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Packet Tracer - VLSM Design and Implementation Practice Topology

You will receive one of three possible topologies.

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
Branch1	G0/0	192.168.72.129	255.255.255.240	N/A
	G0/1	192.168.72.97	255.255.255.224	N/A
	S0/0/0	192.168.72.145	255.255.255.252	N/A
Branch2	G0/0	192.168.72.65	255.255.255.224	N/A
	G0/1	192.168.72.1	255.255.255.192	N/A
	S0/0/0	192.168.72.146	255.255.255.252	N/A
Room-114	VLAN 1	192.168.72.130	255.255.255.240	192.168.72.129
Room-279	VLAN 1	192.168.72.98	255.255.255.224	192.168.72.97
Room-312	VLAN 1	192.168.72.66	255.255.255.224	192.168.72.65
Room-407	VLAN 1	192.168.72.2	255.255.255.192	192.168.72.1
PC-A	NIC	192.168.72.142	255.255.255.240	192.168.72.129
PC-B	NIC	192.168.72.126	255.255.255.224	192.168.72.97
PC-C	NIC	192.168.72.94	255.255.255.224	192.168.72.65
PC-D	NIC	192.168.72.62	255.255.255.192	192.168.72.1

Objectives

Part 1: Examine the Network Requirements

Part 2: Design the VLSM Addressing Scheme

Part 3: Assign IP Addresses to Devices and Verify Connectivity

Background

In this activity, you are given a /24 network address to use to design a VLSM addressing scheme. Based on a set of requirements, you will assign subnets and addressing, configure devices and verify connectivity.

Instructions

Part 1: Examine the Network Requirements

Step 1: Determine the number of subnets needed.

You will subnet the network address **192.168.72.0/24**. The network has the following requirements:

- **Room-114** LAN will require **7** host IP addresses
- **Room-279** LAN will require **15** host IP addresses
- **Room-312** LAN will require **29** host IP addresses
- **Room-407** LAN will require **58** host IP addresses

How many subnets are needed in the network topology?

5 subnets are needed in the network topology.

Step 2: Determine the subnet mask information for each subnet.

- a. Which subnet mask will accommodate the number of IP addresses required for **Room-114**?

Subnet mask /28 will accommodate the number of IP addresses for Room-114.

How many usable host addresses will this subnet support?

This subnet will support 14 usable host addresses.

- b. Which subnet mask will accommodate the number of IP addresses required for **Room-279**?

Subnet mask /27 will accommodate the number of IP addresses for Room-279.

How many usable host addresses will this subnet support?

This subnet will support 30 usable host addresses.

- c. Which subnet mask will accommodate the number of IP addresses required for **Room-312**?

Subnet mask /27 will accommodate the number of IP addresses for Room-312.

How many usable host addresses will this subnet support?

This subnet will support 30 usable host addresses.

- d. Which subnet mask will accommodate the number of IP addresses required for **Room-407**?

Subnet mask /26 will accommodate the number of IP addresses for Room-407.

How many usable host addresses will this subnet support?

This subnet will support 62 usable host addresses.

- e. Which subnet mask will accommodate the number of IP addresses required for the connection between **Branch1** and **Branch2**?

Subnet mask /30 will accommodate the number of IP addresses for Building-1 and Building-2 because only two IP addresses are needed.

Part 2: Design the VLSM Addressing Scheme

Step 1: Divide the 192.168.72.0/24 network based on the number of hosts per subnet.

- Use the first subnet to accommodate the largest LAN.
- Use the second subnet to accommodate the second largest LAN.
- Use the third subnet to accommodate the third largest LAN.
- Use the fourth subnet to accommodate the fourth largest LAN.
- Use the fifth subnet to accommodate the connection between **Branch1** and **Branch2**.

Step 2: Document the VLSM subnets.

Complete the **Subnet Table**, listing the subnet descriptions (e.g. [[S1Name]] LAN), number of hosts needed, then network address for the subnet, the first usable host address, and the broadcast address. Repeat until all addresses are listed.

Subnet Table

Subnet Description	Number of Hosts Needed	Network Address/CIDR	First Usable Host Address	Broadcast Address
<i>Room-407</i>	<i>58</i>	<i>192.168.72.0</i>	<i>192.168.72.1</i>	<i>192.168.72.63</i>
<i>Room-312</i>	<i>29</i>	<i>192.168.72.64</i>	<i>192.168.72.65</i>	<i>192.168.72.95</i>
<i>Room-279</i>	<i>15</i>	<i>192.168.72.96</i>	<i>192.168.72.97</i>	<i>192.168.72.127</i>
<i>Room-114</i>	<i>7</i>	<i>192.168.72.128</i>	<i>192.168.72.129</i>	<i>192.168.72.143</i>
<i>Branch 1 and Branch 2</i>	<i>2</i>	<i>192.168.72.144</i>	<i>192.168.72.145</i>	<i>192.168.72.147</i>

Step 3: Document the addressing scheme.

- Assign the first usable IP addresses to **Branch1** for the two LAN links and the WAN link.
- Assign the first usable IP addresses to **Branch2** for the two LAN links. Assign the last usable IP address for the WAN link.
- Assign the second usable IP addresses to the switches.
- Assign the last usable IP addresses to the hosts.

Part 3: Assign IP Addresses to Devices and Verify Connectivity

Most of the IP addressing is already configured on this network. Implement the following steps to complete the addressing configuration.

Step 1: Configure IP addressing on the Branch1 router LAN interfaces.



```
Branch1
CLI
IOS Command Line Interface

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 192.168.72.146 (Serial0/0/0) is up: new adjacency
%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 192.168.72.146 (Serial0/0/0) is down: holding time expired
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 192.168.72.146 (Serial0/0/0) is up: new adjacency

Branch1>enable
Branch1#configure
Configuring from terminal, memory, or network (terminal)?
Enter configuration commands, one per line. End with CNTL/Z.
Branch1(config)#configure terminal
^
% Invalid input detected at '^' marker.

Branch1(config)#?
Branch1#
%SYS-5-CONFIG_I: Configured from console by console

Branch1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Branch1(config)#interface g
Branch1(config-if)#ip address 192.168.72.129 255.255.255.240
Branch1(config-if)#no shutdown

Branch1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

Branch1(config-if)#exit
Branch1(config)#interface g
Branch1(config)#interface gigabitEthernet 0/1
Branch1(config-if)#ip address 192.168.72.97 255.255.255.224
Branch1(config-if)#no shutdown

Branch1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

Branch1(config-if)#Enter configuration commands, one per line. End with CNTL/Z.
Branch1(config)#
```

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Step 2: Configure IP addressing on the Room-312, switch including the default gateway.

Room-312

CLI

IOS Command Line Interface

```

MOTHERBOARD SERIAL NUMBER : FC10092812
Power supply serial number : A281007032H
Model revision number : B0
Motherboard revision number : B0
Model number : WS-C2960-24TT-L
System serial number : FC1010X104
Top Assembly Part Number : 800-27221-02
Top Assembly Revision Number : A0
Version ID : V03
CLI Code Number : CCM3L00BPA
Hardware Board Revision Number : 0x01

Switch Ports Model          SW Version        SW Image
-----
*  1 24  WS-C2960-24TT-L    15.0(2)SE4        C2960-LANBASEK9-M

Cisco IOS Software, C2960 Software (C2960-LANBASEK9-M), Version 15.0(2)SE4, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2013 by Cisco Systems, Inc.
Compiled Wed 26-Jun-13 02:49 by mnquyen

Press RETURN to get started!

%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

Room-312>enable
Room-312#conf t
Room-312(config)#configure t
Room-312(config)#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Room-312(config)#interface vlan 1
Room-312(config-if)#ip address 192.168.72.66 255.255.255.224
Room-312(config-if)#no shutdown

Room-312(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

Room-312(config-if)#exit
Room-312(config)#ip default
Room-312(config)#ip default-gateway 192.168.72.65
Room-312(config)#

```

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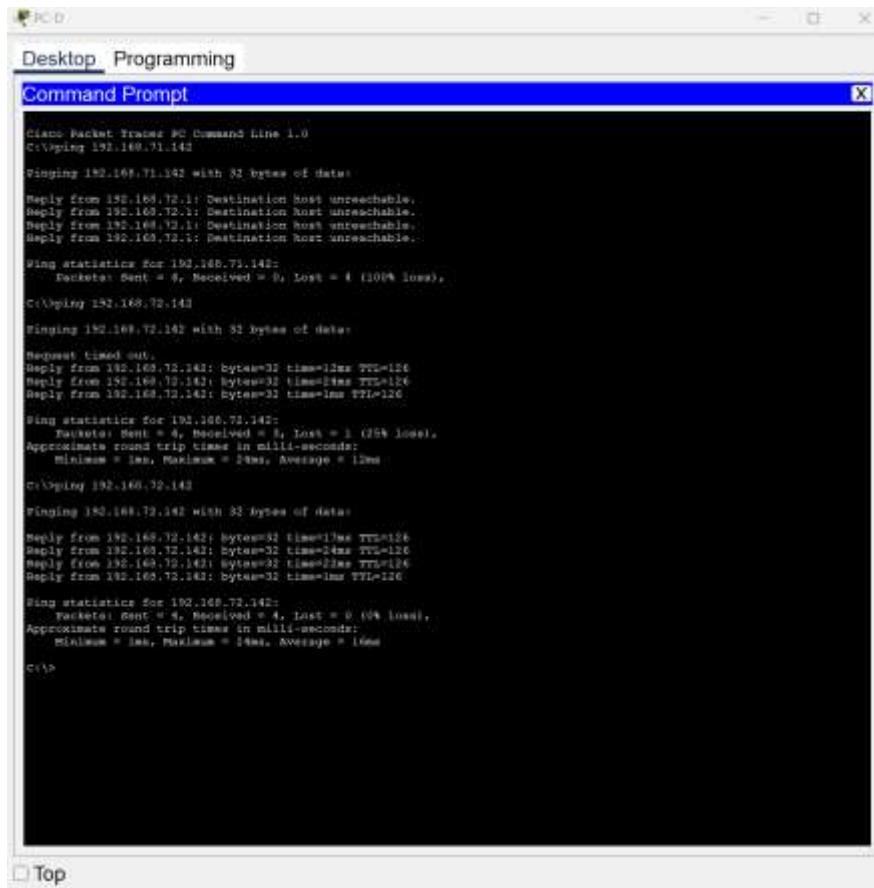
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Step 3: Configure IP addressing on PC-D, including the default gateway.

The screenshot shows the 'IP Configuration' window for PC-D. The window has two tabs: 'Desktop' and 'Programming'. The 'Desktop' tab is active. Under the 'IP Configuration' section, the 'Interface' is set to 'FastEthernet0'. The 'IP Configuration' section has two radio buttons: 'DHCP' (unselected) and 'Static' (selected). The 'Static' configuration fields are filled with the following values: IPv4 Address: 192.168.72.62, Subnet Mask: 255.255.255.192, Default Gateway: 192.168.72.1, and DNS Server: 0.0.0.0. The 'IPv6 Configuration' section has two radio buttons: 'Automatic' (unselected) and 'Static' (selected). The 'Static' configuration fields are filled with the following values: IPv6 Address: (empty), Link Local Address: FE80::260:70FF:FE47:AAC1, Default Gateway: (empty), and DNS Server: (empty). The '802.1X' section has a checkbox 'Use 802.1X Security' (unchecked). The 'Authentication' section has a dropdown menu set to 'MD5'. The 'Username' and 'Password' fields are empty. At the bottom left of the window is a 'Top' button.

Step 4: Verify connectivity.

You can only verify connectivity from Branch1, Room-312, and PC-D. However, you should be able to ping every IP address listed in the **Addressing Table**.



```
PC0
Desktop Programming
Command Prompt

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.71.142

Pinging 192.168.71.142 with 32 bytes of data:

Reply from 192.168.72.1: Destination host unreachable.
Reply from 192.168.72.1: Destination host unreachable.
Reply from 192.168.72.1: Destination host unreachable.
Reply from 192.168.72.1: Destination host unreachable.

Ping statistics for 192.168.71.142:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.72.142

Pinging 192.168.72.142 with 32 bytes of data:

Request timed out.
Reply from 192.168.72.142: bytes=32 time=12ms TTL=126
Reply from 192.168.72.142: bytes=32 time=14ms TTL=126
Reply from 192.168.72.142: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.72.142:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 14ms, Average = 12ms

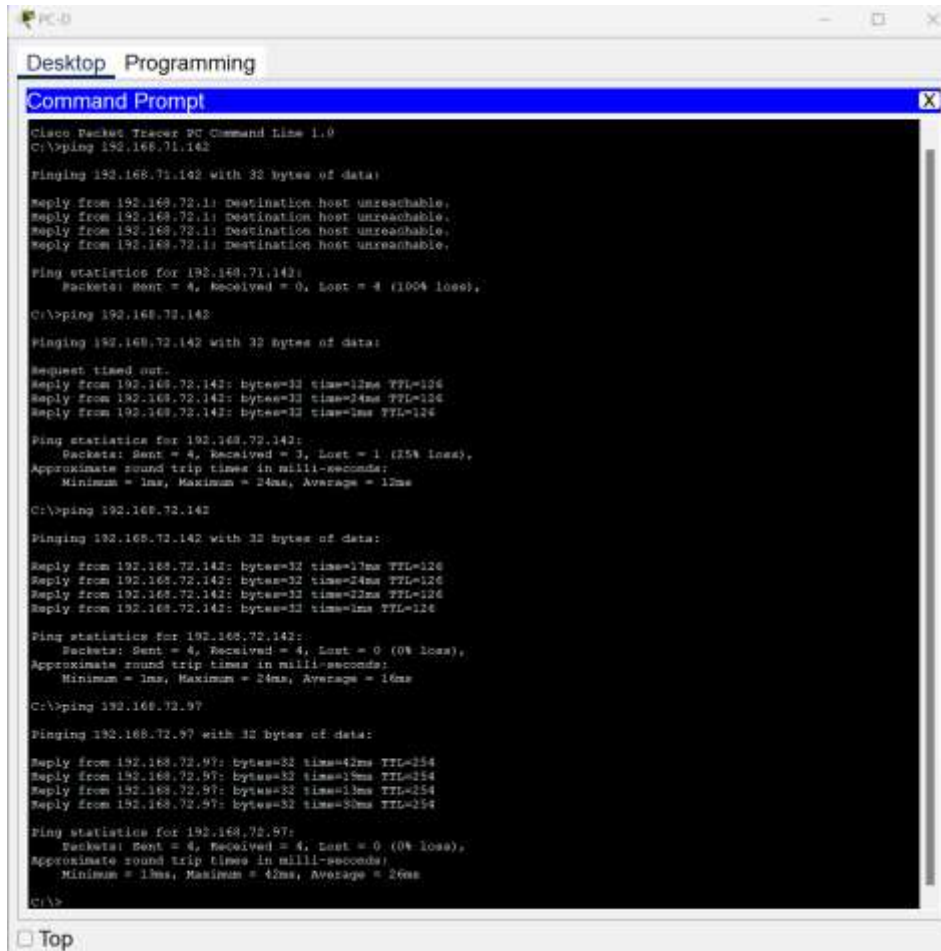
C:\>ping 192.168.72.142

Pinging 192.168.72.142 with 32 bytes of data:

Reply from 192.168.72.142: bytes=32 time=17ms TTL=126
Reply from 192.168.72.142: bytes=32 time=24ms TTL=126
Reply from 192.168.72.142: bytes=32 time=22ms TTL=126
Reply from 192.168.72.142: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.72.142:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 24ms, Average = 16ms

C:\>
```



```
PC-D
Desktop Programming
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.71.142

Pinging 192.168.71.142 with 32 bytes of data:

Reply from 192.168.72.1: destination host unreachable.
Reply from 192.168.72.1: destination host unreachable.
Reply from 192.168.72.1: destination host unreachable.
Reply from 192.168.72.1: destination host unreachable.

Ping statistics for 192.168.71.142:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.72.142

Pinging 192.168.72.142 with 32 bytes of data:

Request timed out.
Reply from 192.168.72.142: bytes=32 time=12ms TTL=126
Reply from 192.168.72.142: bytes=32 time=24ms TTL=126
Reply from 192.168.72.142: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.72.142:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 24ms, Average = 12ms

C:\>ping 192.168.72.142

Pinging 192.168.72.142 with 32 bytes of data:

Reply from 192.168.72.142: bytes=32 time=17ms TTL=126
Reply from 192.168.72.142: bytes=32 time=24ms TTL=126
Reply from 192.168.72.142: bytes=32 time=22ms TTL=126
Reply from 192.168.72.142: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.72.142:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 24ms, Average = 16ms

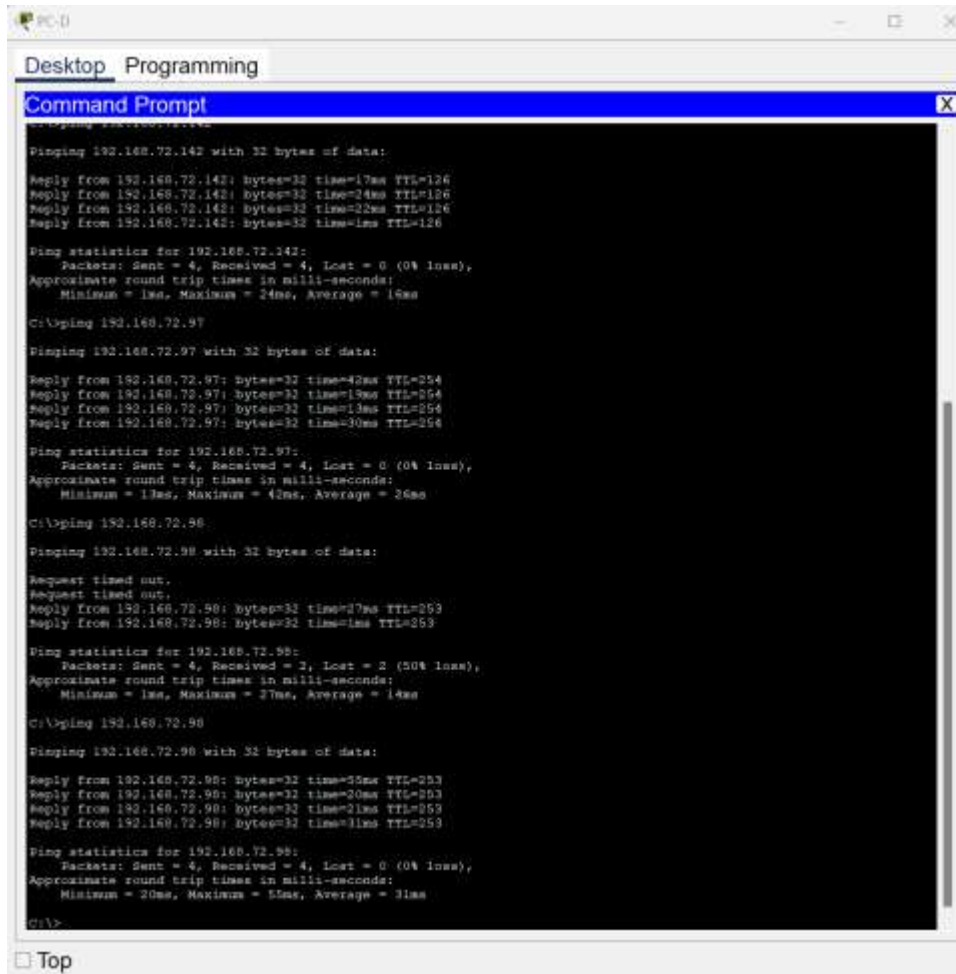
C:\>ping 192.168.72.97

Pinging 192.168.72.97 with 32 bytes of data:

Reply from 192.168.72.97: bytes=32 time=42ms TTL=254
Reply from 192.168.72.97: bytes=32 time=13ms TTL=254
Reply from 192.168.72.97: bytes=32 time=13ms TTL=254
Reply from 192.168.72.97: bytes=32 time=30ms TTL=254

Ping statistics for 192.168.72.97:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 13ms, Maximum = 42ms, Average = 26ms

C:\>
```

```
PC-0
Desktop Programming
Command Prompt

C:\>ping 192.168.72.142

Pinging 192.168.72.142 with 32 bytes of data:

Reply from 192.168.72.142: bytes=32 time=17ms TTL=126
Reply from 192.168.72.142: bytes=32 time=24ms TTL=126
Reply from 192.168.72.142: bytes=32 time=22ms TTL=126
Reply from 192.168.72.142: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.72.142:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 24ms, Average = 18ms

C:\>ping 192.168.72.97

Pinging 192.168.72.97 with 32 bytes of data:

Reply from 192.168.72.97: bytes=32 time=42ms TTL=254
Reply from 192.168.72.97: bytes=32 time=13ms TTL=254
Reply from 192.168.72.97: bytes=32 time=13ms TTL=254
Reply from 192.168.72.97: bytes=32 time=30ms TTL=254

Ping statistics for 192.168.72.97:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 13ms, Maximum = 42ms, Average = 26ms

C:\>ping 192.168.72.98

Pinging 192.168.72.98 with 32 bytes of data:

Request timed out.
Request timed out.
Reply from 192.168.72.98: bytes=32 time=17ms TTL=253
Reply from 192.168.72.98: bytes=32 time=1ms TTL=253

Ping statistics for 192.168.72.98:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 17ms, Average = 14ms

C:\>ping 192.168.72.90

Pinging 192.168.72.90 with 32 bytes of data:

Reply from 192.168.72.90: bytes=32 time=52ms TTL=253
Reply from 192.168.72.90: bytes=32 time=30ms TTL=253
Reply from 192.168.72.90: bytes=32 time=21ms TTL=253
Reply from 192.168.72.90: bytes=32 time=31ms TTL=253

Ping statistics for 192.168.72.90:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 20ms, Maximum = 55ms, Average = 31ms

C:\>
```

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