

Objectives

- To construct a penetrometer LAN and demonstrate its operations.
- Introduction to the various types of cables and the construction of a crossover twisted pair cable.
- Introduce a number of useful and common networking applications.

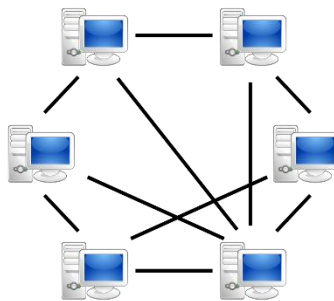
Equipment & Environment

Networks share the same components, functions, and features which are Servers, Clients, Media Shared, Shared printers and other peripherals and Resources. Servers are data Computers that provide shared resources to network users. Clients are computers that access shared network resources provided by a server. Media are the wires that make physical connections. Shared data Files provided to clients by servers across the network. Shared printers and other peripherals any service or device, such as files, printers, or other items, made available for use by members of the network. Additional resources provided by servers.

Introduction

Peer-to-Peer Networks:

In its simplest form, a peer-to-peer (P2P) network is created when two or more PCs are connected and share resources without going through a separate server computer. A P2P network can be an ad hoc connection—a couple of computers connected via a Universal Serial Bus to transfer files. A P2P network also can be a permanent infrastructure that links a half-dozen computers in a small office over copper wires. Or a P2P network can be a network on a much grander scale in which special protocols and applications set up direct relationships among users over the Internet.

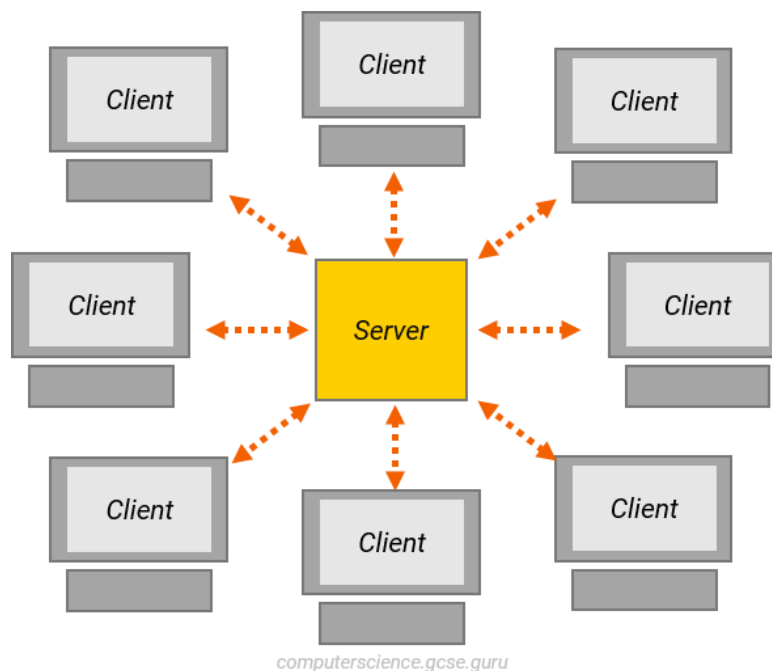


Advantages: Much easier to set up than a client-server network - does not need specialist knowledge

Disadvantages: Because each computer might be being accessed by others it can slow down the performance for the user, Files and folders cannot be centrally backed up, and There is little or no security besides the permissions.

Client/Server Networks:

Client-server networks are computer networks that use a dedicated computer (server) to store data, manage/provide resources and control user access. The server acts as a central point on the network upon which the other computers connect to. A computer that connects to the server is called a client.



Advantages:

- Accessibility
- Flexibility
- Interoperability

Disadvantages:

- Expensive
- Dependence

Types of connections:

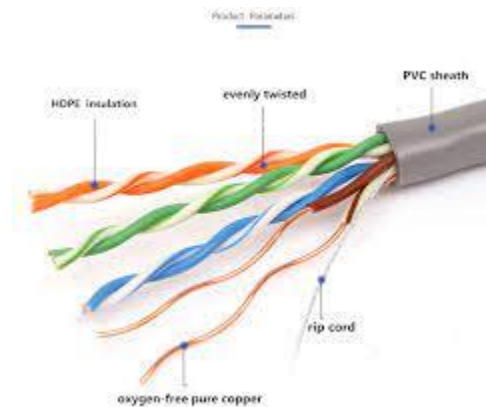
1. Physical Connection:

Cabling: This lab focuses on copper wire. Some of the most obvious advantages of copper cable are that it is cheaper than fiber optic cable and is much easier to terminate in the field.

There are two common types of common copper cables which are:

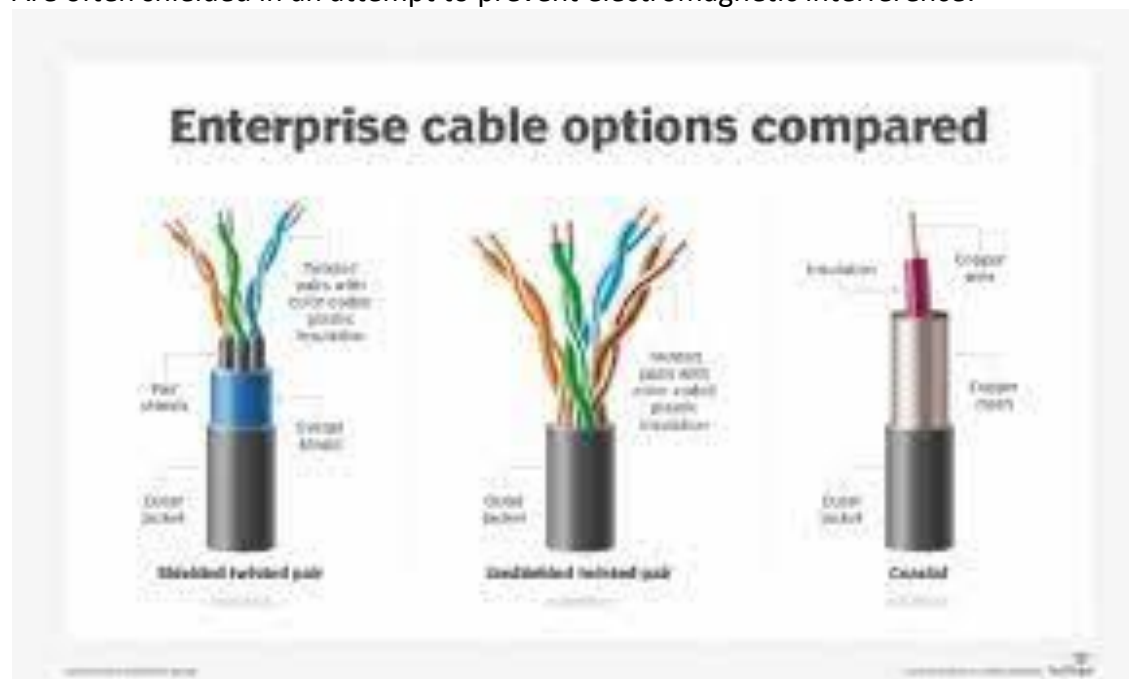
- Unshielded twisted pair (UTP)

This is the most widely used cable. Known as balanced twisted pair, UTP consists of twisted pairs (usually four).



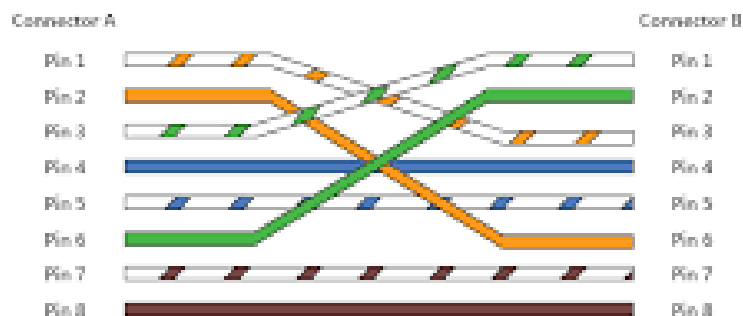
- Shielded twisted pair (STP)

Are often shielded in an attempt to prevent electromagnetic interference.



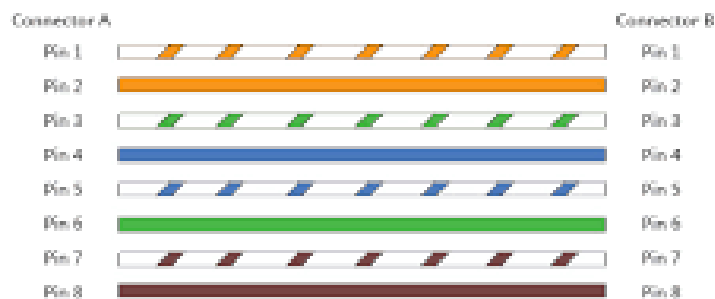
- Crossover connection, used to connect between machines of same type.

Crossover Cable Wiring Scheme



- Straight through connection used to connect two different machines with different types.

Patch Cable/Straight Through Cable Wiring Scheme



2. Logical connection:

Configure the IP address in order to be able to communicate with two or more machines together.

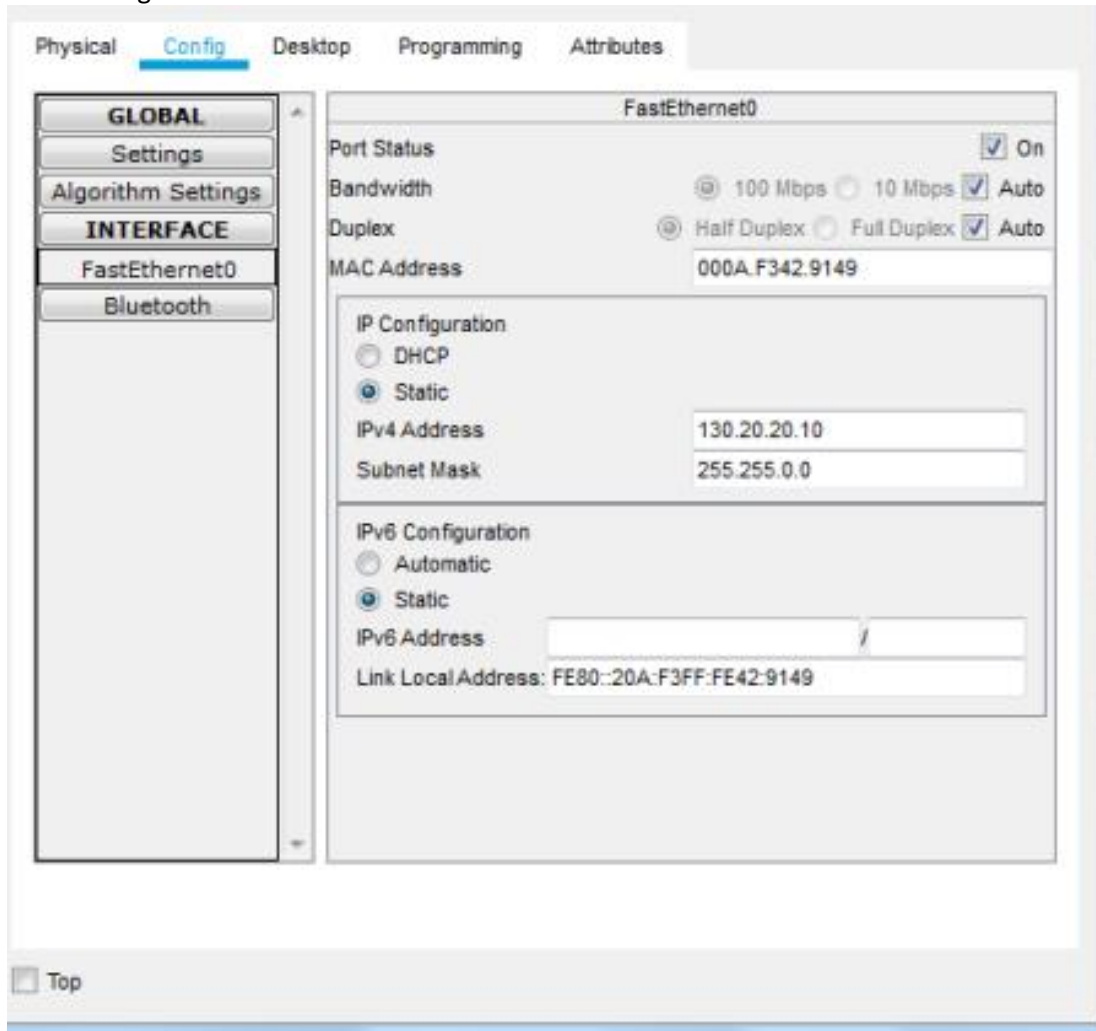
Two types of address:

Physical address: MAC address which cannot be changed, it represents the machine itself. Contains 48 bits in hexadecimal format.

Logical address: IP address which specifies the network amusement. Contains 32 bits in decimal format.

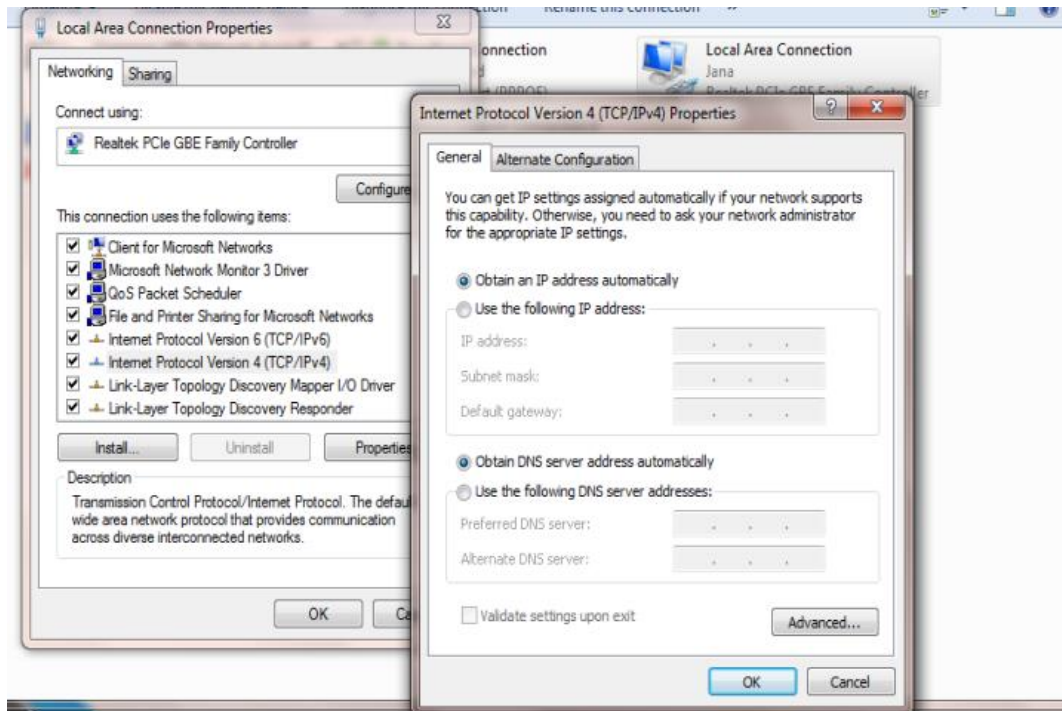
To configure the IP address:

Double click on the first computer, then click on config and select fast Ethernet to set the IP address as shown in figure:



Change the IP address of PC1 as well to be able to communicate with PC0 but give a different host.

number then you can share files immediately between PC1 and PC0:



Procedures:

1. Understand Crossover cable implementation.

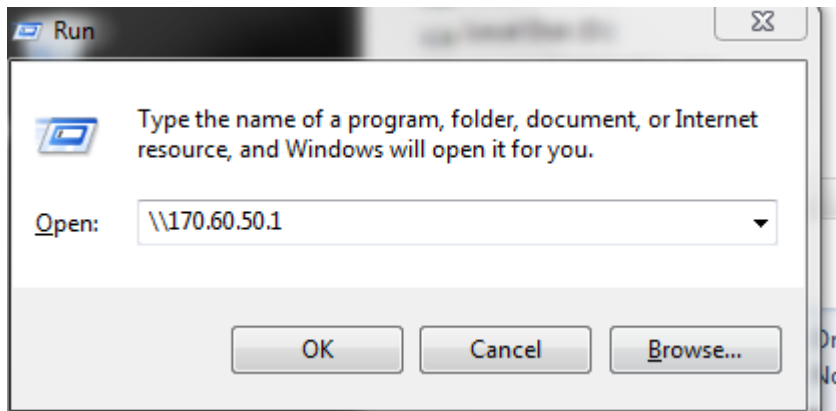
To learn how to implement an ethernet crossover cable. Please review the provided links and videos in the power point file on Blackboard.

2. Sharing in Peer-to-Peer Implementation

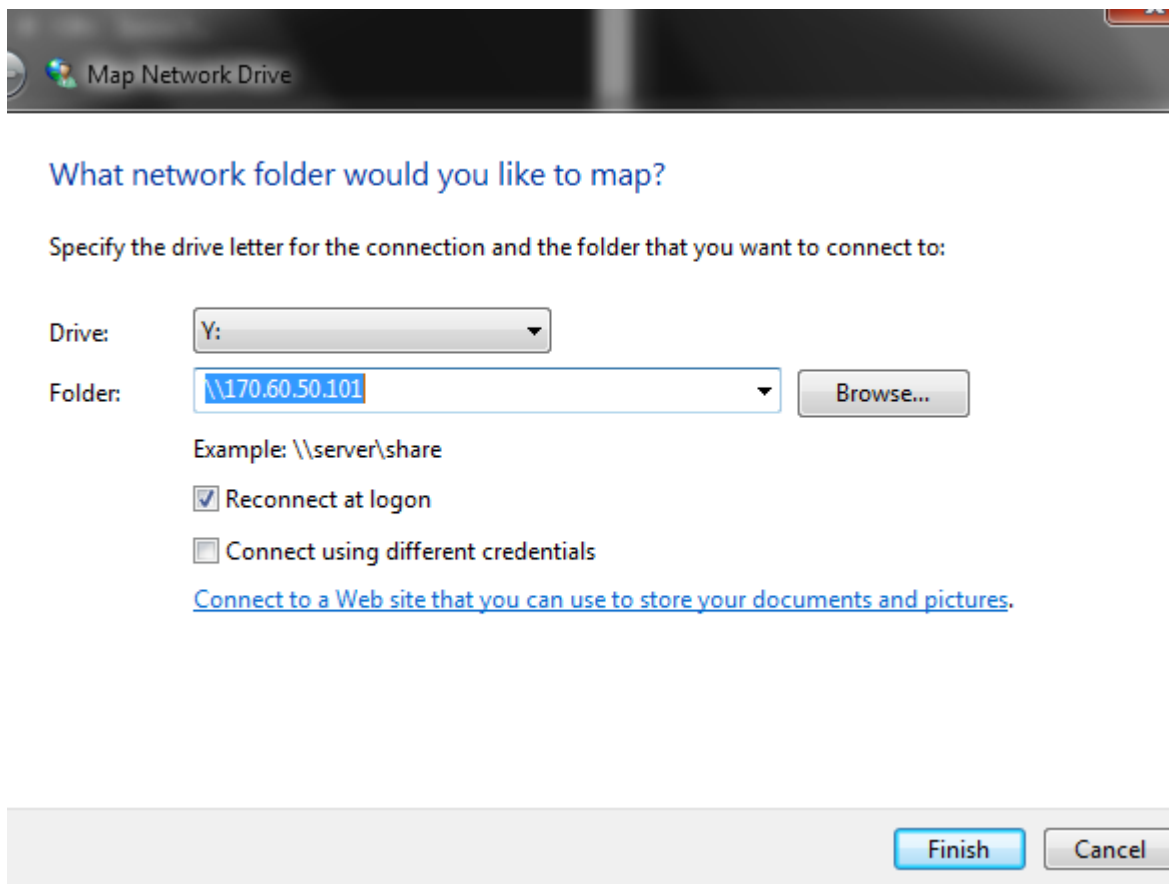
In any Windows network environment (peer-to-peer or server-based), you can set sharing permissions for drives and folders. By default, when you set up a PC on a network, no drives or folders on that PC are shared. The local user of that PC can then choose to share entire drives or individual folders on a drive. This type of security is not really that secure, however, because it affects only network access. In the following steps, you learn how to share folders and files on Window 7.

2.1 Procedure steps

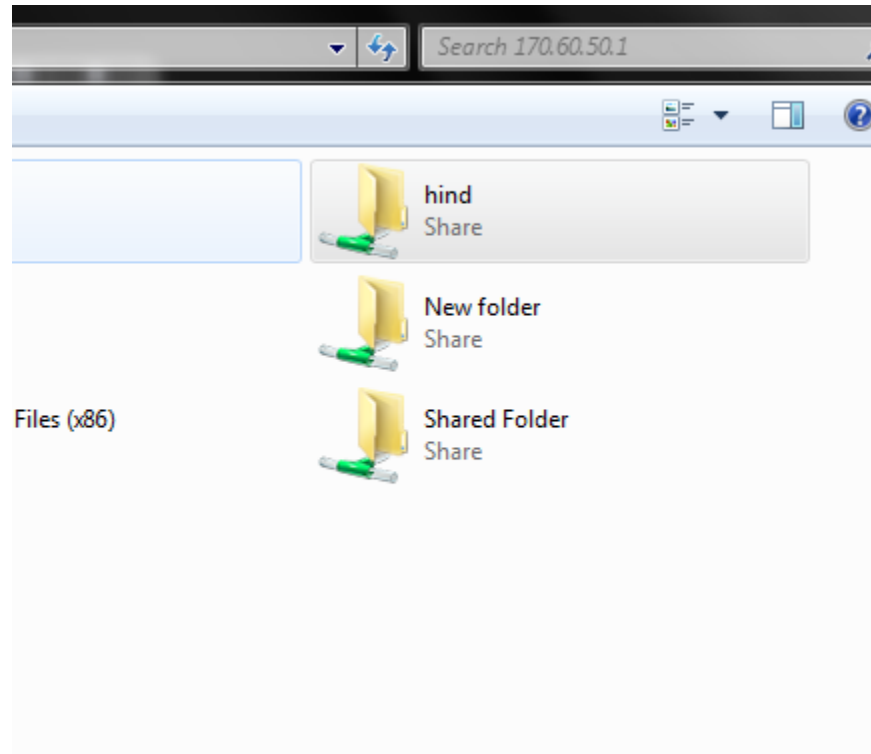
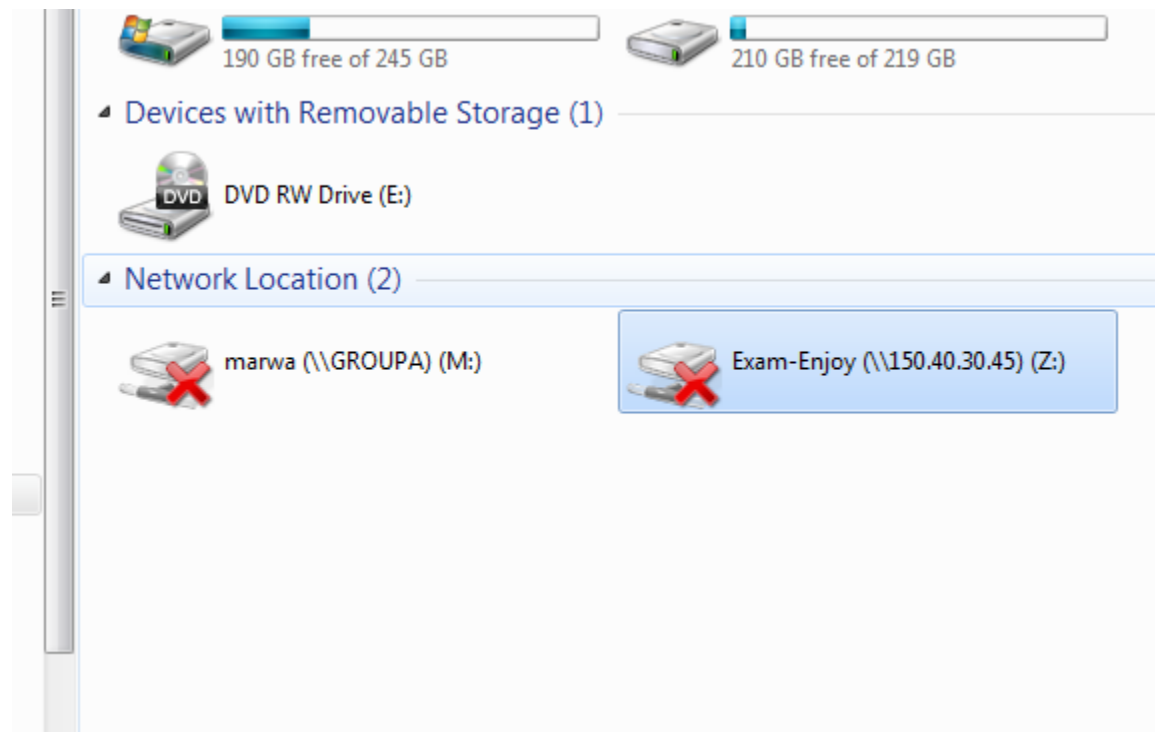
To Access my shared files, write Ip in run like the following:

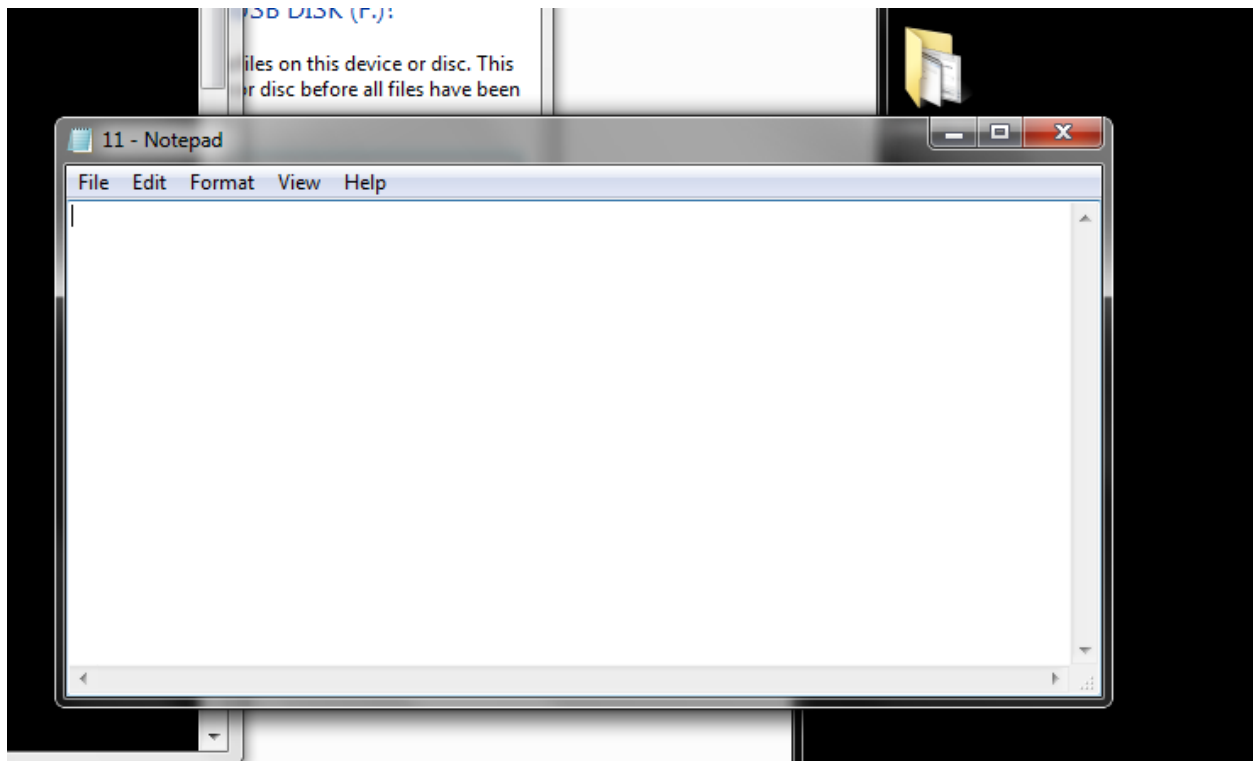


In order to map (sharing the files in faster way by assigns a local drive letter to a shared drive that stored on other computer), Using the option “Map Network Drive” that is accessible by right clicking on “My PC”, we choose a letter for the drive and insert the location of a shared folder:



Now that the mapping is done, the shared folders can be easily accessed through “My PC” as shown in the figure:





3. Network Applications

Ipconfig

We use 'Ipconfig' command to show the communication setup information on the local machine.

```
Command Prompt

C:\Users\User>ipconfig

Windows IP Configuration

Wireless LAN adapter Local Area Connection* 11:

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

Wireless LAN adapter Local Area Connection* 12:

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

Wireless LAN adapter Wi-Fi:

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

we also use the command followed by '/all' to show the physical address of our machine:

```
C:\Users\Lab>ipconfig /all

Windows IP Configuration

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

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix  . :
    Description . . . . . : Realtek PCIe GBE Family Controller
    Physical Address. . . . . : B0-83-FE-50-3D-3B
    DHCP Enabled. . . . . : No
    Autoconfiguration Enabled . . . . : Yes
    Link-local IPv6 Address . . . . . : fe80::e4f6:17dd:a421:6cfe%11(Preferred)
    IPv4 Address. . . . . : 170.60.50.20(Preferred)
    Subnet Mask . . . . . : 255.255.0.0
    Default Gateway . . . . . :
    DHCPv6 IAID . . . . . : 246449150
    DHCPv6 Client DUID. . . . . : 00-01-00-01-1E-55-D4-93-B0-83-FE-50-3D-3B

    DNS Servers . . . . . : fec0:0:0:ffff::1%1
                           fec0:0:0:ffff::2%1
                           fec0:0:0:ffff::3%1

    NetBIOS over Tcpip. . . . . : Enabled

Tunnel adapter 6T04 Adapter:

    Connection-specific DNS Suffix  . :
    Description . . . . . : Microsoft 6to4 Adapter
    Physical Address. . . . . : 00-00-00-00-00-00-E0
    DHCP Enabled. . . . . : No
    Autoconfiguration Enabled . . . . : Yes
    IPv6 Address. . . . . : 2002::aa3c:3214::aa3c:3214(Preferred)
    Default Gateway . . . . . :
    DNS Servers . . . . . : fec0:0:0:ffff::1%1
                           fec0:0:0:ffff::2%1
                           fec0:0:0:ffff::3%1

    NetBIOS over Tcpip. . . . . : Disabled

Tunnel adapter isatap.{9C9D02A2-28B8-4E6C-8453-9B5000762000}:

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

Ping

In order to check the connection with another machine on the server we use the 'ping' command followed by the Ip address of the machine we want to check with, shown in the bellow figure:

```
C:\Users\User>ping google.com

Pinging google.com [142.250.181.78] with 32 bytes of data:
Reply from 142.250.181.78: bytes=32 time=10ms TTL=146
Reply from 142.250.181.78: bytes=32 time=8ms TTL=146
Reply from 142.250.181.78: bytes=32 time=8ms TTL=146
Reply from 142.250.181.78: bytes=32 time=9ms TTL=146

Ping statistics for 142.250.181.78:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 8ms, Maximum = 10ms, Average = 8ms
```

And to use only to reply's we use the '-n' followed by the number we want like follows:

```
C:\Users\Lab>ping 170.60.50.100 -n 2

Pinging 170.60.50.100 with 32 bytes of data:
Reply from 170.60.50.100: bytes=32 time=2ms TTL=128
Reply from 170.60.50.100: bytes=32 time<1ms TTL=128

Ping statistics for 170.60.50.100:
    Packets: Sent = 2, Received = 2, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 2ms, Average = 1ms
```

Tracer

Tracer is used in order to trace the route along which a packet crosses in a network and number of hops, bellow figure shows using 'tracer' command followed by Ip address we want to check with:

```
Minimum = 8ms, Maximum = 10ms, Average = 8ms

C:\Users\User>tracert 142.250.181.78

Tracing route to fjr04s07-in-f14.1e100.net [142.250.181.78]
over a maximum of 30 hops:

  0  5 ms  5 ms  5 ms  172.26.12.1
  1  5 ms  5 ms  5 ms  192.168.99.2
  2  5 ms  5 ms  5 ms  192.168.230.4
  3  5 ms  5 ms  5 ms  192.168.200.2
  4  7 ms  12 ms  10 ms  bba392177.alshamil.net.ae [83.110.108.1]
```

FTP (practical part in the lab)

Application that is used in order to send and receive files to and from a File server.

'FTP followed by the IP address of the server' in order to connect to the server in the following figure (we enter username and password to get connection):

```
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
```

```
C:\Users\Lab>ping 170.60.50.100
```

```
Pinging 170.60.50.100 with 32 bytes of data:
Reply from 170.60.50.20: Destination host unreachable.
Reply from 170.60.50.20: Destination host unreachable.
Reply from 170.60.50.20: Destination host unreachable.
Reply from 170.60.50.20: Destination host unreachable.
```

```
Ping statistics for 170.60.50.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

```
C:\Users\Lab>ping 170.60.50.100
```

```
Pinging 170.60.50.100 with 32 bytes of data:
Reply from 170.60.50.100: bytes=32 time=1ms TTL=128
Reply from 170.60.50.100: bytes=32 time<1ms TTL=128
Reply from 170.60.50.100: bytes=32 time<1ms TTL=128
Reply from 170.60.50.100: bytes=32 time<1ms TTL=128
```

```
Ping statistics for 170.60.50.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

```
C:\Users\Lab>ftp 170.60.50.100
```

```
Connected to 170.60.50.100.
220-Microsoft FTP Service
220 FTP Experiment Network Lab W12-116-HIII
User (170.60.50.100:(none)): anonymous
331 Anonymous access allowed, send identity (e-mail name) as password.
Password:
230-Welcom..to Networks Lab with Dr. Saad and Eng. Maha
230 Anonymous user logged in.
```

Using 'Dir' (directory) command to show the remote files in the server with more details than just listing, like time and date of the adding of each file as you can see:

```
ftp> dir
200 PORT command successful.
150 Opening ASCII mode data connection for /bin/ls.
01-27-22 01:03AM 0 1.txt
01-24-22 03:52AM 0 11.txt
01-24-22 03:39AM 0 alia.txt
01-24-22 03:42AM 0 demo.txt
04-03-95 11:50PM <DIR> dir
11-08-21 04:44AM 0 exp8.docx
01-24-22 03:43AM 0 f.txt
01-24-22 03:38AM 16 fhd.txt
01-24-22 03:42AM 3 hi.txt
01-24-22 03:40AM 4 Lab1.txt
01-24-22 03:43AM 0 labitest.txt
01-27-22 12:57AM <DIR> Mahra
01-27-22 01:01AM 5 Mahra.txt
01-27-22 01:29AM <DIR> Mayed
01-24-22 03:43AM <DIR> Midterm
01-24-22 03:39AM <DIR> MM
01-24-22 03:30AM <DIR> Nework
01-24-22 03:39AM 0 o.txt
01-24-22 01:22AM 3 TestFile.txt
01-24-22 01:16AM 12 U17101110.txt
01-01-18 03:20AM <DIR> xD
```

```
C:\ Command Prompt
```

```
01-24-22 01:16AM 12 U17101110.txt
01-01-18 03:20AM <DIR> xD
226 Transfer complete.
ftp: 1004 bytes received in 0.00Seconds 1004000.00Kbytes/sec.
```

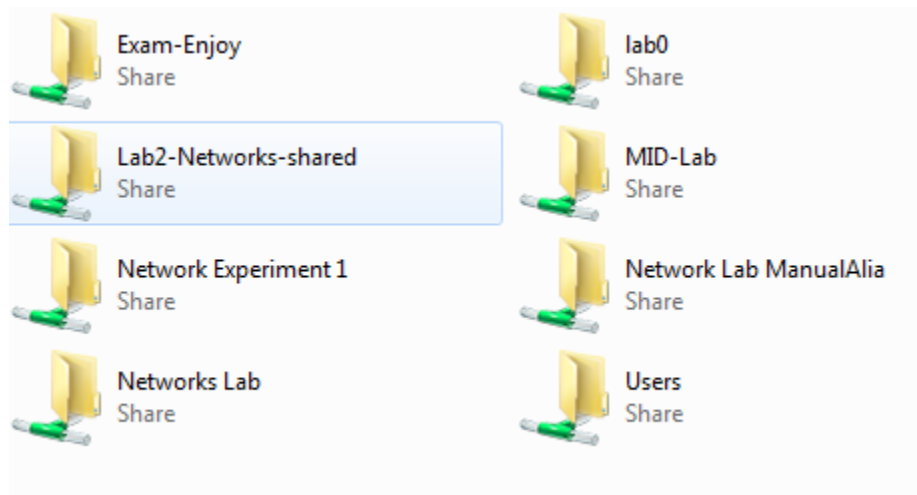
Using 'ls' (list) command in order to list all existing files in the server as you can see in the following screenshots:

```
ftp> ls
200 PORT command successful.
150 Opening ASCII mode data connection for file list.
1.txt
11.txt
Lab1.txt
MM
Mahra
Mahra.txt
Mayed
Midterm
Nework

C:\Users\Lab>ftp 170.60.50.100
Connected to 170.60.50.100.
220-Microsoft FTP Service
220 FTP Experiment Network Lab W12-116-HIII
User <170.60.50.100:(none)>: anonymous
331 Anonymous access allowed, send identity (e-mail name) as password.
Password:
230-Welcom..to Networks Lab with Dr. Saad and Eng. Maha
230 Anonymous user logged in.
ftp> ls
200 PORT command successful.
150 Opening ASCII mode data connection for file list.
1.txt
11.txt
Lab1.txt
MM
Mahra
Mahra.txt
Mayed
Midterm
Nework
TestFile.txt
U17101110.txt
alia.txt
demo.txt
dir
exp8.docx
f.txt
fhd.txt
hi.txt
lab1test.txt
o.txt
xD
226 Transfer complete.
ftp: 185 bytes received in 0.00Seconds 185000.00Kbytes/sec.
```

We use the command get and file name and type in order to open the file we need as following:

```
C:\ Command Prompt
01-24-22 01:16AM 12 U17101110.txt
01-01-18 03:20AM <DIR> xD
226 Transfer complete.
ftp: 1004 bytes received in 0.00Seconds 1004000.00Kbytes/sec.
ftp> get 11.txt
200 PORT command successful.
150 Opening ASCII mode data connection for 11.txt(0 bytes).
226 Transfer complete.
```



And in order to add a file we use 'Put' command followed by the file location and "\file. Type" in order to add the file, and then check with the 'Last' command as shown in the below figure:

```
ftp> put C:\Users\Lab\Desktop\Lab0\lab0.txt
200 PORT command successful.
150 Opening ASCII mode data connection for lab0.txt.
226 Transfer complete.
ftp> ? bytes sent in 0.19Seconds 0.04Kbytes/sec.
ftp> lst lab0.txt
Invalid command.
ftp> lst
Invalid command.
ftp> ls
200 PORT command successful.
150 Opening ASCII mode data connection for file list.
l.txt
li.txt
Lab1.txt
MM
Mahra
Mahra.txt
Mayed
Midterm
Nework
TestFile.txt
U17101110.txt
alia.txt
demo.txt
dir
exp8.docx
f.txt
fhd.txt
hi.txt
lab0.txt
lab1test.txt
o.txt
xD
226 Transfer complete.
ftp> 195 bytes received in 0.00Seconds 195000.00Kbytes/sec.
```

In order to make file into directory we will utilize the 'mudar' command followed by file name, then we will use 'cd' command to add the file and finally 'pad' command to show directory change as followed in the figure (cd command used to change the directory, 'pad' check the current directory and mudar to create a file in the current directory):

```
ftp> mkdir lab1
257 "lab1" directory created.
ftp> cd lab1
250 CWD command successful.
ftp> pwd
257 "/"lab1" is current directory.
ftp> ls
```

Here 'cd.' returns to normal directory and we check again using 'pwd' command as shown:

```
ftp> cd ..
250 CWD command successful.
ftp> pwd
257 "/" is current directory.
```

Finally, 'bin' and 'asc' commands change from the binary to ascii types as shown below, where ASCII is used for single text files while Binary is for sending other types like Tar and Compressed., after we can end the 'Ftp' connection using the 'quit' command:

```
ftp> bin
200 Type set to I.
ftp> asc
200 Type set to A.
ftp> quit
221
```

Conclusion:

We learned in this experiment about the different networks commonly used, main components in those networks and the type of cables used to connect the devices in such networks. Moreover, we learned about different commands that are used to check my network activity, for example ping command is used to detect whether a node (workstation) is alive, while tracer to check path of said package.