

**НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ БІОРЕСУРСІВ І
ПРИРОДОКОРИСТУВАННЯ УКРАЇНИ
ФАКУЛЬТЕТ ІНФОРМАЦІЙНИХ ТЕХНОЛОГІЙ**

Факультет інформаційних технологій

ЛАБОРАТОРНА РОБОТА №9

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Тема: створення та налаштування безпроводової мережі.

Мета заняття: ознайомитися із загальними принципами створення та налаштування безпроводових мереж, отримати практичні навички аналізу та визначення параметрів безпроводових мереж; застосувати отримані знання при виконанні практичних завдань.

Завдання:

Завдання 9.1. Налаштувати безпроводової мережі WEP.

Завдання 9.2. Налаштування безпроводової мережі WPA.

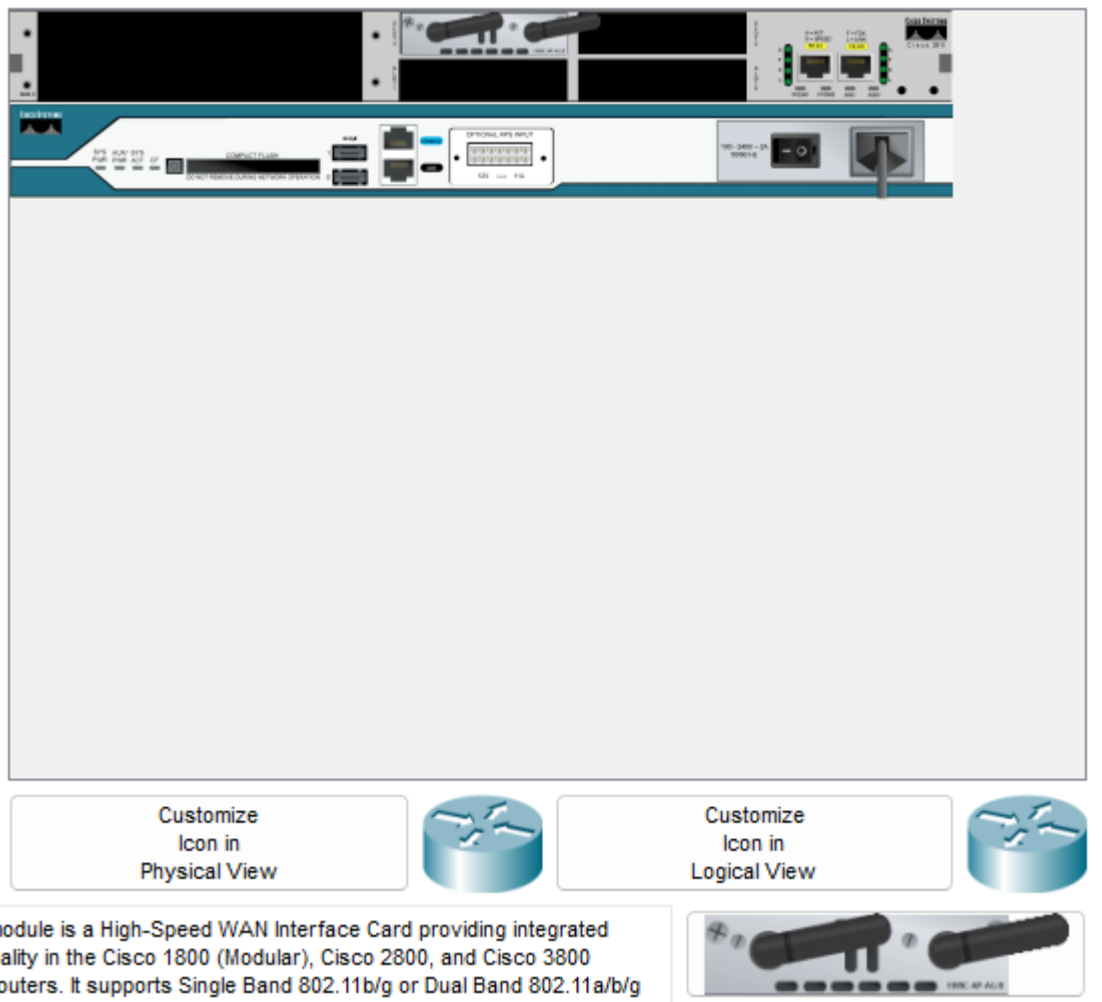
Завдання 9.3. Безпроводова мережа з точкою доступу.

Завдання 9.4. Безпроводова мережа між офісами.

Завдання 9.5. Налаштування комутованого WI-FI з'єднання.

Завдання 9.6. Безпроводовий зв'язок в Packet Tracer з безпроводовим роутером.

Завдання 9.1. Налаштувати безпроводової мережі WEP.



Router1



Wireless0 Bluetooth	MAC Address	0040.0B57.274C
	SSID	Admin
Authentication <input type="radio"/> Disabled <input checked="" type="radio"/> WEP WEP Key <input type="text" value="1234567890"/> <input type="radio"/> WPA-PSK <input type="radio"/> WPA2-PSK PSK Pass Phrase <input type="text"/> <input type="radio"/> WPA <input type="radio"/> WPA2 User ID <input type="text"/> <input type="radio"/> 802.1X Method: <input type="text" value="MD5"/> <input type="button" value="v"/> Password <input type="text"/> User Name <input type="text"/> Password <input type="text"/> Encryption Type <input type="text" value="40/64-Bits (10 Hex digits)"/> <input type="button" value="v"/>		
IP Configuration <input type="radio"/> DHCP <input checked="" type="radio"/> Static IPv4 Address <input type="text" value="192.168.10.2"/> Subnet Mask <input type="text" value="255.255.255.0"/>		

PC1

```

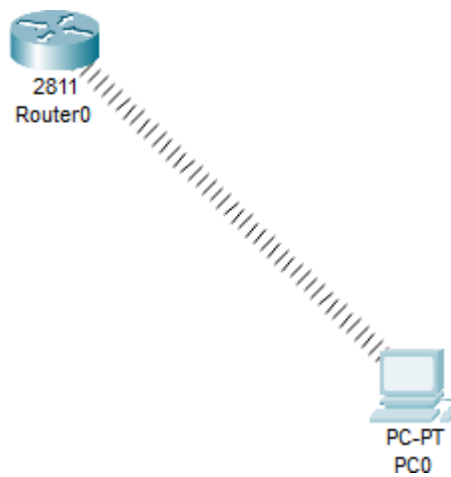
Router(config)#dot11 ssid Admin
Router(config-ssid)#au
Router(config-ssid)#authentication o
Router(config-ssid)#authentication open
Router(config-ssid)#gue
Router(config-ssid)#guest-mode
Router(config-ssid)#exit
Router(config)#int d
Router(config)#int dot
Router(config)#int dot11Radio 0/3/0
Router(config-if)#enc
Router(config-if)#encryption m
Router(config-if)#encryption mode wep man
Router(config-if)#encryption mode wep mandatory
Router(config-if)#en
Router(config-if)#encryption key 1 side 40bit 1234567890
^
% Invalid input detected at '^' marker.

Router(config-if)#encryption key 1 side 40bit 1234567890
^
% Invalid input detected at '^' marker.

Router(config-if)#encryption key 1 size 40bit 1234567890
Router(config-if)#ssid Admin
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#no sh

```

Router1





```
C:\>ping 192.168.10.1

Pinging 192.168.10.1 with 32 bytes of data:

Reply from 192.168.10.1: bytes=32 time=24ms TTL=255
Reply from 192.168.10.1: bytes=32 time=18ms TTL=255
Reply from 192.168.10.1: bytes=32 time=9ms TTL=255
Reply from 192.168.10.1: bytes=32 time=21ms TTL=255

Ping statistics for 192.168.10.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 9ms, Maximum = 24ms, Average = 18ms
```

PC0

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC0	Router0	ICMP		30.828	N	0	(edit)	

Завдання 9.2. Налаштування безпроводової мережі WPA.

IP Configuration

☐ DHCP
 ☒ Static

IPv4 Address

Subnet Mask

Default Gateway

Server

```
Router>en
Router#conf t
Enter configuration commands, one per line.  !
Router(config)#int fa0/0
Router(config-if)#ip addr 2.2.2.1 255.0.0.0
Router(config-if)#no sh
```

Router1

Authentication	
<input type="radio"/> Disabled	<input type="radio"/> WEP
<input type="radio"/> WPA-PSK	<input type="radio"/> WPA2-PSK
<input checked="" type="radio"/> WPA	<input type="radio"/> WPA2
<input type="radio"/> 802.1X	Method:
	MD5
	User Name
	Password
Encryption Type	AES
IP Configuration	
<input type="radio"/> DHCP	
<input checked="" type="radio"/> Static	
IPv4 Address	1.1.1.2
Subnet Mask	255.0.0.0

Gateway/DNS IPv4	
<input type="radio"/> DHCP	
<input checked="" type="radio"/> Static	
Default Gateway	1.1.1.1
DNS Server	

PC1

```

Router(config)#dot11 ssid Adm
Router(config-ssid)#aut
Router(config-ssid)#authentication open
Router(config-ssid)#au
Router(config-ssid)#authentication ke
Router(config-ssid)#authentication key-management wpa
Router(config-ssid)#wpa
Router(config-ssid)#wpa-psk ascii () 12345678
Router(config-ssid)#gu
Router(config-ssid)#guest-mode
Router(config-ssid)#exit
Router(config)#int dot
Router(config)#int dot11Radio 0/2/0
%Invalid interface type and number
Router(config)#int dot11Radio0/2/0
%Invalid interface type and number
Router(config)#int dot11radio0/2/0
%Invalid interface type and number
Router(config)#int dot11Radio0/3/0
Router(config-if)#ip addr 192.168.90.1 255.255.255.0
Router(config-if)#ssid Adm
Router(config-if)#encry
Router(config-if)#encryption m
Router(config-if)#encryption mode c
Router(config-if)#encryption mode ciphers a
Router(config-if)#encryption mode ciphers aes-ccm
Router(config-if)#no sh

Router(config-if)#
%LINK-5-CHANGED: Interface Dot11Radio0/3/0, changed st

%LINEPROTO-5-UPDOWN: Line protocol on Interface Dot11R

Router(config-if)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#conf t
Enter configuration commands, one per line. End with
Router(config)#int fa 0/0
Router(config-if)#ip addr 2.2.2.1 255.0.0.0
Router(config-if)#no sh

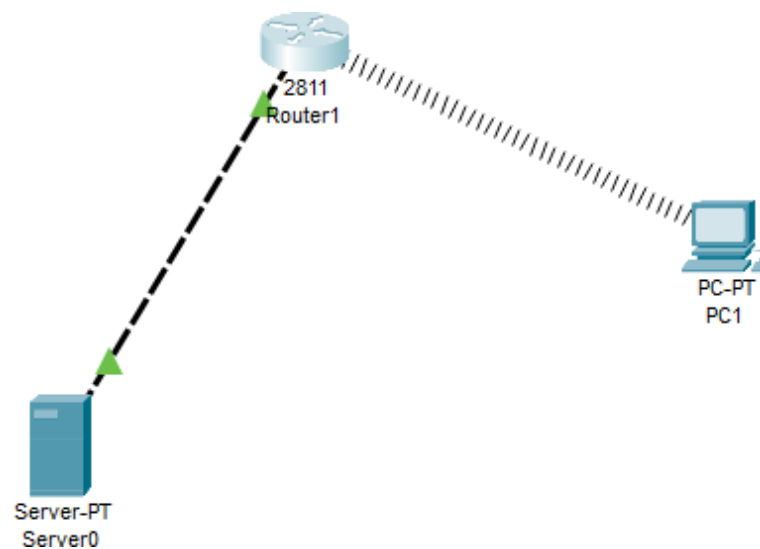
```

Router1



MAC Address	0060.5C03.9964
SSID	Adm
Authentication	
<input type="radio"/> Disabled	<input type="radio"/> WEP
<input checked="" type="radio"/> WPA-PSK	<input type="radio"/> WPA2-PSK
<input type="radio"/> WPA	<input type="radio"/> WPA2
<input type="radio"/> 802.1X	Method:
	MD5
	User Name
	Password
Encryption Type	AES
IP Configuration	
<input type="radio"/> DHCP	
<input checked="" type="radio"/> Static	
IPv4 Address	192.168.90.2
Subnet Mask	255.255.255.0

PC1




```
Pinging 2.2.2.2 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 2.2.2.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 2.2.2.2

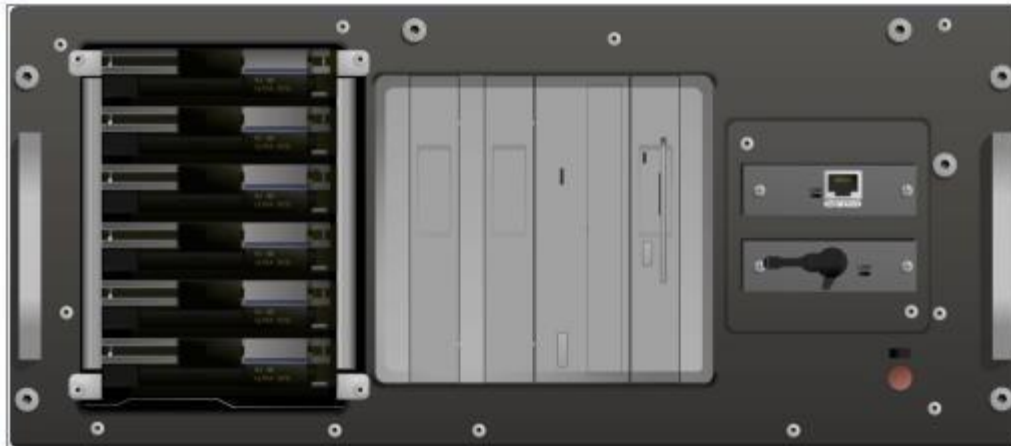
Pinging 2.2.2.2 with 32 bytes of data:

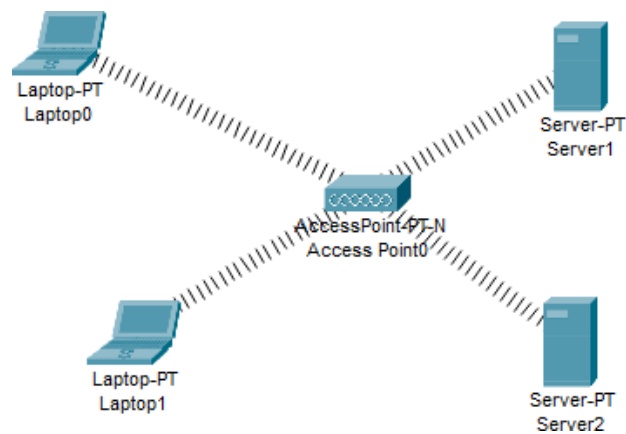
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 2.2.2.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

PC1

Завдання 9.3. Безпроводова мережа з точкою доступу.





Physical	Config	Attributes
<div> <div> GLOBAL Settings INTERFACE Port 0 Port 1 </div> <div> <div>Port 0</div> <div> Port Status Bandwidth Duplex </div> <div> <input checked="" type="checkbox"/> On <input checked="" type="radio"/> 100 Mbps <input type="radio"/> 10 Mbps <input type="checkbox"/> Auto <input checked="" type="radio"/> Half Duplex <input type="radio"/> Full Duplex <input type="checkbox"/> Auto </div> </div> </div>		

AP0

Interface	
Wireless0	
IP Configuration	
<input type="radio"/> DHCP	<input checked="" type="radio"/> Static
IPv4 Address	192.168.1.2
Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0
DNS Server	0.0.0.0

Laptop0

<input checked="" type="radio"/> DHCP	<input type="radio"/> Static	DHCP failed. APIPA is being used.
IPv4 Address	169.254.134.234	
Subnet Mask	255.255.0.0	
Default Gateway	0.0.0.0	
DNS Server	0.0.0.0	

Laptop1

Authentication			
<input checked="" type="radio"/> Disabled	<input type="radio"/> WEP	WEP Key	<input type="text"/>
<input type="radio"/> WPA-PSK	<input type="radio"/> WPA2-PSK	PSK Pass Phrase	<input type="text"/>
<input type="radio"/> WPA	<input type="radio"/> WPA2	User ID	<input type="text"/>
<input type="radio"/> 802.1X	Method:	Password	<input type="text"/>
			MD5 <input type="text"/>
		User Name	<input type="text"/>
		Password	<input type="text"/>
Encryption Type		Disabled <input type="text"/>	

Server1

Authentication			
<input checked="" type="radio"/> Disabled	<input type="radio"/> WEP	WEP Key	<input type="text"/>
<input type="radio"/> WPA-PSK	<input type="radio"/> WPA2-PSK	PSK Pass Phrase	<input type="text"/>
<input type="radio"/> WPA	<input type="radio"/> WPA2	User ID	<input type="text"/>
<input type="radio"/> 802.1X	Method:	Password	<input type="text"/>
			MD5 <input type="text"/>
		User Name	<input type="text"/>
		Password	<input type="text"/>
Encryption Type		Disabled <input type="text"/>	

Server2

```
C:\>ping 169.254.48.28

Pinging 169.254.48.28 with 32 bytes of data:

Reply from 169.254.48.28: bytes=32 time=40ms TTL=128
Reply from 169.254.48.28: bytes=32 time=33ms TTL=128
Reply from 169.254.48.28: bytes=32 time=37ms TTL=128
Reply from 169.254.48.28: bytes=32 time=26ms TTL=128

Ping statistics for 169.254.48.28:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 26ms, Maximum = 40ms, Average = 34ms

C:\>ping 192.168.1.2

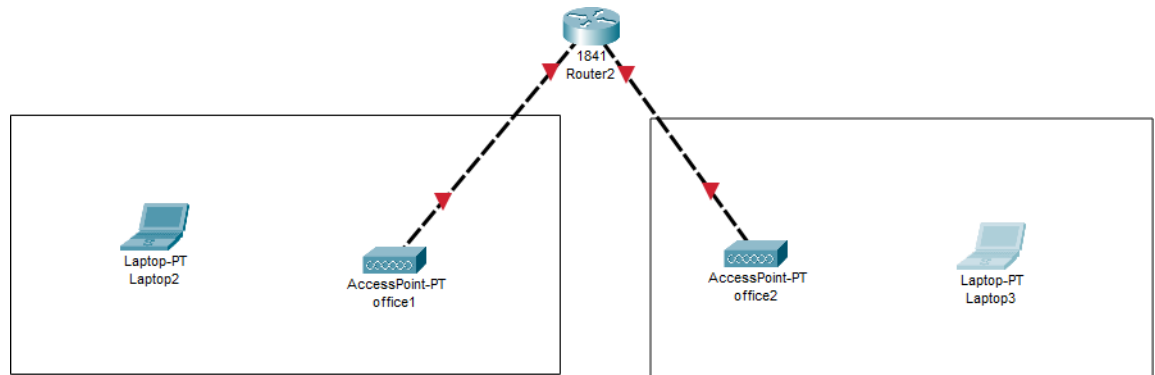
Pinging 192.168.1.2 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

PC1

Завдання 9.4. Безпроводова мережа між офісами.



<input type="radio"/> DHCP	<input checked="" type="radio"/> Static
IPv4 Address	192.168.1.2
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.1
DNS Server	0.0.0.0

SSID	office1
------	---------

Laptop2

<input type="radio"/> DHCP	<input checked="" type="radio"/> Static
IPv4 Address	192.168.2.2
Subnet Mask	255.255.255.0
Default Gateway	192.168.2.1
DNS Server	0.0.0.0

SSID	office2
------	---------

Laptop3

```

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#ip addr 192.168.1.1 255.255.255.0
Router(config-if)#no sg
^
% Invalid input detected at '^' marker.

Router(config-if)#no sh

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#int fa 0/1
Router(config-if)#ip addr 192.168.2.1
% Incomplete command.
Router(config-if)#ip addr 192.168.2.1 255.255.255.0
Router(config-if)#no sh

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

```

Router2

```

ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.1.2: bytes=32 time=39ms TTL=127
Reply from 192.168.1.2: bytes=32 time=33ms TTL=127
Reply from 192.168.1.2: bytes=32 time=27ms TTL=127

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 27ms, Maximum = 39ms, Average = 33ms

```

PC1

Завдання 9.5. Налаштування комутованого WI-FI з'єднання.

Port Status	<input checked="" type="checkbox"/> On
SSID	12345
2.4 GHz Channel	6

AP5



Link Information

Connect

Profiles

Below is a list of available wireless networks. To search for more wireless networks, click the **Refresh** button. To view more information about a network, select the wireless network name. To connect to that network, click the **Connect** button below.

Wireless Network Name	CH	Signal
12345	1	75%

Site Information

Wireless Mode

Infrastructure

Network Type

Mixed B/G

Radio Band

Auto

Security

Disable

MAC Address

0030.F24C.9E96

Refresh

Connect

2.4GHz

Adapter is Active

Wireless-N Notebook AdapterWireless Network Monitor v1.0Model No. WPC300N

IP Configuration

☐ DHCP

☒ Static

IPv4 Address

192.168.1.10

Subnet Mask

255.255.255.0

PC2

Below is a list of available wireless networks. To search for more wireless networks, click the **Refresh** button. To view more information about a network, select the wireless network name. To connect to that network, click the **Connect** button below.

Wireless Network Name

CH

Signal

12345

1

87%

Site Information

Wireless Mode

Infrastructure

Network Type

Mixed B/G

Radio Band

Auto

Security

Disable

MAC Address

0030.F24C.9E96

Refresh

Connect

IP Configuration

☐ DHCP ☒ Static

IPv4 Address: 192.168.1.11

Subnet Mask: 255.255.255.0

Default Gateway: 0.0.0.0

DNS Server: 0.0.0.0

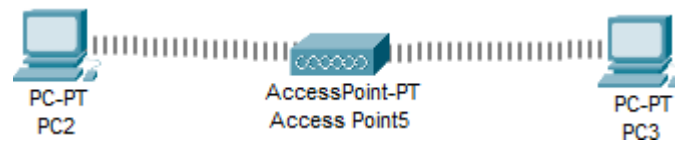
```
C:\>
ping 192.168.1.10

Pinging 192.168.1.10 with 32 bytes of data:

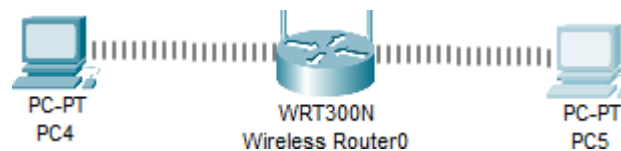
Reply from 192.168.1.10: bytes=32 time=48ms TTL=128
Reply from 192.168.1.10: bytes=32 time=22ms TTL=128
Reply from 192.168.1.10: bytes=32 time=21ms TTL=128
Reply from 192.168.1.10: bytes=32 time=26ms TTL=128

Ping statistics for 192.168.1.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 21ms, Maximum = 48ms, Average = 29ms
```

PC3



Завдання 9.6. Безпроводовий зв'язок в Packet Tracer з безпроводовим роутером.



Network Setup

Router IP

IP Address: 192 . 168 . 0 . 1

Subnet Mask: 255.255.255.0

Wireless Settings

SSID123456

2.4 GHz Channel1 - 2.412GHz

Coverage Range (meters)250,00

Authentication

☐ Disabled

☐ WEP

☐ WPA-PSK

☒ WPA2-PSK

☐ WPA

☐ WPA2

WEP Key

PSK Pass Phrase

1234567890

RADIUS Server Settings

IP Address

Shared Secret

Encryption TypeAES

WR0

✕

Link Information
Connect
Profiles

Below is a list of available wireless networks. To search for more wireless networks, click the **Refresh** button. To view more information about a network, select the wireless network name. To connect to that network, click the **Connect** button below.

Wireless Network Name	CH	Signal
123456	1	100%

Site Information

Wireless Mode Infrastructure

Network Type Mixed B/G/N

Radio Band Auto

Security WPA2-PSK

MAC Address 00E0.8F5C.7008

Refresh
Connect

2.4GHz

Adapter is Inactive

Wireless-N Notebook Adapter
Wireless Network Monitor v1.0
Model No. WPC300N

WPA2-Personal Needed for Connection

This wireless network has WPA2-Personal enabled. To connect to this network, enter the required passphrase in the appropriate field below. Then click the **Connect** button.

Security

WPA2-Personal

Please select the wireless security method used by your existing wireless network.

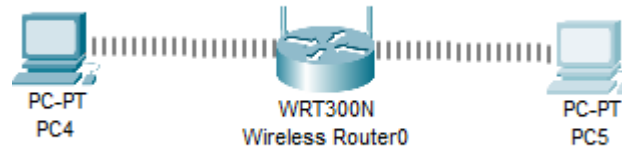
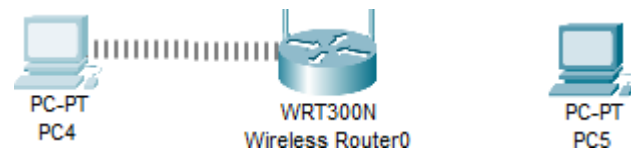
Pre-shared Key

123456789

Please enter a Pre-shared Key that is 8 to 63 characters in length.

Cancel
Connect

PC4



Device Name: PC5			
Device Model: PC-PT			
Port	Link	IP Address	II
Wireless0	Up	192.168.0.101/24	<r
Bluetooth	Down	<not set>	<r

```

Cisco Packet Tracer PC Command Line 1.0
C:\>
ping 192.168.0.101

Pinging 192.168.0.101 with 32 bytes of data:

Reply from 192.168.0.101: bytes=32 time=38ms TTL=128
Reply from 192.168.0.101: bytes=32 time=18ms TTL=128
Reply from 192.168.0.101: bytes=32 time=21ms TTL=128
Reply from 192.168.0.101: bytes=32 time=20ms TTL=128

Ping statistics for 192.168.0.101:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 18ms, Maximum = 38ms, Average = 24ms
  
```

PC4

Висновок

У ході проведення даної лабораторної роботи, ми успішно освоїли загальні принципи створення та налаштування безпроводових мереж. Ми здобули практичні навички у проведенні аналізу та визначенні параметрів безпроводових мереж, що відіграють важливу роль у забезпеченні їх ефективності та безпеки.