



COMPUTER NETWORKS

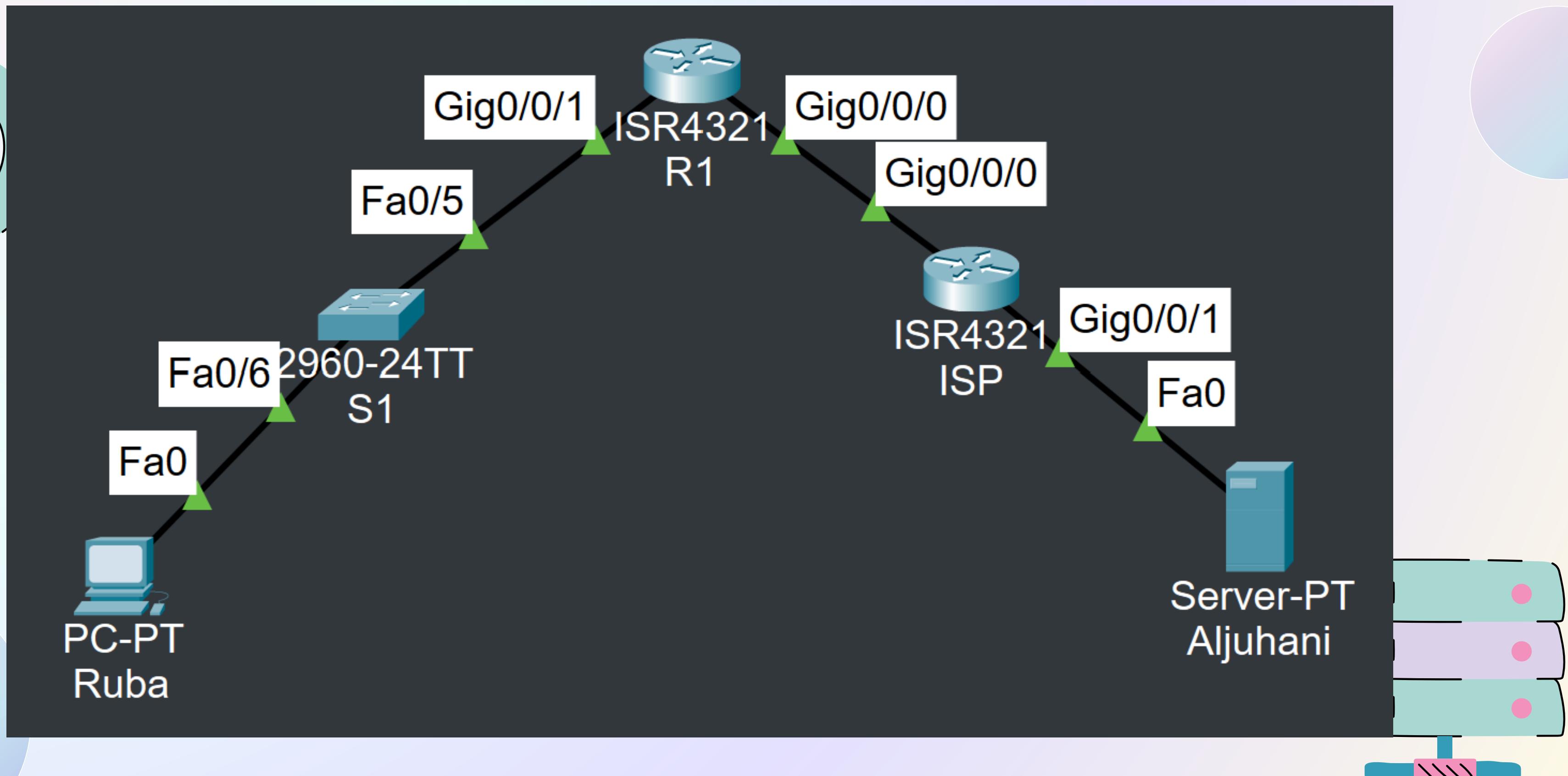


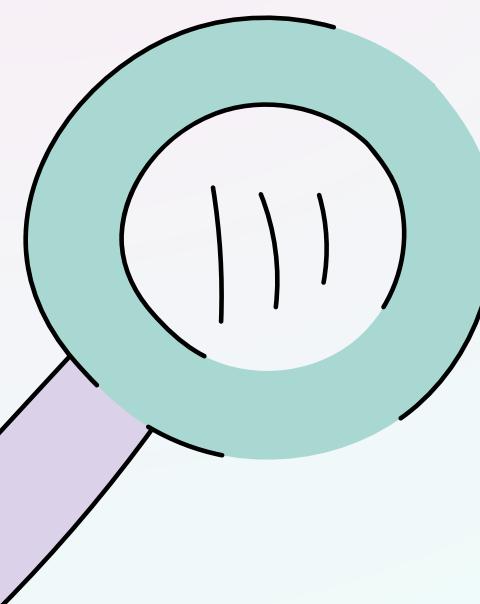
Lap2.2 – Use Ping and Traceroute to Test Network Connectivity

Solved by :

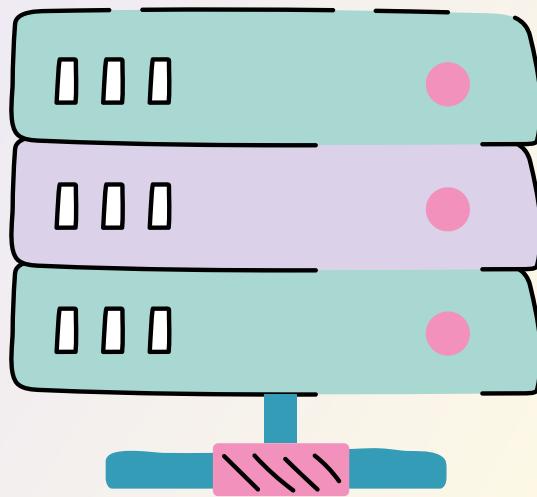
Ruba Aljuhani

Topology

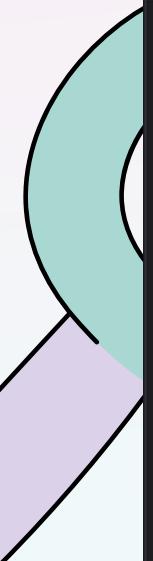




Part 1: Build and Configure the Network



Switch Configure



```
S1
Physical Config CLI Attributes
IOS Command Line Interface

Switch>en
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname Ruba_Aljuhani
Ruba_Aljuhani(config)#interface vlan 1
Ruba_Aljuhani(config-if)# ip address 192.168.1.2 255.255.255.0
Ruba_Aljuhani(config-if)# ipv6 address 2001:db8:acad:1::2/64
Ruba_Aljuhani(config-if)# no shutdown

Ruba_Aljuhani(config-if)#
%LINK-3-UPDOWN: Interface Vlan1, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

Ruba_Aljuhani(config-if)#exit
Ruba_Aljuhani(config)# no shutdown
^
% Invalid input detected at '^' marker.

Ruba_Aljuhani(config)#ip default-gateway 192.168.1.1
Ruba_Aljuhani(config)#end
Ruba_Aljuhani#
%SYS-5-CONFIG_I: Configured from console by console

Ruba_Aljuhani#write
Building configuration...
Copy Paste
■ Top
```



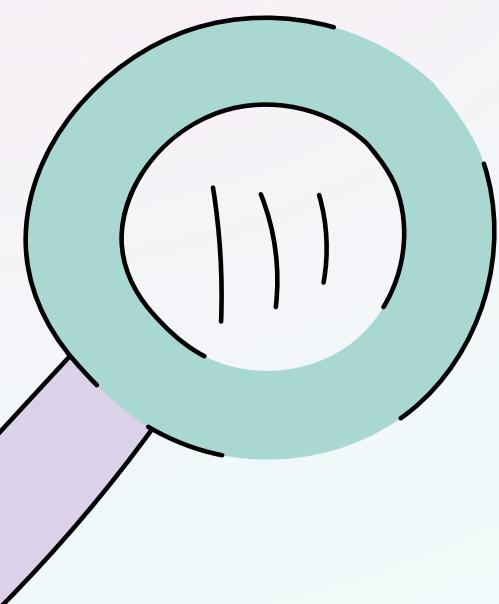
```
S1
Physical Config CLI Attributes
IOS Command Line Interface

Ruba-Aljuhani#conf t
Enter configuration commands, one per line. End
with CNTL/Z.
Ruba-Aljuhani(config)#no ip domain-lookup
Ruba-Aljuhani(config)#
Ruba-Aljuhani(config)#interface vlan 1
Ruba-Aljuhani(config-if)#
Ruba-Aljuhani(config-if)#ip add 192.168.1.2
255.255.255.0
Ruba-Aljuhani(config-if)#ipv6 address
2001:db8:acad:1::2/64
Ruba-Aljuhani(config-if)#
Ruba-Aljuhani(config-if)#no shutdown

Ruba-Aljuhani(config-if)#
%LINK-3-UPDOWN: Interface Vlan1, changed state to
down

%LINEPROTO-5-UPDOWN: Line protocol on Interface
Vlan1, changed state to up
exit
Ruba-Aljuhani(config)#ip default-gateway 192.168.1.1
Ruba-Aljuhani(config)#end
Ruba-Aljuhani#
%SYS-5-CONFIG_I: Configured from console by console
Copy Paste
■ Top
```

Router Configure



```
R1
Physical Config CLI Attributes
IOS Command Line Interface
Router>en
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Ruba_Aljuhani
Ruba_Aljuhani(config)#no ip domain-lookup
Ruba_Aljuhani(config)#ipv6 unicast-routing
Ruba_Aljuhani(config)#interface g0/0/0
Ruba_Aljuhani(config-if)# ip address 64.100.0.2 255.255.255.252
Ruba_Aljuhani(config-if)# ipv6 address 2001:db8:acad::2/64
Ruba_Aljuhani(config-if)# no shutdown

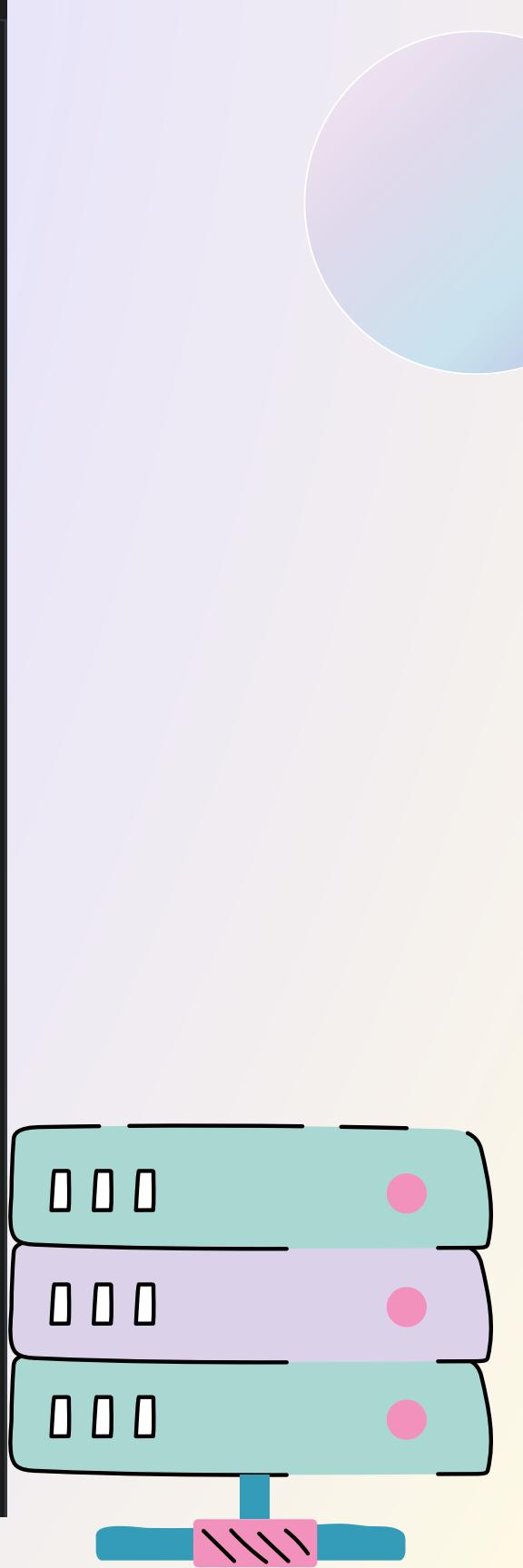
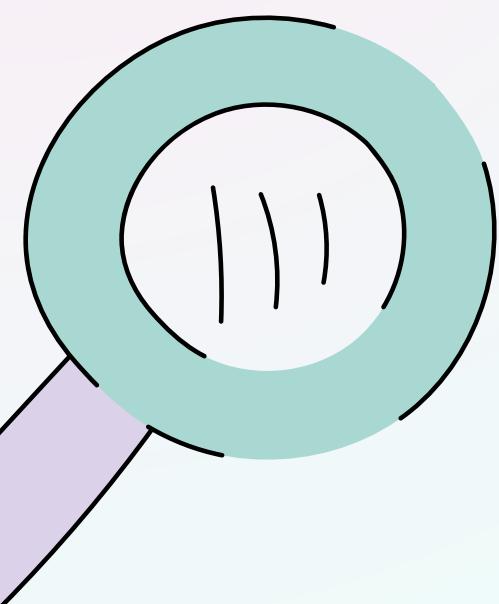
Ruba_Aljuhani(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up
exit
Ruba_Aljuhani(config)#interface g0/0/1
Ruba_Aljuhani(config-if)# ip address 192.168.1.1 255.255.255.0
Ruba_Aljuhani(config-if)# ipv6 address 2001:db8:acad:1::1/64
Ruba_Aljuhani(config-if)# no shutdown

Ruba_Aljuhani(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/1, changed state to up
exit
Ruba_Aljuhani(config)#ip route 0.0.0.0 0.0.0.0 64.100.0.1
Ruba_Aljuhani(config)#ipv6 route ::/0 2001:db8:acad::1
Ruba_Aljuhani(config)#end

Copy Paste
Top
```

ISP



ISP

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router>en
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Ruba_Aljuhani
Ruba_Aljuhani(config)#hostname ISP
ISP(config)#no ip domain-lookup
ISP(config)#ipv6 unicast-routing
ISP(config)#interface g0/0/0
ISP(config-if)# ip address 64.100.0.1 255.255.255.252
ISP(config-if)# ipv6 address 2001:db8:acad::1/64
ISP(config-if)# no shutdown

ISP(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0, changed state to up
exit
ISP(config)#hostname Ruba_Aljuhani
Ruba_Aljuhani(config)#interface g0/0/1
Ruba_Aljuhani(config-if)# ip address 209.165.200.225 255.255.255.224
Ruba_Aljuhani(config-if)# ipv6 address 2001:db8:acad:200::225/64
Ruba_Aljuhani(config-if)# no shutdown

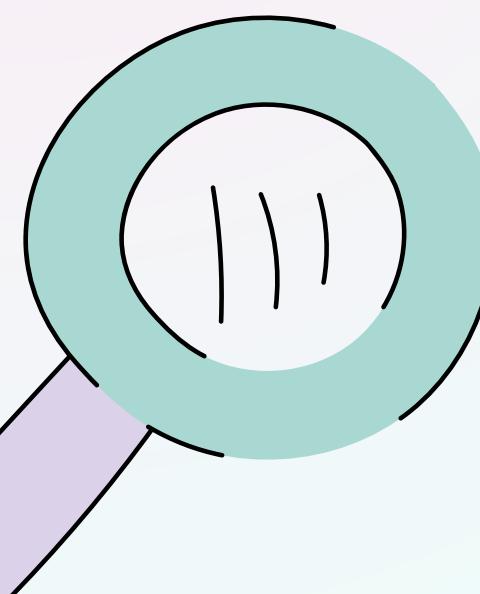
Ruba_Aljuhani(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/1, changed state to up
```

Copy Paste

Top

ISP



ISP

Physical Config **CLI** Attributes

IOS Command Line Interface

```
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0, changed state to up
exit
ISP(config)#hostname Ruba_Aljuhani
Ruba_Aljuhani(config)#interface g0/0/1
Ruba_Aljuhani(config-if)# ip address 209.165.200.225 255.255.255.224
Ruba_Aljuhani(config-if)# ipv6 address 2001:db8:acad:200::225/64
Ruba_Aljuhani(config-if)# no shutdown

Ruba_Aljuhani(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/1, changed state to up
exit
Ruba_Aljuhani(config)#ipv6 route ::/0 2001:db8:acad::2
Ruba_Aljuhani(config)#end
Ruba_Aljuhani#
%SYS-5-CONFIG_I: Configured from console by console
write
Building configuration...
[OK]
Ruba_Aljuhani#ok
Translating "ok"
% Unknown command or computer name, or unable to find computer address

Ruba_Aljuhani#
```

Copy Paste

Top



Step 2: Configure IP Addresses

PC 1

Ruba

Physical Config Desktop Programming Attributes

IP Configuration

Interface FastEthernet0

IP Configuration

DHCP Static

IPv4 Address 192.168.1.10

Subnet Mask 255.255.255.0

Default Gateway 192.168.1.1

DNS Server 0.0.0.0

IPv6 Configuration

Automatic Static

IPv6 Address 2001:DB8:ACAD:1::10 / 64

Link Local Address FE80::260:2FFF:FE19:D43

Default Gateway 2001:DB8:ACAD:1::1

DNS Server

802.1X

Use 802.1X Security

Authentication MD5

Username

Password

Top

PC 2

Aljuhani

Physical Config Services Desktop Programming Attributes

IP Configuration

IP Configuration

DHCP Static

IPv4 Address 209.165.200.226

Subnet Mask 255.255.255.224

Default Gateway 209.165.200.225

DNS Server 0.0.0.0

IPv6 Configuration

Automatic Static

IPv6 Address 2001:DB8:ACAD:200::226 / 64

Link Local Address FE80::290:21FF:FE34:E659

Default Gateway 2001:DB8:ACAD:200::225

DNS Server

802.1X

Use 802.1X Security

Authentication MD5

Username

Password

Top

Part 2-3: Use Ping Command for Basic Network Testing



Ruba

- □ X

Physical Config Desktop Programming Attributes

Command Prompt

```
C:\>ping 64.100.0.1
```

Pinging 64.100.0.1 with 32 bytes of data:

```
Reply from 64.100.0.1: bytes=32 time<1ms TTL=254  
Reply from 64.100.0.1: bytes=32 time=1ms TTL=254  
Reply from 64.100.0.1: bytes=32 time<1ms TTL=254  
Reply from 64.100.0.1: bytes=32 time<1ms TTL=254
```

Ping statistics for 64.100.0.1:

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

```
C:\>ping 209.165.200.226
```

Pinging 209.165.200.226 with 32 bytes of data:

```
Reply from 209.165.200.226: bytes=32 time<1ms TTL=126  
Reply from 209.165.200.226: bytes=32 time=1ms TTL=126  
Reply from 209.165.200.226: bytes=32 time<1ms TTL=126  
Reply from 209.165.200.226: bytes=32 time=1ms TTL=126
```

Ping statistics for 209.165.200.226:

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

PC 1



Ruba

Physical Config Desktop Programming Attributes

Command Prompt

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

```
Reply from 192.168.1.1: bytes=32 time=29ms TTL=255  
Reply from 192.168.1.1: bytes=32 time=1ms TTL=255  
Reply from 192.168.1.1: bytes=32 time<1ms TTL=255  
Reply from 192.168.1.1: bytes=32 time<1ms TTL=255
```

Ping statistics for 192.168.1.1:

```
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
Approximate round trip times in milli-seconds:  
        Minimum = 0ms, Maximum = 29ms, Average = 7ms
```

Top

```
C:\> ping 2001:db8:acad:1::1
```

```
Pinging 2001:db8:acad:1::1 with 32 bytes of data:
```

```
Reply from 2001:DB8:ACAD:1::1: bytes=32 time=27ms
```

```
TTL=255
```

```
Reply from 2001:DB8:ACAD:1::1: bytes=32 time<1ms
```

```
TTL=255
```

```
Reply from 2001:DB8:ACAD:1::1: bytes=32 time<1ms
```

```
TTL=255
```

```
Reply from 2001:DB8:ACAD:1::1: bytes=32 time<1ms
```

```
TTL=255
```

```
Ping statistics for 2001:DB8:ACAD:1::1:
```

```
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

```
Approximate round trip times in milli-seconds:
```

```
    Minimum = 0ms, Maximum = 27ms, Average = 6ms
```

PC 1

```
C:\>ping 209.165.200.226
```

```
Pinging 209.165.200.226 with 32 bytes of data:
```

```
Reply from 209.165.200.226: bytes=32 time<1ms  
TTL=126
```

```
Reply from 209.165.200.226: bytes=32 time<1ms  
TTL=126
```

```
Reply from 209.165.200.226: bytes=32 time=1ms  
TTL=126
```

```
Reply from 209.165.200.226: bytes=32 time=1ms  
TTL=126
```

```
Ping statistics for 209.165.200.226:
```

```
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

```
Approximate round trip times in milli-seconds:
```

```
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

Ruba

Physical Config Desktop Programming Attributes

Command Prompt

```
c:\>ping -t 209.165.200.226
Pinging 209.165.200.226 with 32 bytes of data:
Reply from 209.165.200.226: bytes=32 time<1ms
TTL=126
Reply from 209.165.200.226: bytes=32 time<1ms
TTL=126
Reply from 209.165.200.226: bytes=32 time<1ms
TTL=126
Reply from 209.165.200.226: bytes=32 time=1ms
TTL=126
Reply from 209.165.200.226: bytes=32 time<1ms
TTL=126
Reply from 209.165.200.226: bytes=32 time<1ms
TTL=126
Reply from 209.165.200.226: bytes=32 time<1ms
TTL=126
Reply from 209.165.200.226: bytes=32 time=1ms
TTL=126
Reply from 209.165.200.226: bytes=32 time<1ms
TTL=126
Reply from 209.165.200.226: bytes=32 time=1ms
TTL=126
Reply from 209.165.200.226: bytes=32 time<1ms
TTL=126
Reply from 209.165.200.226: bytes=32 time<1ms
TTL=126
Reply from 209.165.200.226: bytes=32 time<1ms
TTL=126
```

```
Ping statistics for 209.165.200.226:
    Packets: Sent = 23, Received = 23, Lost = 0
(0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

Control-C
^C
C:\>
```

```
C:\>tracert 209.165.200.226
Tracing route to 209.165.200.226 over a maximum
of 30 hops:

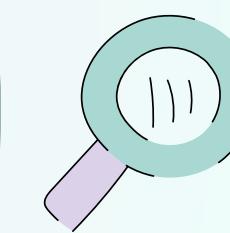
 1  0 ms        0 ms        0 ms      192.168.1.1
 2  0 ms        0 ms        0 ms      64.100.0.1
 3  0 ms        0 ms        0 ms
209.165.200.226

Trace complete.

C:\>
```

Top

ROUTER R1



R1

Physical Config CLI Attributes

IOS Command Line Interface

```
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to
2001:db8:acad:200::226, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip
min/avg/max = 0/0/1 ms

Ruba_Aljuhani#ping 209.165.200.226 repeat 10000
^
% Invalid input detected at '^' marker.

Ruba_Aljuhani#ping
Protocol [ip]:
Target IP address: 209.165.200.226
Repeat count [5]: 10000
Datagram size [100]:
Timeout in seconds [2]:
Extended commands [n]:
Sweep range of sizes [n]:
Type escape sequence to abort.
Sending 10000, 100-byte ICMP Echos to
209.165.200.226, timeout is 2 seconds:
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
```

Copy Paste

Top

R1

Physical Config CLI Attributes

IOS Command Line Interface

```
Ruba_Aljuhani>en
Ruba_Aljuhani#ping 209.165.200.226

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to
209.165.200.226, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip
min/avg/max = 0/0/0 ms

Ruba_Aljuhani#ping 2001:db8:acad:200::226

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to
2001:db8:acad:200::226, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip
min/avg/max = 0/0/1 ms
```

R1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
!!!!!!  
!!!!!!  
!!!!!!  
!!!!!!  
!!!!!!  
!!!!!!  
!!!!!!  
!!!!!!  
!!!!!!  
!!!!!!  
!!!!!!  
!!!!!!  
!!!!!!  
!!!!!!  
!!!!!!  
!!!!!!  
!!!!!!  
!!!!!!  
!!!!!!  
!!!!!!  
Success rate is 100 percent (686/686), round-trip  
min/avg/max = 0/0/24 ms  
  
Ruba_Aljuhani# traceroute 209.165.200.226  
Type escape sequence to abort.  
Tracing the route to 209.165.200.226  
  
1 64.100.0.1      0 msec      0 msec      0 msec  
2 209.165.200.226 0 msec      1 msec      0 msec  
Ruba_Aljuhani#traceroute 2001:db8:acad:200::226  
Type escape sequence to abort.  
Tracing the route to 2001:db8:acad:200::226  
  
1 2001:DB8:ACAD::1 0 msec      0 msec      0 msec  
2 2001:DB8:ACAD:200::226 0 msec      1 msec  
0 msec  
Ruba_Aljuhani#
```

Copy Paste

Top

router1-IPV4-IPV6

```
Ruba_Aljuhani>en
Ruba_Aljuhani# traceroute 209.165.200.226
Type escape sequence to abort.
Tracing the route to 209.165.200.226

 1  *      0 msec      0 msec
 2  64.100.0.1        0 msec      0 msec      0 msec
 3  209.165.200.226  4294967295 msec0 msec      0
msec
Ruba_Aljuhani#
```

Copy **Paste**

switch

Top



Physical Config CLI Attributes

IOS Command Line Interface

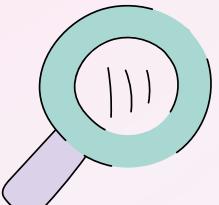
```
with CNTL/Z.  
Ruba_Aljuhani(config)#interface  
GigabitEthernet0/0/1  
Ruba_Aljuhani(config-if)#no shutdown  
Ruba_Aljuhani(config-if)#end  
Ruba_Aljuhani#  
%SYS-5-CONFIG_I: Configured from console by  
console  
  
Ruba_Aljuhani#show ip interface brief  
Interface          IP-Address      OK? Method  
Status            Protocol  
GigabitEthernet0/0/0 64.100.0.1    YES manual  
up                up  
GigabitEthernet0/0/1 209.165.200.225 YES manual  
up                up  
Vlan1             unassigned     YES unset  
administratively down down  
Ruba_Aljuhani#ping 209.165.200.226|
```

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to
209.165.200.226, timeout is 2 seconds:
!!!!

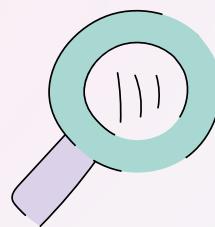
Success rate is 100 percent (5/5), round-trip
min/avg/max = 0/0/1 ms

isp
configuration

 b. From PC-A, ping the addresses listed in the following table and record the average round trip time and IPv4 Time to Live (TTL) or IPv6 Hop Limit. **Optional:** Use Wireshark to see the IPv6 Hop Limit value.

b. From PC-A, ping the addresses listed in the following table and record the average round trip time and IPv4 Time to Live (TTL) or IPv6 Hop Limit. **Optional:** Use Wireshark to see the IPv6 Hop Limit value.

Destination	Average Round Trip Time (ms)	TTL / Hop Limit
192.168.1.10	0ms	255
2001:db8:acad:1::10	0ms	255
192.168.1.1 (R1)	0 ms	255
2001:db8:acad:1::1 (R1)	0ms	255
192.168.1.2 (S1)	0ms	255



b. From PC-A, ping the addresses listed in the following table and record the average round trip time and IPv4 Time to Live (TTL) or IPv6 Hop Limit. Optional: Use Wireshark to see the IPv6 Hop Limit value.

Lab - Use Ping and Traceroute to Test Network Connectivity

Destination	Average Round Trip Time (ms)	TTL / Hop Limit
2001:db8:acad:1::2(S1)	0ms	255
64.100.0.2 (R1)	0ms	255
2001:DB8:ACAD::2 (R1)	10ms	254
64.100.0.1 (ISP)	10ms	255
2001:DB8:ACAD::1 (ISP)	0ms	254
209.165.200.225 (ISP G0/0/1)	0ms	254
2001:DB8:ACAD:200::225 (ISP G0/0/1)	0ms	126
209.165.200.226 (External)	0ms	126
2001:DB8:ACAD:200::226 (External)	0ms	126



Reflection Questions

1. What could prevent ping or traceroute responses from reaching the originating device besides network connectivity issues?
 - Firewalls or security filters blocking ICMP packets.
 - Access Control Lists (ACLs) blocking ICMP traffic.
 - Rate limiting on devices or routers to prevent DoS attacks.
 - Router configurations dropping ICMP packets for security or performance reasons.
2. If you ping a non-existent address on the remote network, such as 209.165.200.227, what is the message displayed by the ping command?
What does this mean? If you ping a valid host address and receive this response, what should you check?
 - Message: "Destination Host Unreachable" or "Request Timed Out".
 - Meaning: The address does not exist or is unreachable.
 - What to Check: Ensure the destination device has the correct IP configuration and routing information, and check for firewall or ACL issues.
3. If you ping an address that does not exist in any network in your topology, such as 192.168.5.3, from a Windows-based PC, what is the message displayed by the ping command? What does this message indicate?
Message: "Destination Host Unreachable" or "Request Timed Out".
 - Meaning: The device does not have a route to reach the destination because the address is invalid or unreachable.
4. What is the IPv4 TTL value set on the Windows host? What is the IPv4 TTL value set on a Cisco device?
 - Windows Host TTL: 128.
 - Cisco Device TTL: 255.
5. What is the IPv6 Hop Limit value set on the Windows host? What is the IPv6 Hop Limit value set on a Cisco device?
 - Windows Host Hop Limit: 128.
 - Cisco Device Hop Limit: 64.