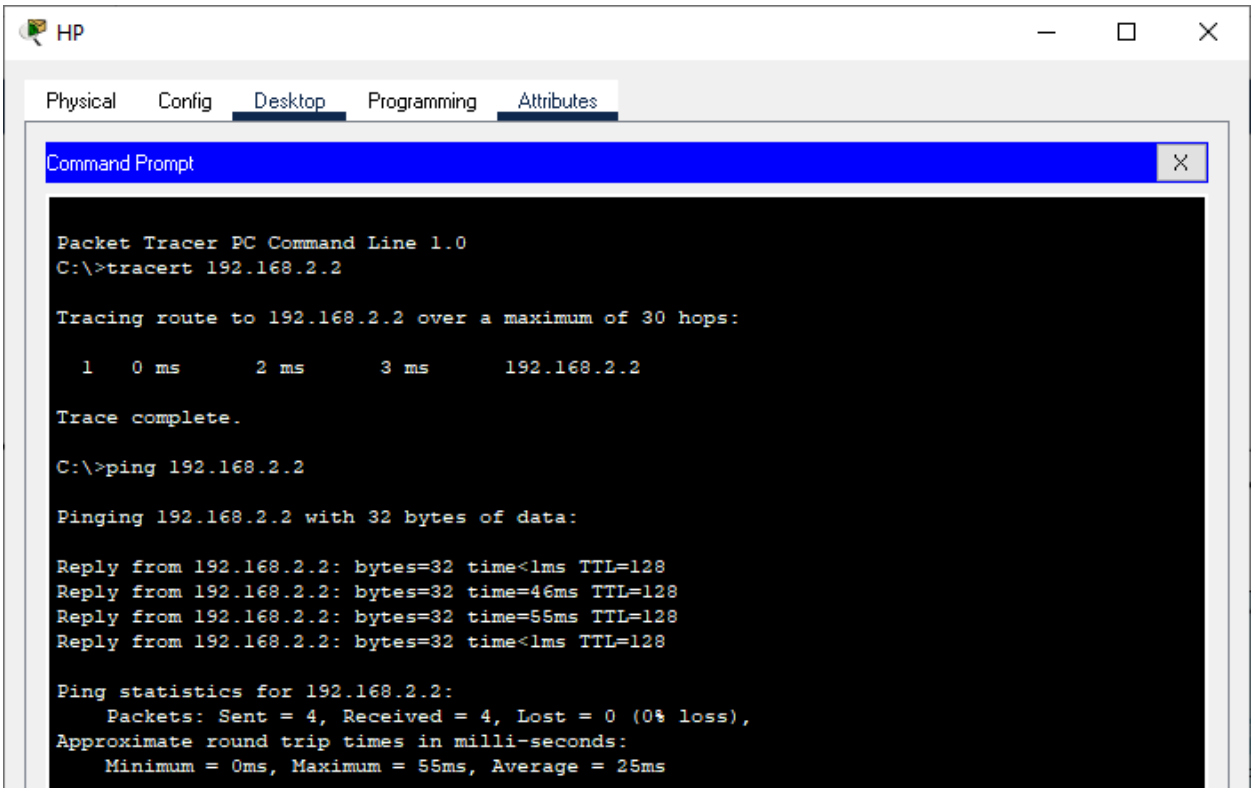
Command Prompt

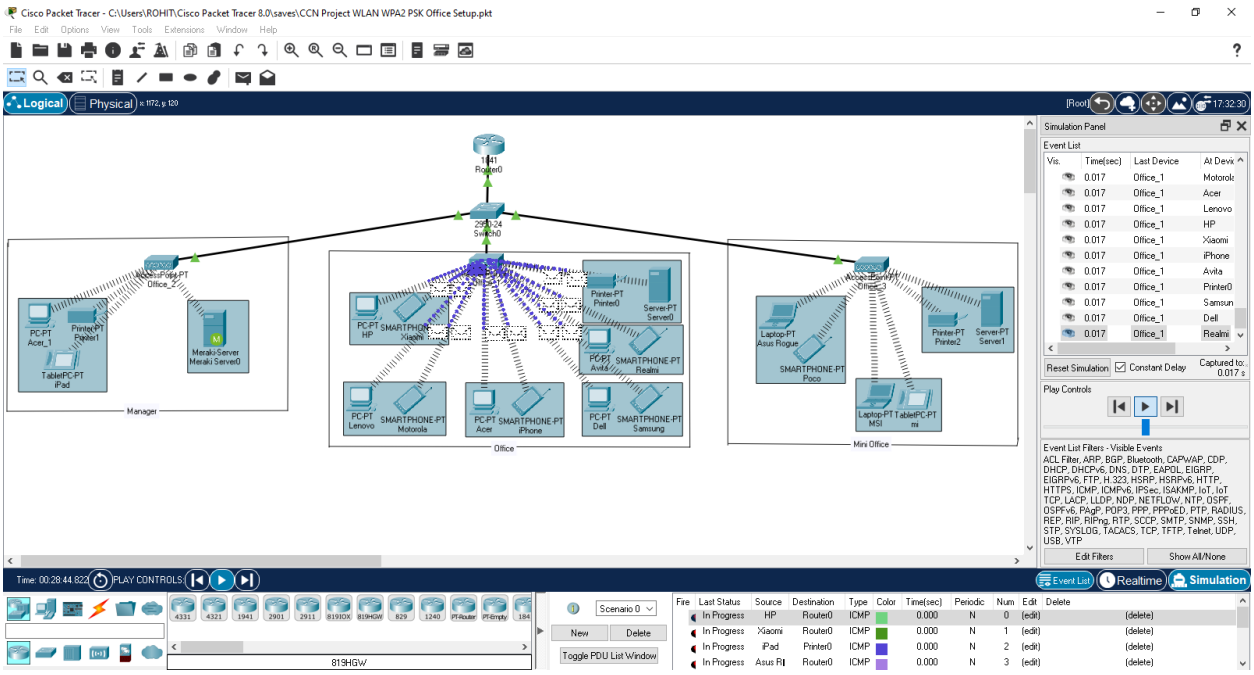
```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.2.18

Pinging 192.168.2.18 with 32 bytes of data:

Reply from 192.168.2.18: bytes=32 time=29ms TTL=128
Reply from 192.168.2.18: bytes=32 time=66ms TTL=128
Reply from 192.168.2.18: bytes=32 time<1ms TTL=128
Reply from 192.168.2.18: bytes=32 time=21ms TTL=128

Ping statistics for 192.168.2.18:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 66ms, Average = 29ms

C:\>tracert 192.168.2.18

Tracing route to 192.168.2.18 over a maximum of 30 hops:

  1    0 ms      1 ms      5 ms      192.168.2.18

Trace complete.
```


iPhone
Physical
Config
Desktop
Programming
Attributes
Command Prompt
Packet Tracer PC Command Line 1.0
C:\>tracert 192.168.2.7
Tracing route to 192.168.2.7 over a maximum of 30 hops:
1 4 ms 3 ms 4 ms 192.168.2.7
Trace complete.
C:\>ping 192.168.2.7
Pinging 192.168.2.7 with 32 bytes of data:
Reply from 192.168.2.7: bytes=32 time=14ms TTL=128
Reply from 192.168.2.7: bytes=32 time=16ms TTL=128
Reply from 192.168.2.7: bytes=32 time=24ms TTL=128
Reply from 192.168.2.7: bytes=32 time=2ms TTL=128
Ping statistics for 192.168.2.7:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 2ms, Maximum = 24ms, Average = 14ms


iPad
Physical
Config
Desktop
Programming
Attributes
Command Prompt
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.2.14
Pinging 192.168.2.14 with 32 bytes of data:
Reply from 192.168.2.14: bytes=32 time<1ms TTL=128
Reply from 192.168.2.14: bytes=32 time<1ms TTL=128
Reply from 192.168.2.14: bytes=32 time=60ms TTL=128
Reply from 192.168.2.14: bytes=32 time=61ms TTL=128
Ping statistics for 192.168.2.14:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 61ms, Average = 30ms
C:\>tracert 192.168.2.14
Tracing route to 192.168.2.14 over a maximum of 30 hops:
1 4 ms 0 ms 4 ms 192.168.2.14
Trace complete.


Server0
Physical
Config
Services
Desktop
Programming
Attributes
Command Prompt
Packet Tracer SERVER Command Line 1.0
C:\>ping 192.168.2.13
Pinging 192.168.2.13 with 32 bytes of data:
Reply from 192.168.2.13: bytes=32 time=14ms TTL=128
Reply from 192.168.2.13: bytes=32 time=30ms TTL=128
Reply from 192.168.2.13: bytes=32 time=1ms TTL=128
Reply from 192.168.2.13: bytes=32 time=16ms TTL=128
Ping statistics for 192.168.2.13:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 1ms, Maximum = 30ms, Average = 15ms
C:\>tracert 192.168.2.13
Tracing route to 192.168.2.13 over a maximum of 30 hops:
1 4 ms 2 ms 0 ms 192.168.2.13
Trace complete.


HP
Physical
Config
Desktop
Programming
Attributes
Command Prompt
Packet Tracer PC Command Line 1.0
C:\>tracert 192.168.2.2
Tracing route to 192.168.2.2 over a maximum of 30 hops:
1 0 ms 2 ms 3 ms 192.168.2.2
Trace complete.
C:\>ping 192.168.2.2
Pinging 192.168.2.2 with 32 bytes of data:
Reply from 192.168.2.2: bytes=32 time<1ms TTL=128
Reply from 192.168.2.2: bytes=32 time=46ms TTL=128
Reply from 192.168.2.2: bytes=32 time=55ms TTL=128
Reply from 192.168.2.2: bytes=32 time<1ms TTL=128
Ping statistics for 192.168.2.2:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 55ms, Average = 25ms



Conclusion-

Thus, WLAN WPA2 PSK network for an office environment is successfully designed and executed using Cisco packet Tracer.

References-

[1] WLAN definition <https://techterms.com/definition/wlan>

[2] Engineering Standards <http://en.wikipedia.org/w/index.php?title=IEEE_802.1>

[3] Benefits and Vulnerabilities of Wi-Fi Protected Access 2 (WPA2) Paul Arana INFS 612 – Fall 2006 <https://cs.gmu.edu/~yhwang1/INFS612/Sample_Projects/Fall_06_GPN_6_Final_Report.pdf>

[4] Reference to design a WLAN WPA2 PSK network <https://youtu.be/vAr9XsAo0iM>

[5] Wireless Router configuration in Cisco Packet Tracer <https://computernetworking747640215.wordpress.com/2018/06/22/wireless-router-configuration-in-cisco-packet-tracer/>