

Laboratory tasks

Data link layer

- Ethernet

CCNA1v6 lab links

[5.1.1.7] -Using Wireshark to Examine Ethernet Frames

[5.1.2.8] -Viewing Network Device MAC Addresses

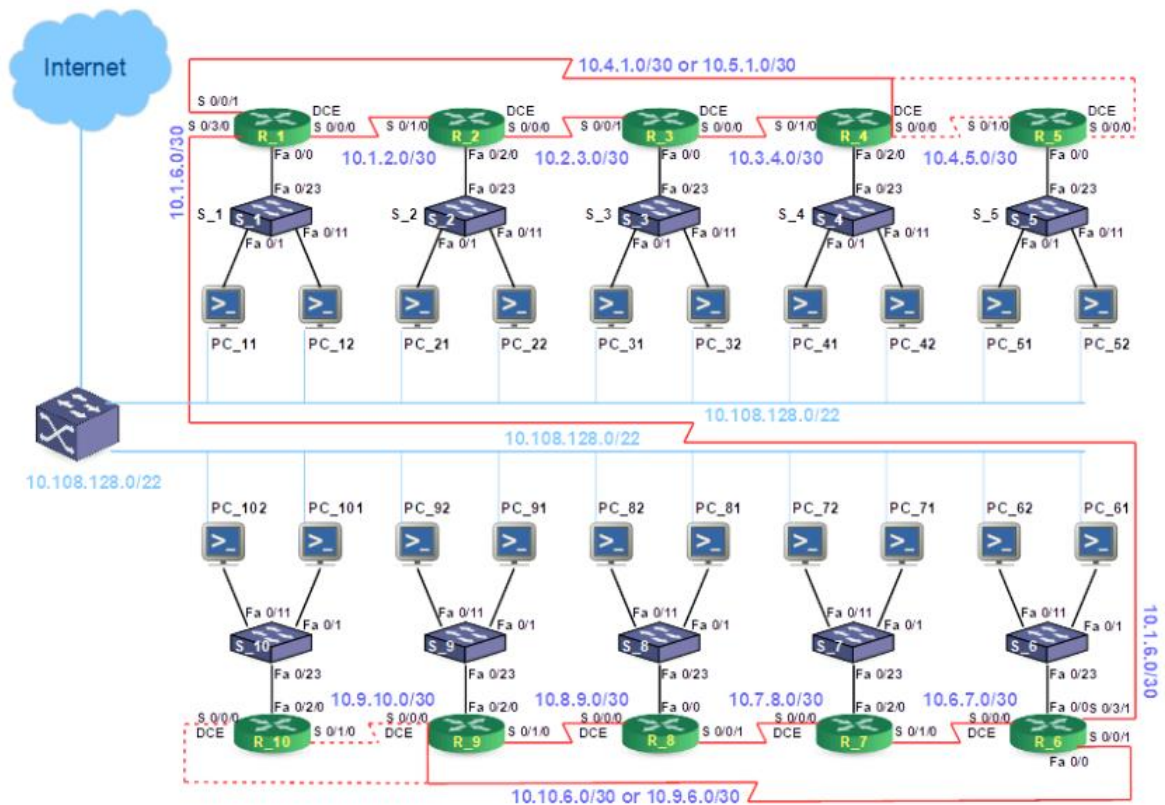
[5.2.1.7] -Using IOS CLI with Switch MAC Address Tables

CCNA1v6 PT links

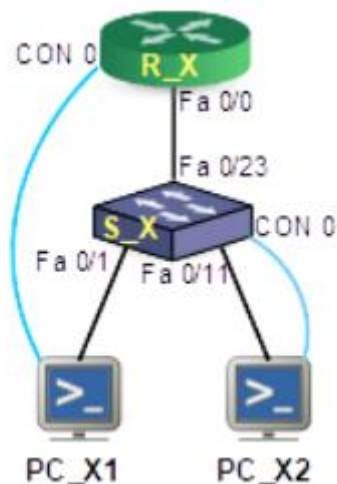
[5.3.1.3] -Identify MAC and IP Addresses

[5.3.2.8] -Examine the ARP Table

Lab topology



Base topology of single lab group



The following connections have been configured in the base topology:

- PC_X1 Cisco NIC port connected with straight cable to S_X port Fa0 / 1.
- PC_X1 COM port 1 connected with console cable to R_X CON port 0.
- PC_X2 Cisco port NIC connected with straight cable to S_X port Fa0 / 11.
- PC_X2 COM port 1 connected by a console cable to S_X CON CON port 0.
- R_X Fa 0/0 port connected by a straight cable to S_X port Fa0 / 23.

Task 1 - Recognition of interfaces and cable connections in the base topology of the laboratory group. Configuration of IPv4 addresses.

Points: 1

Scenario of activities

Note: During the exercise, write the results in the notebook.

Identification of the lab topology architecture

1. In the user's home directory, create a text document to save the answers. In particular a table with a description of the location and configuration of network interfaces as well as console cable connections.
2. Check and write down the switch ports to which the PC_X1 and PC_X2 computers are connected. Ports should match those proposed in the base topology. In case of inaccuracies, please reconnect the cables.
3. Check and write down the devices to which serial ports of PC_X1 and PC_X2 are connected. They should be connected as proposed in the basic topology. In case of inaccuracies, please reconnect the cables.

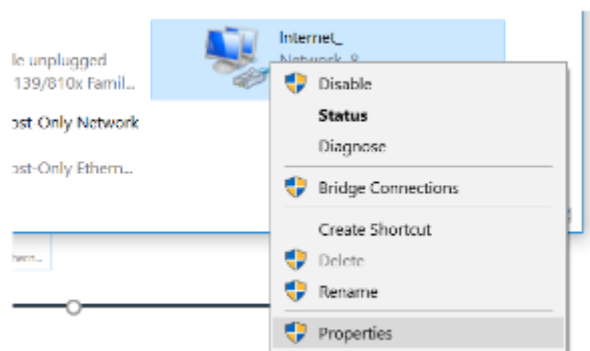
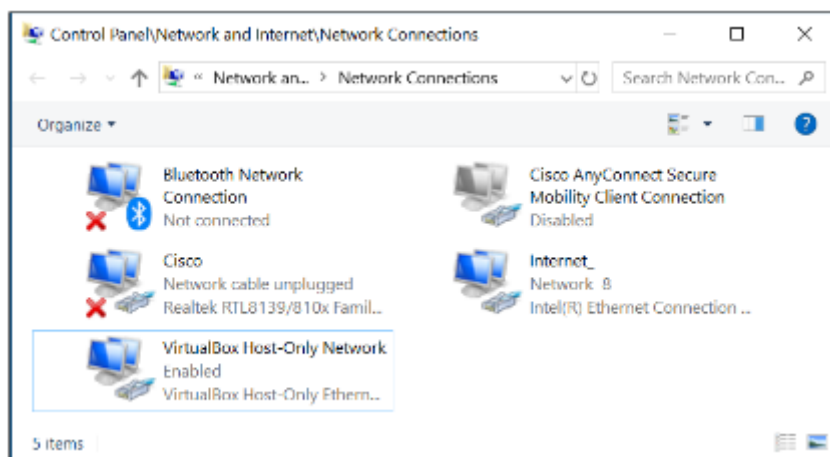
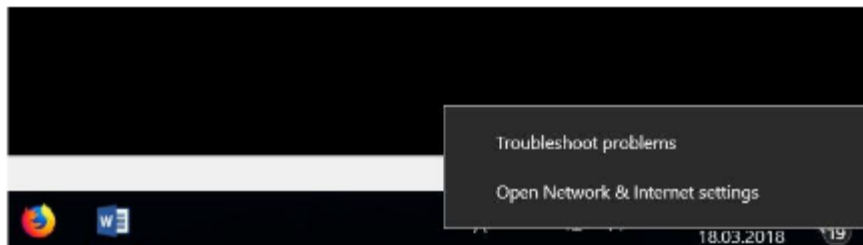
Basic IPv4 PC configuration

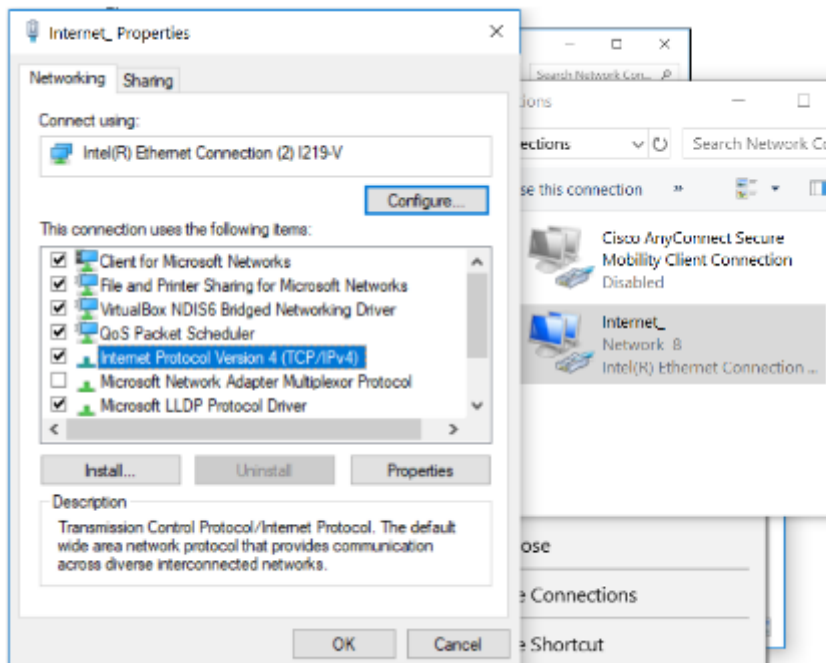
4. Check and save the configuration of the PC NIC interfaces.

5. Configure the IP address on the Ethernet interface ("Cisco") leading to the lab set. Use the following addresses:
PC_X1: 192.168.X.X1255.255.255.0, Gateway 192.168.X.X0
PC_X2: 192.168.X.X2255.255.255.0, Gateway 192.168.X.X0

Configure IPv4 address in the Windows system in GUI mode

6.





To validate the configuration of IP protocols in Windows you can use the graphical interface or the command line command: `ipconfig` (in the cmd - Command Line window). The second option is more reliable, because the graphical interface can sometimes shows the wrong address. Adding the parameter `/all` print more interface details.

`c: \> ipconfig / all` -shows additional configuration information regarding, for example, MAC address or IPv6 configuration.

```
ca Command Prompt
C:\Users\tmp>
C:\Users\tmp>ipconfig

Windows IP Configuration

Ethernet adapter Internet_:

    Connection-specific DNS Suffix  . : 
    Link-local IPv6 Address . . . . . : fe80::e11a:fd78:d2ba:92e5%17
    IPv4 Address. . . . . : 10.108.128.2
    Subnet Mask . . . . . : 255.255.252.0
    Default Gateway . . . . . : 10.108.131.254

Ethernet adapter Cisco:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :
```

```
ca Command Prompt
C:\Users\tmp>ipconfig /all

Windows IP Configuration

    Host Name . . . . . : knnet
    Primary Dns Suffix . . . . . : 
    Node Type . . . . . : Hybrid
    IP Routing Enabled. . . . . : No
    WINS Proxy Enabled. . . . . : No

Ethernet adapter Internet_:

    Connection-specific DNS Suffix  . : 
    Description . . . . . : Intel(R) Ethernet Connection (2) I219-V
    Physical Address. . . . . : 30-5A-3A-5A-1C-58
    DHCP Enabled. . . . . : No
    Autoconfiguration Enabled . . . . : Yes
    Link-local IPv6 Address . . . . . : fe80::e11a:fd78:d2ba:92e5%17(Preferred)
    IPv4 Address. . . . . : 10.108.128.2(Preferred)
    Subnet Mask . . . . . : 255.255.252.0
    Default Gateway . . . . . : 10.108.131.254
    DHCPv6 IAID . . . . . : 53500474
    DHCPv6 Client DUID. . . . . : 00-01-00-01-1F-3A-5F-6B-30-5A-3A-5A-1C-58
    DNS Servers . . . . . : 10.108.131.254
    NetBIOS over Tcpip. . . . . : Enabled
```

7. Test the connection between the computers with the ping command. Before running the test, make sure that the switch connecting computers has been started.
PC_X1: c: \> ping192.168.X.X2
PC_X2: c: \> ping192.168.X.X1
In case of failure, correct the configuration.
8. Report the task to instructor.

Task 2

Points: 2

Scenario of activities

Note: During the exercise, write the results in the notebook.

1. In the user's home directory, create a text document to save te ansvers.

(c: \>cisco\users\user_name)

Basic configuration of PC computers.

2. Configure the IPv4 addresses of the Ethernet (Cisco) interfaces that lead to the laboratory set. Use the following addresses:
PC_X1: 192.168.X.X1255.255.255.0, gateway 192.168.X.X0
PC_X2: 192.168.X.X2255.255.255.0, gate 192.168 .X.X0
You can use the configuration made in the previous exercise

Ethernet frame analysis

3. Check and save physical addresses of PC network interfaces. Use the `ipconfig` command.
4. Start the Wireshark program. Capture traffic on the interface that connects computers to the lab set ("Cisco" interface).
5. Perform connectivity test between PC_X1 and PC_X2.
c:\> ping 192.168.X.X2
6. Stop Wireshark.
7. Save the printout from the Wireshark program in the user's directory.
8. Find in the listing the Ethernet frame sent from computer PC_X2 to computer PC_X1 and note the frame number (ID).
9. Analyze the Ethernet frame. Find and write the following data:
 - Write in the order the names of all header field and their size in Bytes.
 - Note the size of the Ethernet data field.
 - Calculate the size of the Ethernet Data part.
 - Save the recipient's MAC address.
 - Save the sender's MAC address.
10. Compare physical addresses of PCs with addresses from the Ethernet frame.
11. **Report the task to be checked by the instructor.**

Task 3 - Analysis of the ARP protocol using the Wireshark program

Points: 2

Scenario of activities

Note: During the exercise, write the results in the notebook.

1. In the user's home directory, create a text document to save te answers.
(c: \>cisco\users\user_name)

Basic configuration of PC computers.

2. Check the IP addresses on the PC interfaces connected to the external network ("Internet NIC").

Analysis of the ARP3 protocol.

3. Check and write physical addresses of external PC network interfaces ("Internet").
Use the `ipconfig` command.
4. Analyze the contents of the ARP table of PCs in Windows.
Display and save the contents of the table:
c: \> arp -a.
Delete the contents of the array:

```
c: \> arp -d *
```

Perform the connectivity test between PC_X1 and PC_X2. Use addresses from external interfaces:

```
c: \> ping 10.108.128.N
```

N - corresponds to the number of the computer.

Display and save the value of the ARP table:

```
c: \> arp -a.
```

Re-clear the contents of the array:

```
c: \> arp -d *
```

5. Start the Wireshark program. Capture traffic on the interface that connects computers to the Internet.
6. Perform a connectivity test between PC_X1 and PC_X2.
PC_X1:

```
c: \> ping 10.108.128.N7.
```
7. Stop Wireshark.
8. Save the printout from the Wireshark program in the user's directory.
9. Find the ARP frame program sent from and to the PC_X1 computer.
To simplify the task, use the Wireshark filter. Enter the keyword "arp".
Save the ID of ARP frames.
10. Analyze the contents of the ARP frames.
Save the source and destination MAC addresses.
Save what contains the arp answer?

ARP protocol analysis for external hosts communication. Analysis of MAC addresses of external hosts

11. Restart Wireshark.
12. Perform a connectivity test to any two external hosts eg:

```
c:\>ping www.pwr.edu.pl
```

```
c: \> ping www.google.pl ...
```
13. Stop the Wireshark program and save its result in the user's directory.
14. Check if the external host addresses have been added to the arp table.
Explain the result of arp -a.
15. In Wireshark, find and note the frame numbers sent to external hosts.
16. What MAC addresses of the target have been entered into Ethernet headers?
Explain why these addresses are not different from each other?
17. Compare the physical addresses of PCs with addresses from the Ethernet frames.
18. **Report the task to the instructor.**