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(An autonomous Institute of Savitribai Phule Pune University)

Router Setup

Problem Statement: -

Configuration of a router to create a small network

Theory:

1. Switch:

A switch is a device that connects multiple devices within a local area network (LAN). It uses MAC addresses to forward data only to the intended recipient device, ensuring efficient and secure data transfer. Unlike a hub, which broadcasts data to all connected devices, a switch intelligently directs data to the correct destination, reducing network congestion and improving overall performance.

Applications:

- **Small Office Network:** A small office with 20 employees, each with their own computer. Additionally, the office has network printers, a network-attached storage (NAS) device, and a VoIP phone system.
- **Home Network with Smart Devices:** A modern home with multiple smart devices such as smart TVs, smart thermostats, security cameras, gaming consoles, computers, tablets, and smartphones, all requiring a stable and high-speed network connection.

Specifications:

- **Port count:** 8 to 48 Ports
- **Speed:** Gigabit Ethernet (10/100/1000 Mbps)
- **Layer:** 2/3-layer switch



2. Router:

A router is a device that forwards data packets between computer networks. It directs traffic on the internet, determining the best path for data to travel from the source to the destination. Routers connect different networks together, such as connecting a home network to the internet, and they often provide additional functions like network address translation (NAT) and dynamic host configuration protocol (DHCP).

Applications:

- **Home Network:** Connecting multiple devices such as computers, smartphones, tablets, and smart devices to the internet and each other.
- **Enterprise Network:** Managing and directing data traffic between different subnets and ensuring efficient communication between departments and branches.
-

Specifications:

- **Port count:** Typically 4 to 8 LAN ports, 1 to 2 WAN ports
- **Speed:** Gigabit Ethernet (10/100/1000 Mbps), with some models supporting 10 Gbps
- **Wireless Support:** Wi-Fi 5 (802.11ac) or Wi-Fi 6 (802.11ax)
- **Security Features:** Firewall, VPN support, WPA3 encryption



3. Gateway:

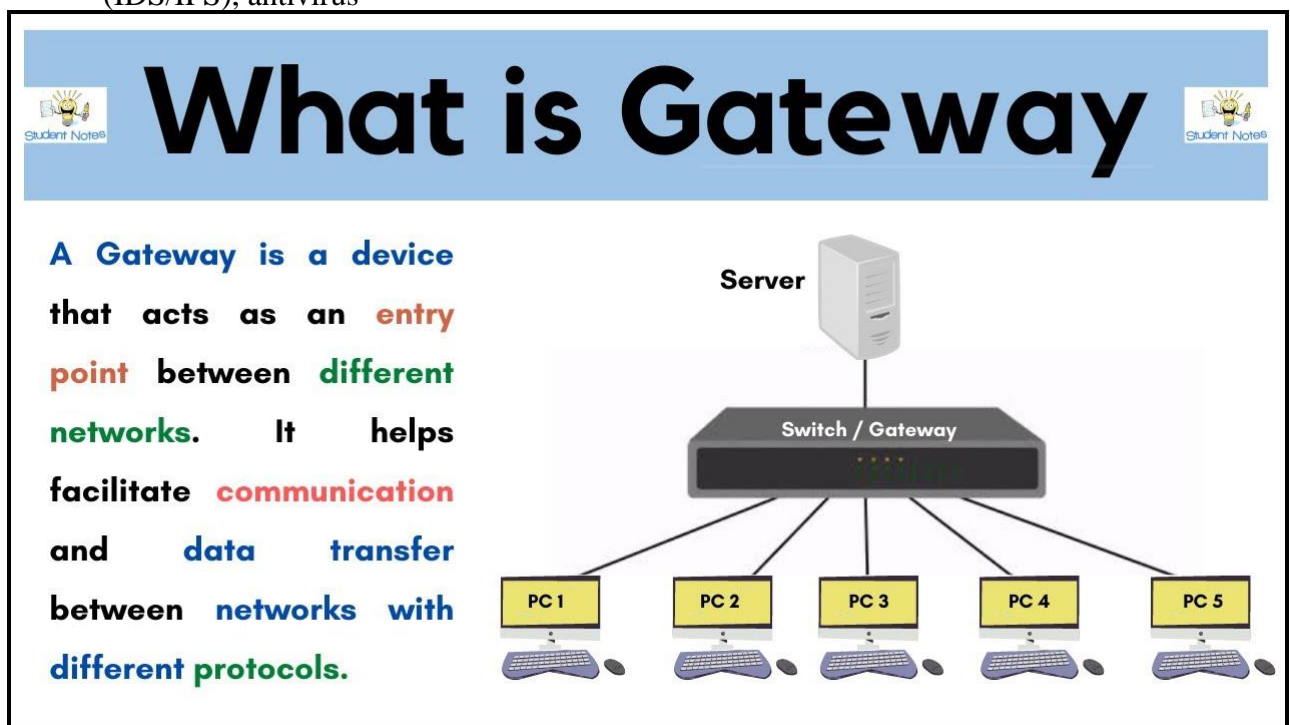
A gateway is a device that acts as a bridge between two different networks, often connecting your home network to the broader internet. In home networks, the router often functions as a gateway.

Applications:

- **Enterprise Network:** Connecting a corporate LAN to the internet, often incorporating security features like firewalls and intrusion detection systems.
- **IoT Network:** Connecting various Internet of Things (IoT) devices to the main network and enabling communication between different protocols used by IoT devices.

Specifications:

- **Port count:** Typically 4 to 8 LAN ports, 1 to 2 WAN ports
- **Speed:** Gigabit Ethernet (10/100/1000 Mbps)
- **Functions:** Protocol translation, firewall, VPN, DHCP server
- **Security Features:** Advanced firewall, intrusion detection/prevention system (IDS/IPS), antivirus



4. Hub:

A hub is a basic networking device that connects multiple Ethernet devices in a local area network (LAN). Unlike a switch, a hub broadcasts incoming data packets to all connected devices, regardless of the intended recipient. This can lead to network inefficiencies and collisions, making hubs less commonly used in modern networks compared to switches.

Applications:

- **Small Network:** Simple, small-scale networks where advanced features and high efficiency are not required.
- **Legacy Systems:** Older networks where cost is a primary concern and only basic

connectivity is needed.

Specifications:

- **Port count:** 4 to 24 Ports
- **Speed:** Fast Ethernet (10/100 Mbps), with some older models supporting only 10 Mbps
- **Type:** Passive or Active (with some models providing amplification of the signal)



Networking Commands

1. ping

Description: Tests connectivity between two networked devices by sending ICMP Echo Request packets and waiting for Echo Reply packets.

Use Cases:

- Checking if a specific host is reachable.
- Measuring round-trip time (latency).

Syntax:

ping [options] destination

Example:

ping google.com

```
C:\>ping 192.168.1.7

Pinging 192.168.1.7 with 32 bytes of data:
Reply from 192.168.1.224: Destination host unreachable.
Reply from 192.168.1.224: Destination host unreachable.
Reply from 192.168.1.224: Destination host unreachable.
Reply from 192.168.1.224: Destination host unreachable.

Ping statistics for 192.168.1.7:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

2. traceroute

Description: Traces the route packets take to a network host, showing each hop along the way.

Use Cases:

- Diagnosing routing issues.
- Determining the path taken to reach a destination.

Syntax:

traceroute [options] destination

Example:

traceroute google.com

```
root@office:~# traceroute lifewire.com
traceroute to lifewire.com (151.101.1.121), 30 hops max, 60 byte packets
 1  165.227.176.253 (165.227.176.253)  0.653 ms  0.644 ms  0.618 ms
 2  138.197.248.26 (138.197.248.26)  0.658 ms  0.648 ms  0.637 ms
 3  nyk-b3-link.telia.net (62.115.45.5)  1.104 ms  35.031 ms nyk-b3-link.telia.net (62.115.45.9)  1.041 ms
 4  nyk-bb4-link.telia.net (62.115.139.150)  2.116 ms  2.081 ms nyk-bb3-link.telia.net (62.115.140.222)  1.370 ms
 5  nyk-b5-link.telia.net (62.115.115.1)  1.694 ms nyk-b5-link.telia.net (80.91.254.14)  2.031 ms nyk-b5-link.telia.net (62.115.115.1)  1.630 ms
 6  * * *
 7  * * *
 8  * * *
 9  * * *
10  * * *
11  * * *
12  * * *
13  * * *
14  * * *
15  * * *
16  * * *
17  * * *
18  * * *
```

3. ifconfig

Description: Configures or displays network interface parameters for Unix/Linux systems.

Use Cases:

- Viewing or changing IP addresses.
- Checking network interface status.

Syntax:

ifconfig [interface] [options]

Example:

ifconfig eth0

```

C:\Users\Chris>ipconfig /all

Windows IP Configuration

Host Name . . . . . : Laptop
Primary Dns Suffix . . . . . :
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
DNS Suffix Search List. . . . . : telus

Wireless LAN adapter Wireless Network Connection:

Connection-specific DNS Suffix . : telus
Description . . . . . : Intel(R) Centrino(R) Wireless-N 2230
Physical Address. . . . . : 68-5D-43-66-0B-0C
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::799d:c5a7:c72:b925%11(Preferred)
IPv4 Address. . . . . : 192.168.1.66(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Lease Obtained. . . . . : June-01-14 12:41:11 PM
Lease Expires . . . . . : June-03-14 12:41:11 AM
Default Gateway . . . . . : 192.168.1.254
DHCP Server . . . . . : 192.168.1.254
DNS Servers . . . . . : 8.8.8.8
                        8.8.4.4
NetBIOS over Tcpip. . . . . : Enabled

```

4. ip

Description: Shows/manipulates routing, devices, policy routing, and tunnels.

Use Cases:

- Managing IP addresses.
- Configuring network interfaces.

Syntax:

ip [options] object { COMMAND | help }

Example:

ip addr show

```

tecmint@tecmint]$ ip -j -p link show eth2
{
  "ifindex": 15,
  "link_index": 16,
  "ifname": "eth2",
  "flags": [ "BROADCAST", "MULTICAST", "UP", "LOWER_UP" ],
  "mtu": 1500,
  "qdisc": "noqueue",
  "operstate": "UP",
  "linkmode": "DEFAULT",
  "group": "default",
  "link_type": "ether",
  "address": "02:42:ac:13:01:02",
  "broadcast": "ff:ff:ff:ff:ff:ff",
  "link_netnsid": 0
}
tecmint@tecmint:~$

```

5. netstat

Description: Displays network connections, routing tables, interface statistics, masquerade connections, and multicast memberships.

Use Cases:

- Monitoring network connections.
- Troubleshooting network issues.

Syntax:

netstat [options]

Example:

netstat -an

```
C:\>netstat -ano

Active Connections

Proto Local Address           Foreign Address         State       PID
TCP   0.0.0.0:135              0.0.0.0:0               LISTENING   680
TCP   0.0.0.0:445              0.0.0.0:0               LISTENING   4
TCP   0.0.0.0:3389             0.0.0.0:0               LISTENING   1128
TCP   0.0.0.0:49152            0.0.0.0:0               LISTENING   348
TCP   0.0.0.0:49153            0.0.0.0:0               LISTENING   772
TCP   0.0.0.0:49154            0.0.0.0:0               LISTENING   896
TCP   0.0.0.0:49155            0.0.0.0:0               LISTENING   432
TCP   0.0.0.0:49156            0.0.0.0:0               LISTENING   448
TCP   10.0.2.15:139            0.0.0.0:0               LISTENING   4
TCP   [::]:135                 [::]:0                  LISTENING   680
TCP   [::]:445                 [::]:0                  LISTENING   4
TCP   [::]:3389                [::]:0                  LISTENING   1128
TCP   [::]:49152               [::]:0                  LISTENING   348
TCP   [::]:49153               [::]:0                  LISTENING   772
TCP   [::]:49154               [::]:0                  LISTENING   896
TCP   [::]:49155               [::]:0                  LISTENING   432
TCP   [::]:49156               [::]:0                  LISTENING   448
UDP   0.0.0.0:5355             *:*
```

6. nslookup

Description: Queries Domain Name System (DNS) to obtain domain name or IP address mapping.

Use Cases:

- Checking DNS records.
- Troubleshooting DNS issues.

Syntax:

nslookup [options] [name | -] [server]

Example:

nslookup google.com

```
Microsoft Windows [Version 10.0.17134.472]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\support>nslookup wikipedia.org
Server: UnKnown
Address: 192.168.122.1

Non-authoritative answer:
Name:    wikipedia.org
Addresses: 2620:0:863:ed1a::1
          198.35.26.96
```

Domain Name

7. dig

Description: Queries DNS servers for information about host addresses, mail exchanges, nameservers, and related information.

Use Cases:

- Detailed DNS queries.
- Verifying DNS configurations.

Syntax:

dig [options] [name] [type]

Example:

dig google.com

```
; <<>> DiG 9.7.2-P2 <<>> example.com -t ns
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 51966
;; flags: qr rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;example.com.                IN      NS

;; ANSWER SECTION:
example.com.                 86400   IN      NS      a.iana-servers.net.
example.com.                 86400   IN      NS      b.iana-servers.net.

;; Query time: 421 msec
;; SERVER: 8.8.8.8#53(8.8.8.8)
;; WHEN: Fri Oct 22 20:25:51 2010
;; MSG SIZE  rcvd: 77
```

8. arp

Description: Displays and modifies the IP-to-Physical address translation tables used by the ARP protocol.

Use Cases:

- Viewing or managing ARP cache.
- Troubleshooting network issues related to ARP.

Syntax:

arp [options] [hostname]

Example:

arp -a

```
PS C:\Users\robst> arp -a

Interface: 192.168.1.246 --- 0x3
Internet Address      Physical Address      Type
192.168.1.1           bc-76-c5-1d-19-56     dynamic
192.168.1.245         f8-ac-65-86-fb-28     dynamic
224.0.0.22            01-00-5e-00-00-16     static
239.255.255.250       01-00-5e-7f-ff-fa     static
PS C:\Users\robst>
PS C:\Users\robst> arp -d 192.168.1.245
PS C:\Users\robst>
PS C:\Users\robst> arp -a
```


9. route

Description: Displays or modifies the IP routing table.

Use Cases:

- Managing static routes.
- Viewing the current routing table.

Syntax:

route [options] [command] [target]

Example:

route -n

```
Microsoft Windows [Version 10.0.14393]
(c) 2016 Microsoft Corporation. All rights reserved.

C:\Windows\system32>route add 192.168.35.0 MASK 255.255.255.0 192.168.0.2
OK!

C:\Windows\system32>_
```

10. curl

Description: Transfers data to or from a server, using supported protocols (HTTP, FTP, etc.).

Use Cases:

- Testing REST APIs.
- Downloading or uploading files.

Syntax:

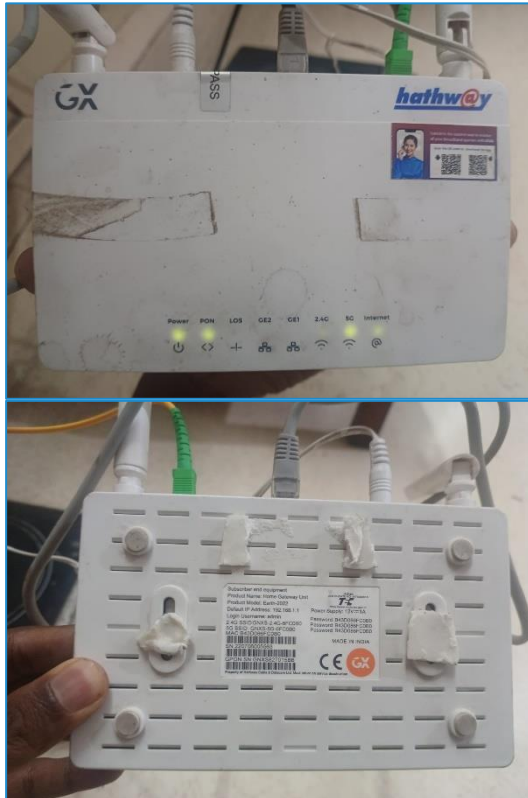
curl [options] [URL...]

Example:

curl https://www.google.com

```
D:\curl>curl --help
Usage: curl [options...] <url>
Options: <H> means HTTP/HTTPS only, <F> means FTP only
  --anyauth          Pick "any" authentication method <H>
 -a, --append        Append to target file when uploading <F/SFTP>
  --basic            Use HTTP Basic Authentication <H>
  --cacert FILE      CA certificate to verify peer against <SSL>
  --capath DIR       CA directory to verify peer against <SSL>
 -E, --cert CERT[:PASSWD] Client certificate file and password <SSL>
  --cert-type TYPE   Certificate file type <DER/PEM/ENG> <SSL>
  --ciphers LIST     SSL ciphers to use <SSL>
  --compressed       Request compressed response (using deflate or gzip)
 -K, --config FILE   Specify which config file to read
  --connect-timeout SECONDS Maximum time allowed for connection
 -C, --continue-at OFFSET Resumed transfer offset
 -b, --cookie STRING/FILE String or file to read cookies from <H>
 -c, --cookie-jar FILE Write cookies to this file after operation <H>
  --create-dirs      Create necessary local directory hierarchy
  --crlf             Convert LF to CRLF in upload
```

Home Gateway Unit:



Device information:

- Product Name: Home Gateway Unit
- Product Model: EG-2022
- Default IP Address: 192.168.1.1
- Login Username: admin
- 2.4G SSID: GNXS-2.4G-6FC0B0
- 5G SSID: GNXS-5G-6FC0B0
- MAC Address: B4:3D:08:6F:C0
- Power Supply: 12V, 1A
- Manufacturer: GX
- Country of Manufacture: India

Features:

- Dual-Band Wi-Fi: Provides both 2.4 GHz and 5 GHz wireless networks for better performance and range.
- Ethernet Ports: Multiple LAN ports for wired connections to devices such as computers, printers, and other network hardware.
- Management Interface: Web-based management interface accessible via the default IP address.
- Security Features: Basic security features including password-protected access to the management interface and Wi-Fi networks.



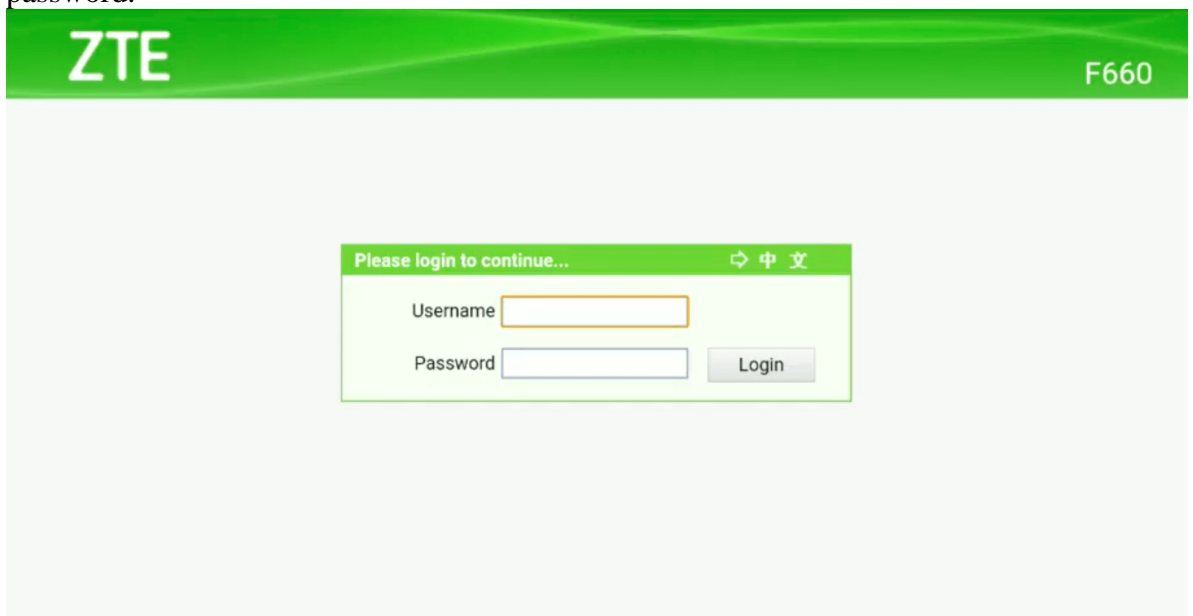
Device Information:

- Name: ZTE CORPORATION
- Product: GPON ONT
- Model: ZXHN F670L
- Power: 12V == 1A
- Date: SEP 2020
- 2.4G SSID: 3ZTE_2.4G_7eXuzp
- 5G SSID: 5ZTE_5G_7eXuzp
- MAC Address: 5C-3A-3D-A3-E8-5B
- Country of Manufacture: China

How to login to ZTE Router?

1. Open a browser and type **192.168.1.1** or **192.168.0.1** in the address bar.
2. Enter **admin** for Username and Password and click Login. If admin doesn't work, try **Web@0063** for

password.



3. You will be now logged into your ZTE Router interface.
The process is compatible with ZTE F609, F660, F680, F668, and other ZTE router models.

How to Change WiFi Network Name (SSID) on ZTE Routers?

1. Open a browser and type **192.168.1.1** or **192.168.0.1** in the address bar.
2. Login with the Username and Password you have set for your router.
3. Click **Network** from the left menu and then select **WLAN**.
4. Under the **WLAN** section, select **SSID Settings**.

ZTE F660

Path: Network-WLAN-SSID Settings [中文](#) [Logout](#)

- +Status
- Network
 - +WAN
 - WLAN
 - Basic
 - SSID Settings**
 - Security
 - Access Control List
 - Associated Devices
 - WMM
 - WiFi Restrictions
 - WPS
 - +LAN
 - +PON
 - +Routing(IPv4)
 - +Routing(IPv6)

Choose SSID: SSID1

Hide SSID: ☐

Enable SSID: ☐

Enable SSID Isolation: ☐

Maximum Clients: 32 (1 ~ 32)

SSID Name: SSID1 (1 ~ 32 characters)

Priority: 0

5. Choose SSID1 and enter the new WiFi name in the **SSID Name** field.
6. Click on **Submit** button to save the changes.

How to Change WiFi Password on ZTE Routers?

1. Open a browser and type **192.168.1.1** or **192.168.0.1** in the address bar.
2. Login with the Username and Password you have set for your router.
3. Click on **Network** from the left menu and then select **WLAN**.
4. Under the **WLAN** section, select **Security**.

ZTE F670L

Path: Network-WLAN Radio2.4G-Security [中文](#) [Logout](#)

- +Status
- Network
 - +WAN
 - +WLAN Common Setting
 - WLAN Radio2.4G
 - Basic
 - SSID Settings
 - Security**
 - Access Control List
 - Associated Devices
 - WMM
 - WPS
 - +WLAN Radio5G
 - +LAN
 - +PON
 - +Routing(IPv4)

Choose SSID: SSID1

Authentication Type: WPA/WPA2-PSK

WPA Passphrase: (8 ~ 63 characters)

WPA Encryption Algorithm: TKIP+AES

5. Choose SSID1 and select Authentication Type as **WPA/WPA2-PSK**.
6. Enter the new WiFi password in the **WPA Passphrase** field.
7. Click on the **Submit** button to save the changes.

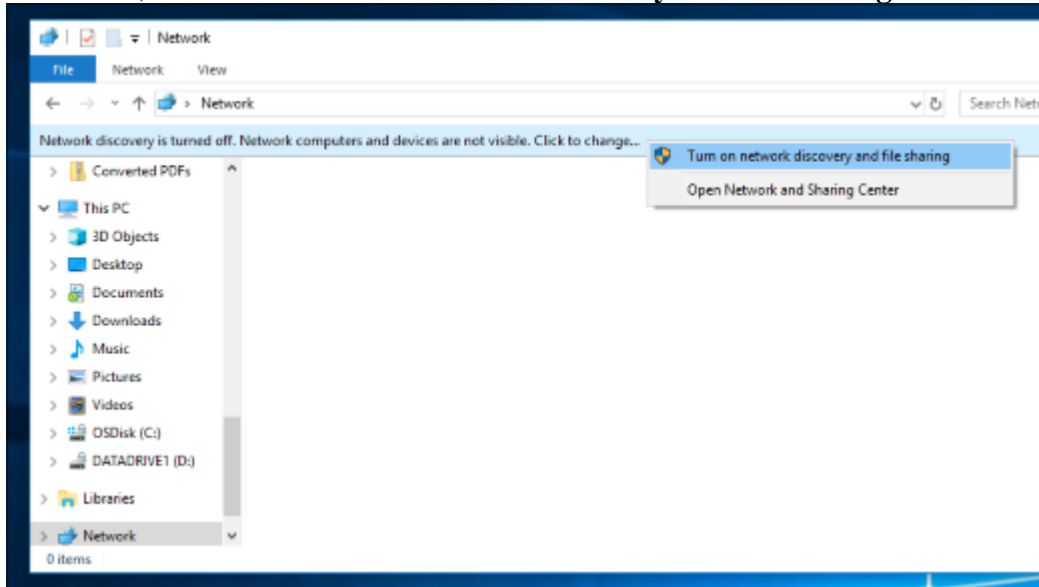
All Blog Posts

FILE SHARING USING WIFI

If you want to share files between Windows 10 laptop and Windows 11 PC, you can do it through **Windows Shared Directory**. But it requires that **both devices are on the same private network**.

1. Turn on network discovery

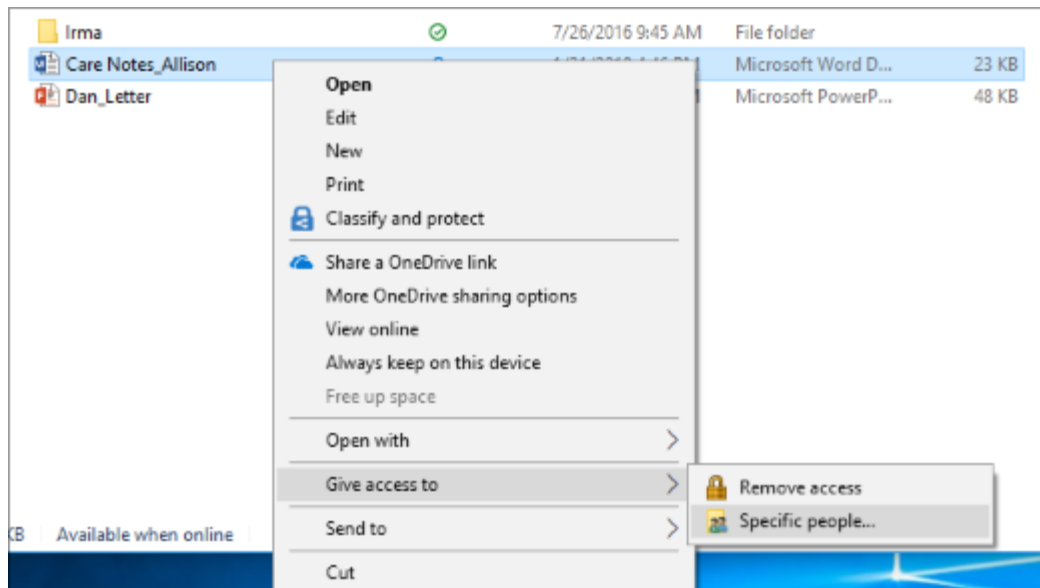
Go to **Network** in File Explorer, and see an error message ("**Network discovery is turned off....**"), you'll need to turn on network discovery to see devices on the network that are sharing files. To turn it on, select the **Network discovery is turned off** banner, then select **Turn on network discovery and file sharing**.



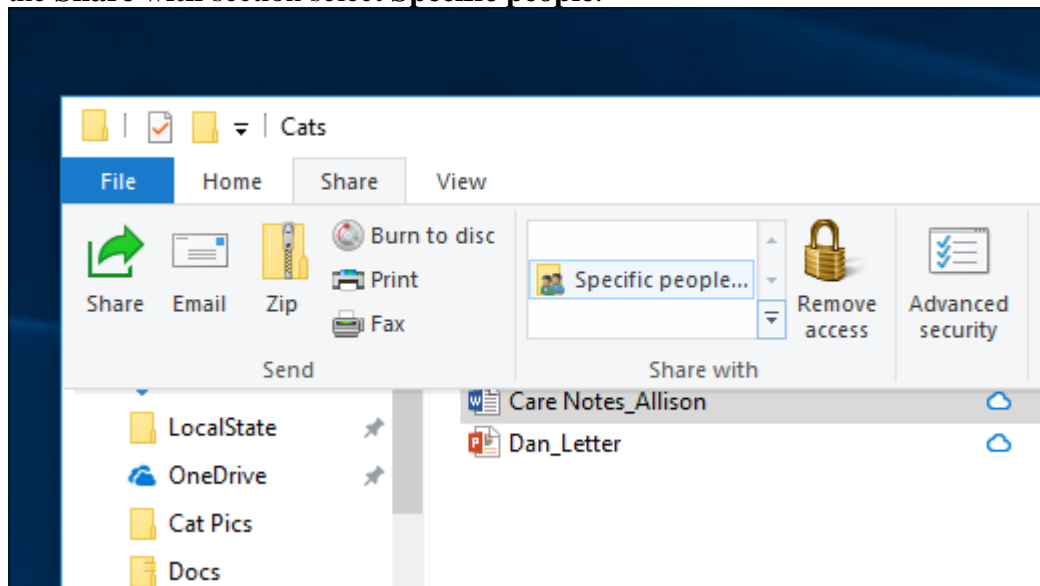
2. It should be noted that you need to **put both devices on the same network and set the network as a Private Network**, so that other devices in the same network are trustworthy and can be connected to both devices.
- **Private network.** Use this for networks you trust, such as a network at home or work. When a network is set to private, your PC is discoverable to other devices on the network, and you can use your PC for file and printer sharing.
 - **Public network.** Use this for networks you connect to when you're out and about, such as a Wi-Fi network at a coffee shop. Your PC will be hidden from other devices on the network, and you can't use your PC for file and printer sharing.

To change a Wi-Fi network to private

3. On the right side of the taskbar, select the **Wi-Fi network** icon.
 4. Under the name of the Wi-Fi network that you're connected to, select **Properties**.
 5. Under **Network profile**, select **Private**.
3. Share a file or folder in **File Explorer**:
1. Right-click or press a file, select **Give access to > Specific people**.



2. Select a file, select the **Share** tab at the top of File Explorer, and then in the **Share with** section select **Specific people**.



- Select a user on the network to share the file with, or select **Everyone** to give all network users access to the file.
- If you select multiple files at once, you can share them all in the same way. It works for folders, too—share a folder, and all files in it will be shared.

Configuration

Step 1: Connect both pc to router

Step 2: Allow Nearby Sharing: public folders sharing

Step 3: run this on windows run - ncpa.cpl

Step 4: Open ethernet setting by clicking right click ->opening properties and enabling IPv4.

How to configure wifi

Step 5: Connect the particular wifi

Step 6: open its admin website. <http://192.168.2.1>

Step 7: Login using Id & password

Id = admin

Password= 1234

Step 8: Go to setup page -> to Internet setup

Step 9: Select Static IP.

IP: 172.25.0.3.1

Sub 255.255.255.0

Default gateway 172.25.0.254

DNS Server 172.16.0.250

Alt DNS Server 8.8.8.8

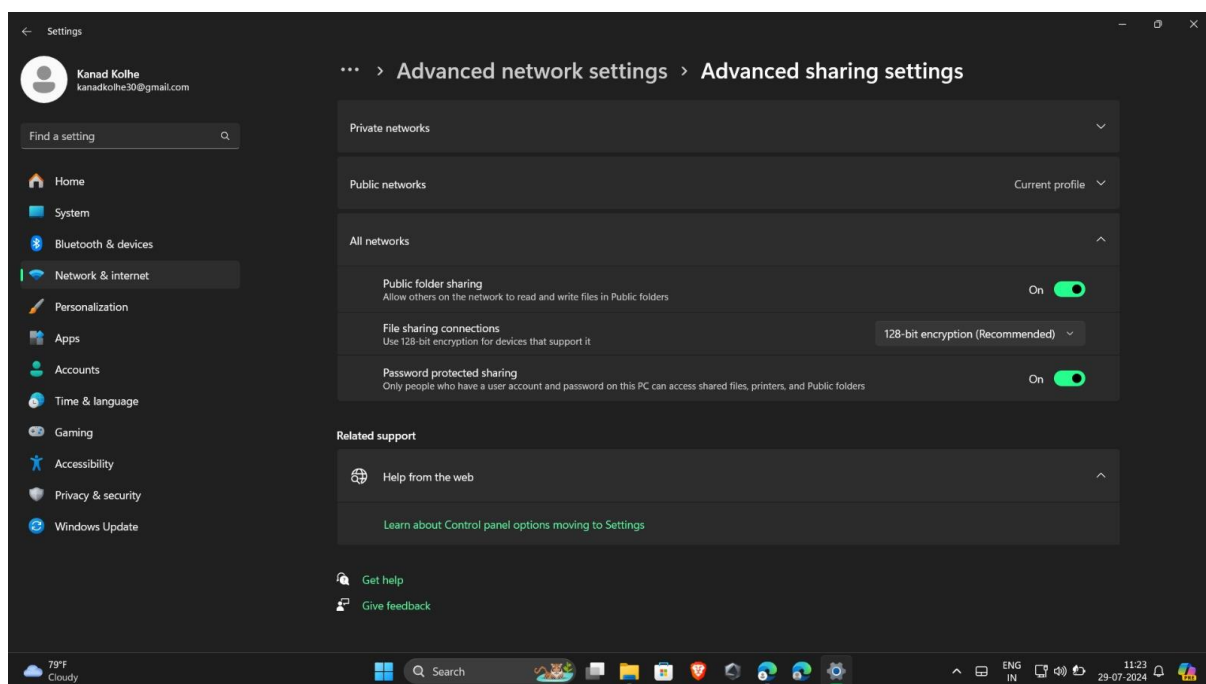
Step 11: Setup Local network -> Lan interface setup

Step 12: Enter the router ip

Step 13: Apply changes.

Step 14 : <http://172.16.0.250:8090>

Step 15: Login with college id.



ADVANCED NETWORK SETTINGS

Network notification

When this feature is turned on, your phone will notify you when an un-protected Wi-Fi network is available in the area. It will then give you the option to connect to the network.

Un-protected Wi-Fi networks require no password or other secret credentials to access. Unfortunately, this is also a security risk.

Connecting to any Wi-Fi network gives the owner of that network the potential to monitor your activity online. For security reasons it is a good idea to connect only to Wi-Fi networks operated by people you trust.

Blocked open networks

A feature only found on some devices, this allows you to maintain a list of open networks that you do not want to be notified about, and do not want to connect to. This feature probably does not make sense if you do not use the above Network notification option.

As stated in the previous section, connecting to Wi-Fi networks owned by people you do not trust is a security risk.

MAC address

This is a read-only field intended only to show you the MAC address of your device's Wi-Fi network adapter.

The purpose of a MAC address is to uniquely identify a network adapter using a code that is unique to that adapter. It can be used by some computer networks to implement access control allowing only certain network adapters to connect.

You would not normally be expected to need this address unless the administrator of a network needs it from you.

IP address

This is also a read-only field, only intended to show you the current IP address for your Wi-Fi connection. Unlike the MAC address, the IP address can change between different Wi-Fi connection sessions.

The IP address for your device is usually assigned by the network you have connected to.

Check for Internet service

If this device-specific option is enabled, every time your device connects to a Wi-Fi network it will check to ensure that the Wi-Fi network allows access to the Internet. If a connection to external servers on the Internet cannot be established, you will receive a notification message on your device informing you that the Wi-Fi network you have connected to does not currently have Internet access.

This feature can be useful in troubleshooting potential problems with the network you are connecting to via Wi-Fi. Specifically, it can be used to alert you when the Wi-Fi access point exists and is working, but its path out to the wider Internet is not available.

If you regularly connect to Wi-Fi networks that are not connected to the Internet, or may not always be connected to the Internet, this option may quickly become annoying.

You would not normally be expected to need this address unless you need it for a particular communication purpose.

The image consists of two screenshots of a computer screen, likely a Windows 10 desktop, showing a web browser with two different pages.

The top screenshot shows the web interface of a Digisol DG-HR1400 150Mbps Wireless Broadband Router. The browser address bar shows the URL `192.168.2.1/index.htm`. The page has a red header with the Digisol logo and the router model. The main content area is titled "LAN Interface Setup" and contains fields for "IP Address" (192.168.2.1) and "Subnet Mask" (255.255.255.0). Below these fields is a "DHCP Server Settings" section with a dropdown menu for "DHCP Mode" set to "DHCP Server", and fields for "IP Pool Range" (192.168.2.2 to 192.168.2.254), "Max Lease Time" (120 minutes), "Domain Name" (domain.name), "DNS Server 1" (192.168.2.1), "DNS Server 2", and "DNS Server 3". There are "Apply Changes" and "Undo" buttons at the bottom of the settings section. A sidebar on the left contains links like "Wizard", "Local Network", "Internet Setup", "IPv6", and "Mode Settings". A "Helpful Hints..." section is visible on the right.

The bottom screenshot shows a web browser with the URL `https://172.16.0.250:8090/httpclient.html`. The page displays a "Welcome to VIT Pune" message. In the center, there is a white box with a green checkmark and the text "You are signed in as 12210578". Below this, there is a green "Sign out" button and a link "Access the User Portal". At the bottom of the page, there is a warning message: "ACCESS WARNING Unauthorized use of Pirated / Illegal softwares is strictly prohibited. Any type of Hacking, Cracking and similar activities will attract to action u... is prohibited and will be seriously monitored Unauthorized access or violation of security resolutions is unlawful Appropriate disciplinary action will be taken aga...". A system tray overlay is visible on the right side of the screen, showing icons for Wi-Fi, Bluetooth, Battery saver, Night light, Mobile hotspot, and Airplane mode, along with a battery level indicator at 53%.