

Lab – IPv4 Addresses and Network

Topology



Objectives

- Build a simple peer-to-peer network and verify physical connectivity.
- Assign various IPv4 addresses to hosts and observe the effects on network communication

Background / Preparation

In this lab, you will build a simple peer-to-peer network using two PCs and an Ethernet crossover cable. You will assign various IPv4 addresses to the hosts and determine the effects on their ability to communicate.

Required Resources

- 2 PCs (Windows 10) with at least one wired Ethernet NIC on each PC
- 1 Ethernet cross-over cable to connect the PCs (provided by instructor)

Step 1: Connect the PCs to create a peer-to-peer network.

- Obtain an Ethernet crossover cable provided by the instructor to connect the two PCs.

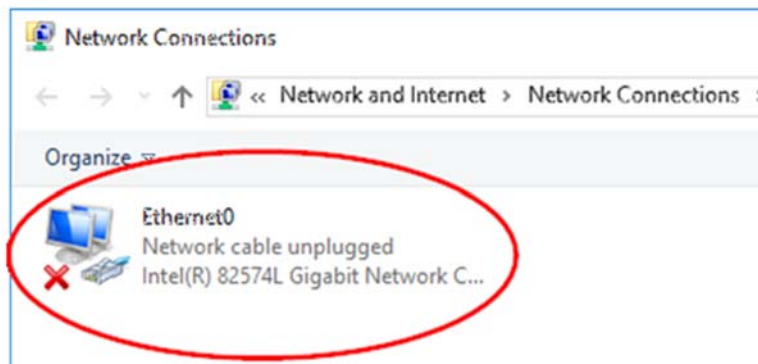
Note: (optional lab setup) The PCs may be connected to a switch using two straight-through cables. The following instructions assume you are using a crossover cable.

- Plug one end of the cable into the Ethernet NIC of PC-A. Plug the other end of the cable into the Ethernet NIC of PC-B. As you insert the cable, you should hear a click which indicates that the cable connector is properly inserted into the port.

Step 2: Verify physical connectivity.

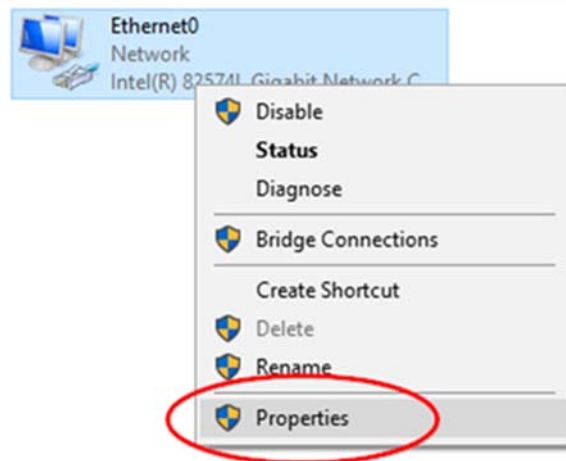
- After the Ethernet crossover cable is connected to both PCs, take a close look at each Ethernet port. A link light (usually green or amber) indicates that physical connectivity has been established between the two NICs. Try unplugging the cable from one PC then reconnecting it to verify that the light goes off then back on.
- On PC-A, right-click on **Start** and select **Network Connections**.

- c. If there was a problem connecting the network cable, Ethernet0 will read **Network cable unplugged** and will have a red X in the icon. If so, troubleshoot by repeating Steps 1 and 2. You may also want to ask your instructor to confirm that you are using an Ethernet crossover cable.

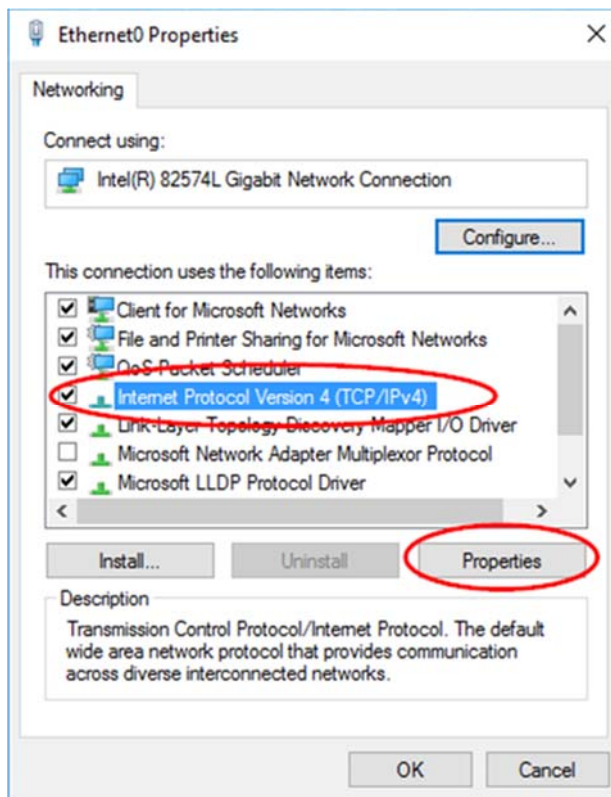


Step 3: Configure IPv4 Settings on PC-A and PC-B.

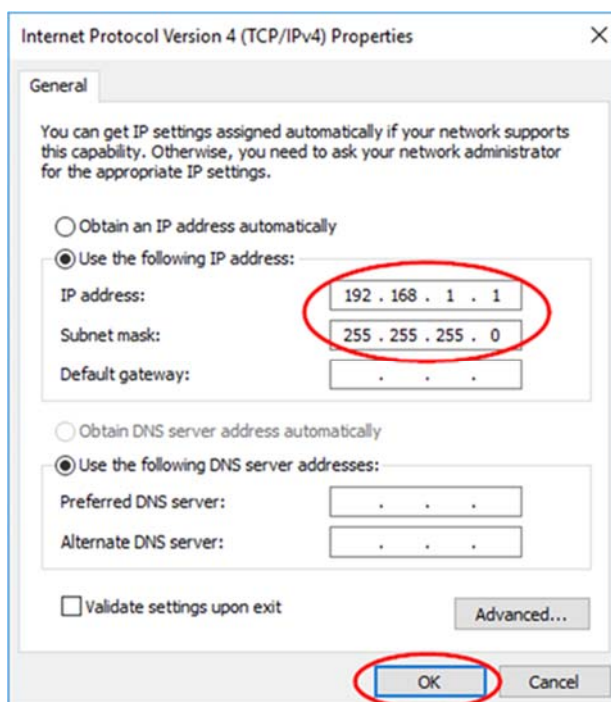
- a. Configure manual IPv4 addressing on PC-A and PC-B so that they are able to communicate using TCP/IP. On PC-A right click the **Ethernet0** icon in this example and click **Properties**.



- b. In the Ethernet0 Properties window select **Internet Protocol Version 4 (TCP/IPv4)** and click the **Properties** button.



- c. Select the **Use the following IPv4 address** and enter the IPv4 address **192.168.1.1** and subnet mask **255.255.255.0**. Click **OK** > **Close** to exit the Ethernet0 Properties window.

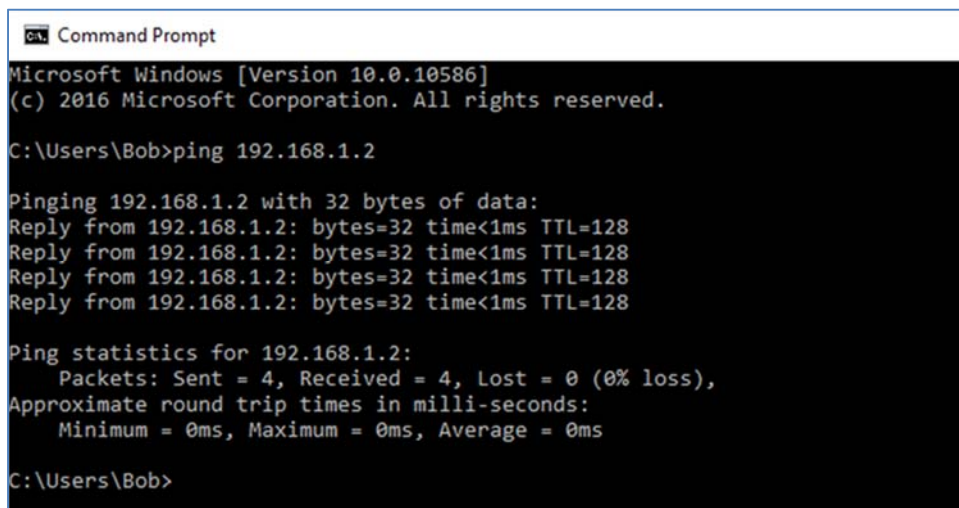


- d. Repeat steps 3a – 3c for PC-B using an IPv4 address **192.168.1.2** and a subnet mask **255.255.255.0**.

Step 4: Verify IPv4 connectivity between the two PCs.

Note: To test TCP/IP connectivity between the PCs, Windows Firewall must be disabled temporarily on both PCs. Windows Firewall should be re-enabled after the tests have been completed. To access Windows Firewall, click **Settings > Network & Internet > Ethernet > Windows Firewall > Turn Windows Firewall on or off**.

- a. Now that the two PCs are physically connected and configured correctly with IPv4 addresses, we need to make sure they can communicate with each other. The **ping** command is a simple way to accomplish this task.
- b. From PC-A, right-click **Start**, and select **Command Prompt**.
- c. At the command prompt, enter **ping 192.168.1.2**. A successful **ping** will verify network connectivity and PC-A can communicate with PC-B.



```
Command Prompt
Microsoft Windows [Version 10.0.10586]
(c) 2016 Microsoft Corporation. All rights reserved.

C:\Users\Bob>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\Bob>
```

- d. Repeat this procedure and **ping 192.168.1.1** from PC-B.
- e. Close the command prompt on both PCs.

Step 5: Change IPv4 address for PC-B.

- a. On PC-B, right-click on **Start** and select **Network Connections**, and right-click the **Ethernet0** icon. Choose **Properties** from the pull-down menu.
- b. Select **Internet Protocol Version 4 (TCP/IPv4)**. Click **Properties**.
- c. Change the logical IPv4 address for PC-B from 192.168.1.2 to **192.168.2.2** and leave the subnet mask set to 255.255.255.0.
- d. Click **OK** which will close the **Internet Protocol Version 4 (TCP/IPv4)** window. Click the **Close** button to exit the **Ethernet0 Properties** window.

Step 6: Test network connectivity between the 2 PCs.

- a. From PC-B, right-click **Start**, and select **Command Prompt**.

- b. At the command prompt, type **ping 192.168.2.2** and press **Enter**. Was it successful? Explain.

- c. What type of networking device would allow the PCs to communicate even though they are on different networks?

Step 7: Change IPv4 address for PC-A.

- a. On PC-A, right-click on **Start** and select **Network Connections**, and right-click the **Ethernet0** icon. Choose **Properties** from the pull-down menu.
- a. Select **Internet Protocol Version 4 (TCP/IP)**. Click **Properties**.
- b. Change the logical IPv4 address for PC-A from 192.168.1.1 to 192.168.2.99 and leave the subnet mask set to 255.255.255.0. Click **OK**, to close the **Internet Protocol Version 4 (TCP/IP)** window. Click **Close** to exit the **Ethernet0 Properties** window.

The two PCs are still on the same physical Ethernet network. Are they on the same logical IPv4 network now?

Step 8: Test network connectivity between the 2 PCs.

- a. On PC-B, repeat step 4b to access the Windows command prompt.
- b. At the command prompt, type **ping 192.168.2.99** and press **Enter**. Was it successful? Explain.

Step 9: (Optional – Use only if the Firewall was originally ENABLED) Re-enable the firewall.

To ensure that the PC is protected from unauthorized access, re-enable the Windows Firewall.

To access Windows Firewall, click **Settings > Network & Internet > Ethernet > Windows Firewall > Turn Windows Firewall on or off**.