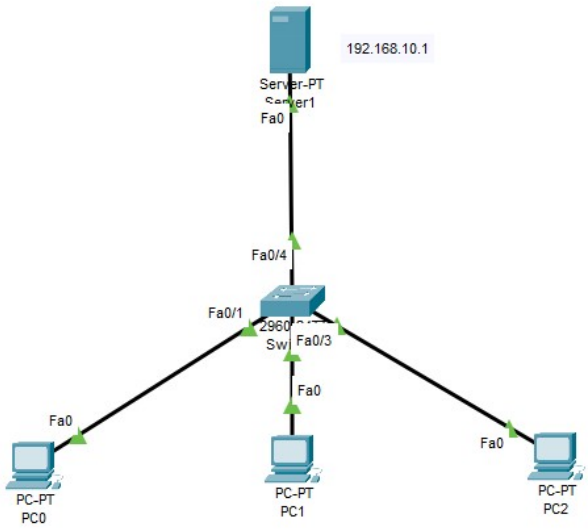
1. DHCP Configuration Using Server (No Router)

Aim: *To configure a DHCP server using a Server device and dynamically assign IP addresses to client PCs.*

What is DHCP? : Dynamic Host Configuration Protocol (DHCP) is a client–server protocol that automatically provides IP configuration details to network devices, such as: IP address, Subnet mask, Default gateway, and DNS server. Without DHCP, each device must be manually configured, which is time-consuming and error-prone.

Step 1: Place and Connect Devices

1. Open Cisco Packet Tracer. Place: 1 Switch, 1 Server and 2 PCs.
2. Connect:



Step 2: Assign Static IP to Server

(Required because server itself must have a fixed address)

1. Click Server
2. Go to Desktop → IP Configuration
3. Set:
    - IP Address: 192.168.10.1
    - Subnet Mask: 255.255.255.0
    - Default Gateway: *(leave blank)*

Step 3: Enable DHCP Service on Server

1. Click Server
2. Go to Services
3. Select DHCP
4. Turn DHCP → ON and Fill the fields as follows:

Field	Value
Pool Name	serverPool
Default Gateway	*(leave blank)*
DNS Server	8.8.8.8

Field	Value
Start IP Address	192.168.10.10
Subnet Mask	255.255.255.0
Maximum Users	20

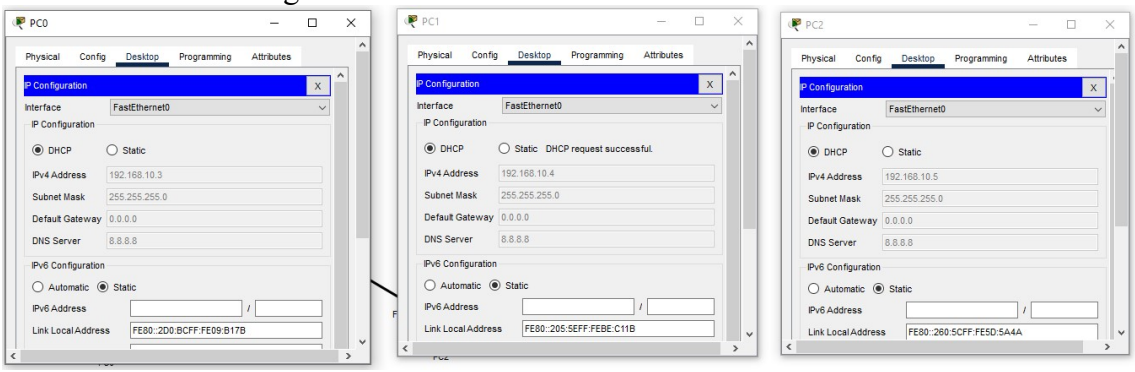
5. Save the configuration

Step 4: Configure PCs as DHCP Clients

For each PC:

1. Click PC → Desktop
2. Open IP Configuration
3. Select DHCP

DHCP server will assign IP address.



Step 5: Test Connectivity

From PC1: ping 192.168.10.3

Successful replies confirm DHCP is working.

2. Demonstration of APIPA (Automatic Private IP Addressing)

Aim: *To demonstrate Automatic Private IP Addressing (APIPA) when a host fails to obtain an IP address from a DHCP server.*

Theory (Brief)

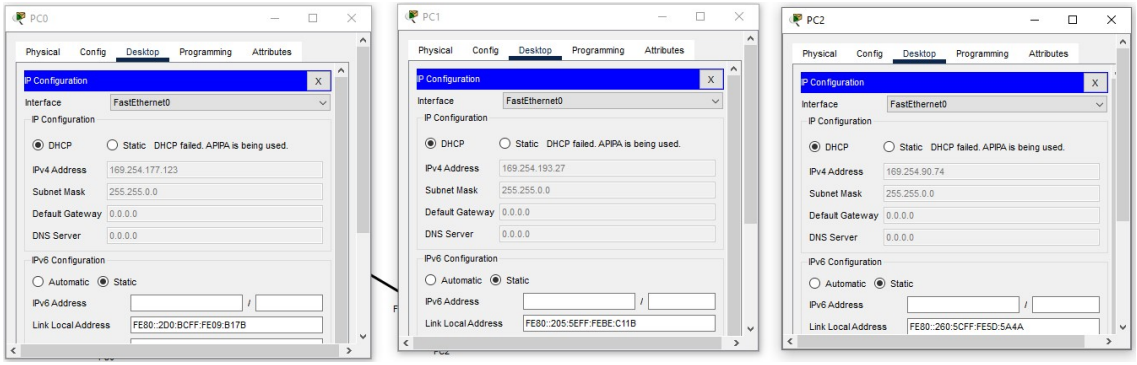
APIPA is a mechanism by which a host automatically assigns itself an IP address in the range: **169.254.0.0 – 169.254.255.255.** When a DHCP server is unavailable, APIPA allows limited local communication but does not support gateway or Internet access.

Step 1: In the above experiment, **turn off** the DHCP service on the server.

Step 2: For each PC:

1. Click PC → Desktop
2. Open IP Configuration
3. Select DHCP again

Observe APIPA Address Assignment



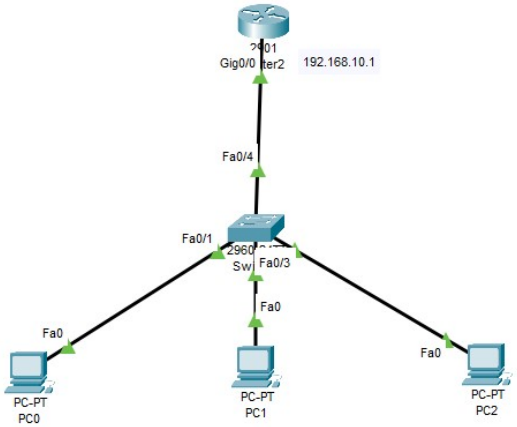
3. DHCP Configuration on a Cisco Router

Aim: *To configure a Cisco router as a DHCP server and dynamically assign IP to hosts.*

Why DHCP on a Router? : A Cisco router can function as: DHCP server, DHCP relay agent, and DHCP client. Using a router as a DHCP server is ideal for small to medium networks, as it eliminates the need for a dedicated DHCP server.

Configuration Steps

Create a topology as shown in the figure below.



Step 1: Configure Router Interface

```
Router> enable
Router# configure terminal
Router(config)# interface gigabitEthernet0/0
Router(config-if)# ip address 192.168.10.1 255.255.255.0
Router(config-if)# no shutdown
Router(config-if)# exit
```

Step 2: Exclude Static IP Addresses

```
Router(config)# ip dhcp excluded-address 192.168.10.1 192.168.10.10
```

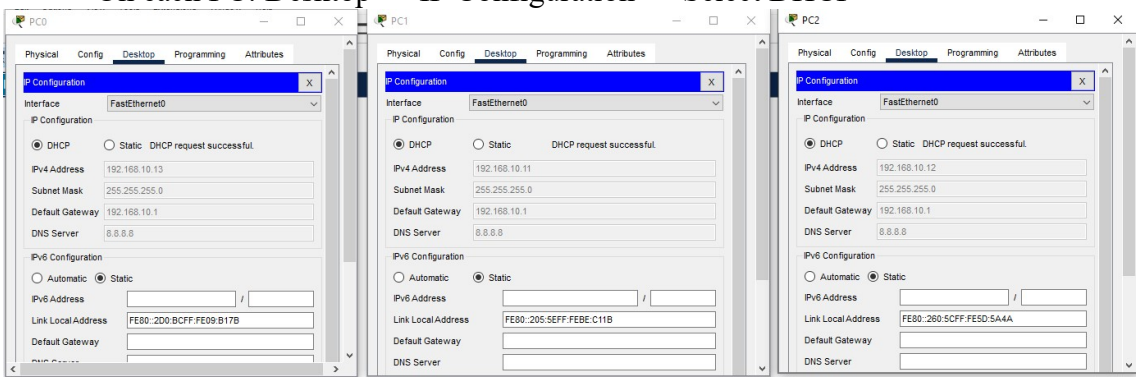
Step 3: Create DHCP Pool

```
Router(config)# ip dhcp pool LAN_POOL
Router(dhcp-config)# network 192.168.10.0 255.255.255.0
Router(dhcp-config)# default-router 192.168.10.1
Router(dhcp-config)# dns-server 8.8.8.8
```

Router(dhcp-config)# exit

Step 4: Configure PCs

On each PC: Desktop → IP Configuration → Select DHCP



Step 5: Verification

On Router

show ip dhcp binding

show ip dhcp pool

On PC

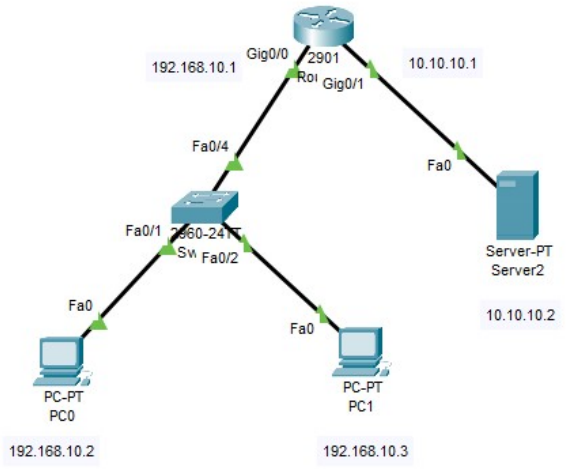
Ipconfig

4. Configuring a Client–Server Network and Analyzing FTP Packet Communication

Aim: *To configure a client–server network using FTP (File Transfer Protocol) and analyze the message communication (packets) exchanged between the client and server.*

What is FTP? : File Transfer Protocol (FTP) is an application-layer protocol used to: Upload files to a server, Download files from a server, and Manage files (list, delete, rename). FTP works over TCP, ensuring reliable data transfer.

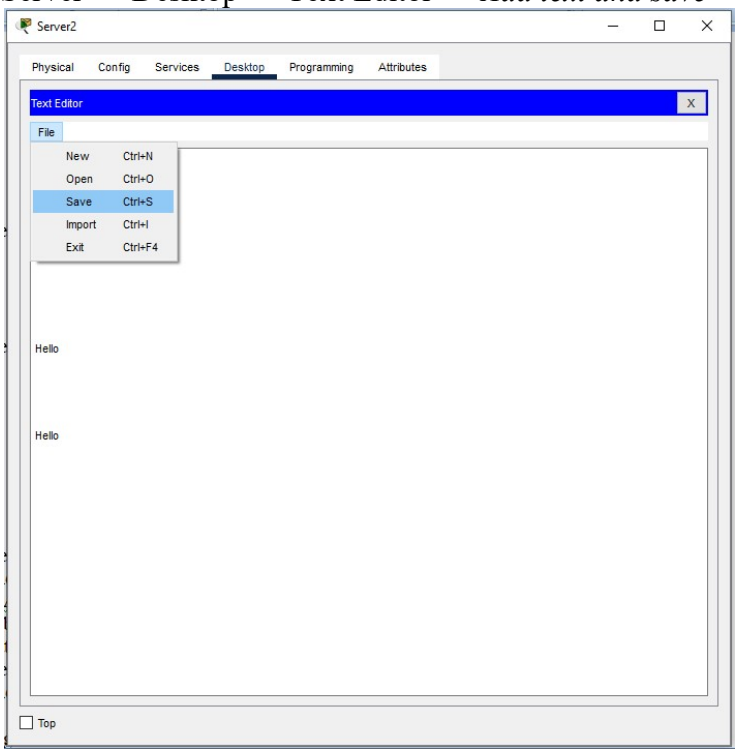
Network Topology (Packet Tracer)



Configuration Steps (Cisco Packet Tracer)

Step 1: Configure Client IP

- Client PC0 → Desktop → IP Configuration
  IP Address: 192.168.10.2
  Subnet Mask: 255.255.255.0
  Gateway : 192.168.10.1
- Client PC1 → Desktop → IP Configuration
  IP Address: 192.168.10.3
  Subnet Mask: 255.255.255.0
  Gateway : 192.168.10.1
- Add a sample file (e.g., test.txt)
  Server → Desktop → Text Editor → *Add text and save*



Step 2: Configure Server IP

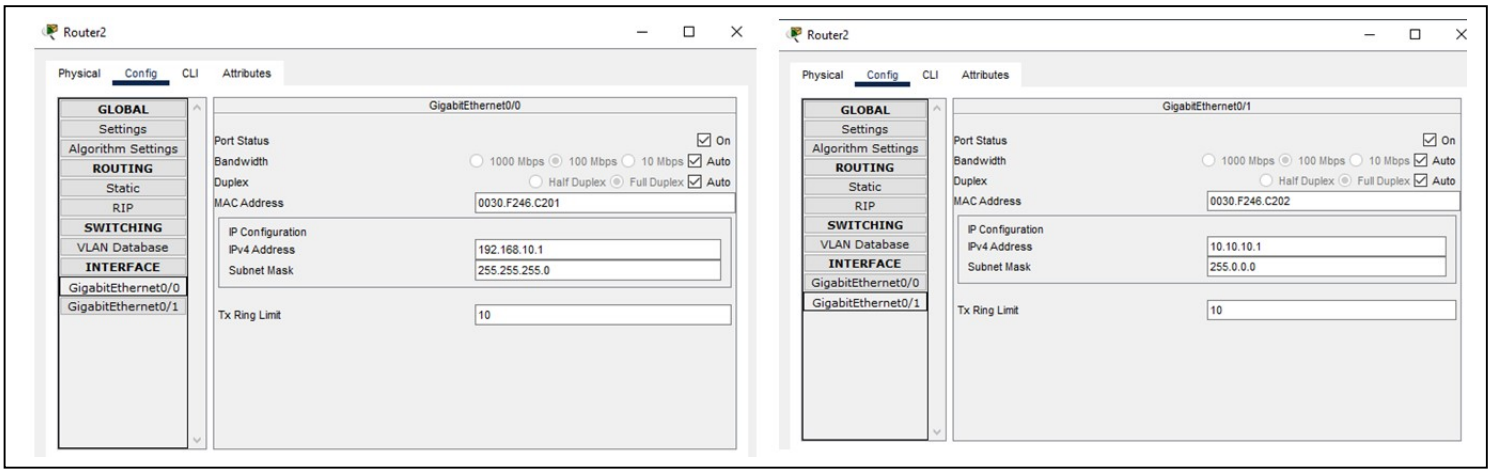
- Server → Desktop → IP Configuration
  IP Address: 10.10.10.2
  Subnet Mask: 255.0.0.0
  Gateway : 10.10.10.1

Step 3: Enable FTP Service on Server

- Server → Services → FTP
  Turn **FTP: ON**
- Create user:
  Username: S2C2
  Password: iter

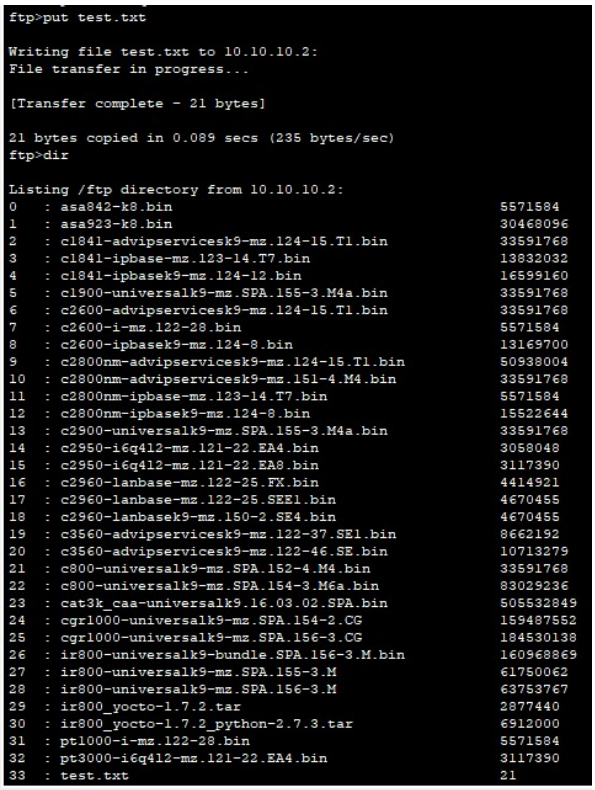
Step 4: Configure Router

Configure Router's interfaces as shown in the figure below.



Step 5: FTP Communication between Clients (PC0 to PC1)

- Client (PC0) → Desktop → Command Prompt
  C:> dir *# will list test.txt on PC0*
  ftp 10.10.10.2
  Login:
  Username: S2C2
  Password: iter
  FTP Commands:
  dir *# will not list test.txt on ftp server*
  put test.txt
  dir *# will list now test.txt on ftp server*



```
ftp>put test.txt

Writing file test.txt to 10.10.10.2:
File transfer in progress...

[Transfer complete - 21 bytes]

21 bytes copied in 0.089 secs (235 bytes/sec)
ftp>dir

Listing /ftp directory from 10.10.10.2:
0    : asa842-k8.bin                                5571584
1    : asa923-k8.bin                                30468096
2    : c1841-advipservicesk9-mz.124-15.T1.bin       33591768
3    : c1841-ipbase-mz.123-14.T7.bin                13832032
4    : c1841-ipbasek9-mz.124-12.bin                 16599160
5    : c1900-universalk9-mz.SPA.155-3.M4a.bin       33591768
6    : c2600-advipservicesk9-mz.124-15.T1.bin       33591768
7    : c2600-i-mz.122-28.bin                        5571584
8    : c2600-ipbasek9-mz.124-8.bin                  13169700
9    : c2800nm-advipservicesk9-mz.124-15.T1.bin     50938004
10   : c2800nm-advipservicesk9-mz.151-4.M4.bin      33591768
11   : c2800nm-ipbase-mz.123-14.T7.bin              5571584
12   : c2800nm-ipbasek9-mz.124-8.bin                15522644
13   : c2900-universalk9-mz.SPA.155-3.M4a.bin       33591768
14   : c2950-i6q412-mz.121-22.EA4.bin               3058048
15   : c2950-i6q412-mz.121-22.EA8.bin               3117390
16   : c2960-lanbase-mz.122-25.FX.bin               4414921
17   : c2960-lanbase-mz.122-25.SEE1.bin             4670455
18   : c2960-lanbasek9-mz.150-2.SE4.bin             4670455
19   : c3560-advipservicesk9-mz.122-37.SE1.bin      8662192
20   : c3560-advipservicesk9-mz.122-46.SE.bin       10713279
21   : c800-universalk9-mz.SPA.152-4.M4.bin         33591768
22   : c800-universalk9-mz.SPA.154-3.M6a.bin        83029236
23   : cat3k_caa-universalk9.16.03.02.SPA.bin       505532849
24   : cgr1000-universalk9-mz.SPA.154-2.CG          159487552
25   : cgr1000-universalk9-mz.SPA.156-3.CG          184530138
26   : ir800-universalk9-bundle.SPA.156-3.M.bin     160968869
27   : ir800-universalk9-mz.SPA.155-3.M             61750062
28   : ir800-universalk9-mz.SPA.156-3.M             63753767
29   : ir800_yocto-1.7.2.tar                        2877440
30   : ir800_yocto-1.7.2_python-2.7.3.tar           6912000
31   : pt1000-i-mz.122-28.bin                       5571584
32   : pt3000-i6q412-mz.121-22.EA4.bin              3117390
33   : test.txt                                     21
```

- Client (PC1) → Desktop → Command Prompt

  C:> dir *# will not list test.txt on PC1*

  ftp 10.10.10.2

  Login:

  Username: S2C2

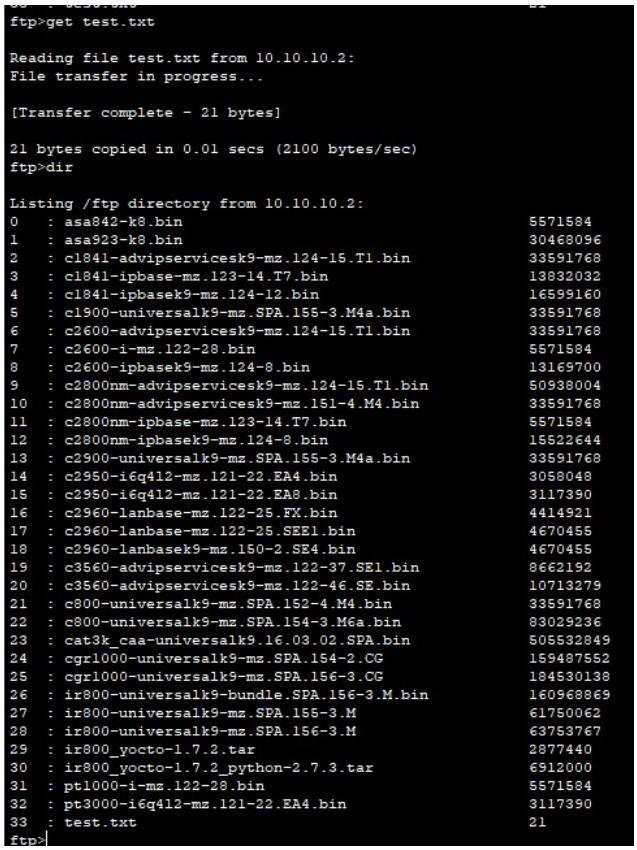
  Password: iter

  FTP Commands:

  get test.txt *# get file from server*

  quit

  C:> dir *# will now list test.txt on PC1*



```
ftp>get test.txt

Reading file test.txt from 10.10.10.2:
File transfer in progress...

[Transfer complete - 21 bytes]

21 bytes copied in 0.01 secs (2100 bytes/sec)
ftp>dir

Listing /ftp directory from 10.10.10.2:
0    : asa842-k8.bin                                5571584
1    : asa923-k8.bin                                30468096
2    : c1841-advipservicesk9-mz.124-15.T1.bin       33591768
3    : c1841-ipbase-mz.123-14.T7.bin                13832032
4    : c1841-ipbasek9-mz.124-12.bin                 16599160
5    : c1900-universalk9-mz.SPA.155-3.M4a.bin       33591768
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7    : c2600-i-mz.122-28.bin                        5571584
8    : c2600-ipbasek9-mz.124-8.bin                  13169700
9    : c2800nm-advipservicesk9-mz.124-15.T1.bin     50938004
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15   : c2950-i6q412-mz.121-22.EA8.bin               3117390
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17   : c2960-lanbase-mz.122-25.SEE1.bin             4670455
18   : c2960-lanbasek9-mz.150-2.SE4.bin             4670455
19   : c3560-advipservicesk9-mz.122-37.SE1.bin      8662192
20   : c3560-advipservicesk9-mz.122-46.SE.bin       10713279
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25   : cgr1000-universalk9-mz.SPA.156-3.CG          184530138
26   : ir800-universalk9-bundle.SPA.156-3.M.bin     160968869
27   : ir800-universalk9-mz.SPA.155-3.M             61750062
28   : ir800-universalk9-mz.SPA.156-3.M             63753767
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30   : ir800_yocto-1.7.2_python-2.7.3.tar           6912000
31   : pt1000-i-mz.122-28.bin                       5571584
32   : pt3000-i6q412-mz.121-22.EA4.bin              3117390
33   : test.txt                                     21
ftp>
```

- Client (PC0) → Desktop → Command Prompt

  delete test.txt

  dir *# will not list test.txt on ftp server*