

Aim ⇨ To configure the router for DHCP [Dynamic Host Configuration Protocol].

Objectives ⇨

- To create a small network with one router, one switch, and 4 PCs.
- To configure the router and assign the DHCP tool.
- To verify the connectivity and to get the IP address of all PCs from the router automatically.

Apparatus ⇨ Switch 2960, Router 2911, PC, connecting cables.

Theory ⇨

The Dynamic Host Configuration Protocol (DHCP) is a network management protocol used to automatically assign IP addresses and other network configuration parameters to devices on a network. This automation simplifies network administration by eliminating the need for manual IP address configuration for each device, reducing errors and saving time. DHCP operates on a client-server model where the DHCP server allocates IP addresses from a predefined pool, ensuring efficient utilization of available IP addresses.

In this experiment, the objective is to configure a DHCP server on a Cisco 2911 router within a small network consisting of one router, one switch, and four PCs. The configuration involves assigning an IP address to the router, enabling the DHCP service, and defining the address pool from which the router will allocate IP addresses to connected PCs.

Router Configuration Process:

1. **Accessing Configuration Mode:** Enter Router#config to access global configuration mode for setting up the router.
2. **Configuring Interface:** Use int gig0/0 to select the GigabitEthernet0/0 interface, then assign an IP address with ip add 192.168.1.1 255.255.255.0 and enable the interface using no shutdown. This establishes connectivity for the router.
3. **Verifying Configuration:** The command do vr is used to verify the current configuration and confirm that the interface is operational.
4. **Enabling DHCP Service:** Use service dhcp to enable the DHCP server on the router, allowing it to provide IP addresses to clients.
5. **Configuring DHCP Pool:** Enter ip dhcp pool <pool-name> to create a DHCP pool for allocating IP addresses. The pool must be named appropriately.

6. **Defining Network and Router:** Use network 192.168.1.0 255.255.255.0 to specify the network address for the DHCP pool and default-router 192.168.1.1 to set the default gateway for the clients.
7. **Setting DNS Server:** The command dns-server 192.168.1.2 specifies the DNS server IP address that the DHCP clients will use.
8. **Excluding Addresses:** Use excluded-address 192.168.1.1 to prevent the DHCP server from assigning specific addresses, ensuring they remain available for static assignment.
9. **Verifying DHCP Configuration:** Finally, use do show ip dhcp binding to verify that the DHCP server is allocating IP addresses to connected PCs.

By following these steps, the router is configured to automatically assign IP addresses to the PCs, simplifying network management and ensuring efficient utilization of IP resources. This experiment illustrates the essential role of DHCP in modern network environments, enhancing connectivity and operational efficiency.

Simulation ↗

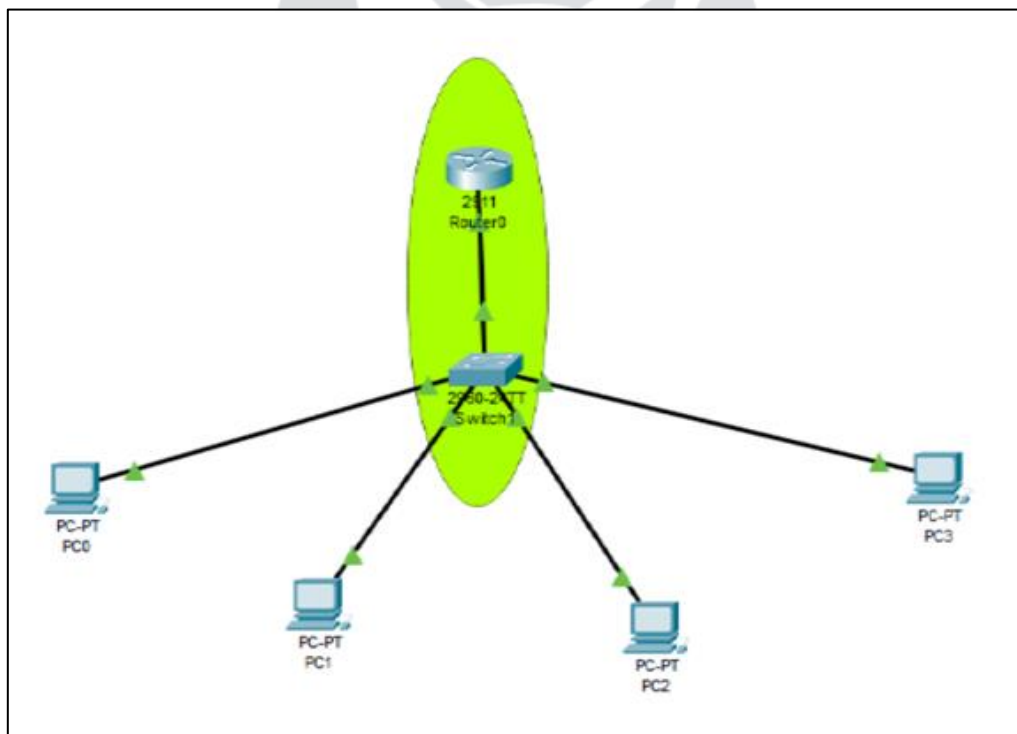


Fig. i) Router Configuration

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Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int gig0/0
Router(config-if)#ip add 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#do wr
Building configuration...
[OK]
Router(config)#service ?
  dhcp          Enable DHCP server and relay agent
  nagle         Enable Nagle's congestion control algorithm
  password-encryption Encrypt system passwords
  timestamps    Timestamp debug/log messages
Router(config)#service dhcp
Router(config)#
Router(config)#ip ?
  access-list   Named access-list
  cef           Cisco Express Forwarding
  default-gateway Specify default gateway (if not routing IP)
  default-network Flags networks as candidates for default routes
  dhcp          Configure DHCP server and relay parameters
  domain        IP DNS Resolver
  domain-lookup Enable IP Domain Name System hostname translation
  domain-name   Define the default domain name
  flow-export   Specify host/port to send flow statistics
  forward-protocol Controls forwarding of physical and directed IP broadcasts
  ftp           FTP configuration commands
  host          Add an entry to the ip hostname table
  local         Specify local options
  name-server   Specify address of name server to use
  nat           NAT configuration commands
  route         Establish static routes
  routing       Enable IP routing
  scp           Scp commands
  ssh           Configure ssh options
  tcp          Global TCP parameters

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Router(config)#ip dhcp ?
  excluded-address Prevent DHCP from assigning certain addresses
  pool              Configure DHCP address pools
  relay             DHCP relay agent parameters
Router(config)#ip dhcp pool ECENITD
Router(dhcp-config)#network ?
  A.B.C.D Network number in dotted-decimal notation
Router(dhcp-config)#network 192.168.1.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.1.1
Router(dhcp-config)#dns-server 192.168.1.1
Router(dhcp-config)#exit
Router(config)#do wr
Building configuration...
[OK]
Router(config)#

```

PC1

Interface	FastEthernet0
IP Configuration	
<input checked="" type="radio"/> DHCP	<input type="radio"/> Static
IPv4 Address	192.168.1.3
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.1
DNS Server	192.168.1.1

PC2

Interface	FastEthernet0
IP Configuration	
<input checked="" type="radio"/> DHCP	<input type="radio"/> Static
IPv4 Address	192.168.1.4
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.1
DNS Server	192.168.1.1

PC3

Interface	FastEthernet0
IP Configuration	
<input checked="" type="radio"/> DHCP	<input type="radio"/> Static
IPv4 Address	192.168.1.5
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.1
DNS Server	192.168.1.1

PC0

Interface	FastEthernet0
IP Configuration	
<input checked="" type="radio"/> DHCP	<input type="radio"/> Static
IPv4 Address	192.168.1.2
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.1
DNS Server	192.168.1.1

Fig. ii) Various Commands

Result ➡

- A network topology was successfully created using a Cisco 2911 router and a Cisco 2960 switch.
- The 2911 router was effectively configured as a DHCP server, enabling automatic IP address assignment to connected devices.
- Network connectivity was verified, confirming that all PCs successfully received their IP addresses from the router.

Conclusion ↔

This experiment demonstrated the configuration of a Cisco 2911 router for DHCP in Packet Tracer, providing practical experience in automatic IP address assignment, network communication, and effective network management.

Precautions ↔

- Use appropriate cables to connect the switch, router, and PCs to ensure reliable communication.
- Enter commands accurately to avoid configuration errors that may disrupt network functionality.
- Secure access with strong passwords and consider enabling encryption for enhanced security.
- Regularly save the running configuration to prevent loss of settings after a reboot.

