FACULTY OF INFORMATION TECHNOLOGY
DEPARTMENT OF NETWORKS AND INFORMATION SYSTEMS

CHAPTER 3 – PRACTICE 01

Basic Router Configuration

OBJECTIVES

- Understand:
  - ✓ The main modes of Router Cisco 2811
- Use basic commands on Router 2811:
  - ✓ To switch between these modes
  - ✓ To show information on the device
  - ✓ To configure device
- Execute some commands to configure:
  - ✓ Interface
  - ✓ Static and default route

CONTENTS

Router Cisco 2811 – Command Modes

Main modes of Router

User EXEC Mode:

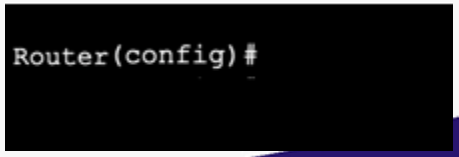
- Allows access to only a limited number of basic monitoring commands
- Identified by the CLI prompt that ends with the > symbol

Privileged EXEC Mode:

- Allows access to all commands and features
- Identified by the CLI prompt that ends with the # symbol

Global Configuration Mode:

- Used to access configuration options on the device



Router's Command Modes

Router Cisco 2811 – Common commands

Some common commands:

- *"?"* = help command
- *"enable"* command at the user EXEC mode to enter privileged EXEC mode

```
Router>
Router>?
Exec commands:
  <1-99>      Session number to resume
  connect     Open a terminal connection
  disable     Turn off privileged commands
  disconnect  Disconnect an existing network connection
  enable      Turn on privileged commands
  exit        Exit from the EXEC
  logout      Exit from the EXEC
  ping        Send echo messages
  resume      Resume an active network connection
  show        Show running system information
  ssh         Open a secure shell client connection
  telnet      Open a telnet connection
  terminal    Set terminal line parameters
  traceroute  Trace route to destination
Router>
Router>en
Router#
```

Router's Command Modes

Router Cisco 2811 – Common commands

Some common commands:

- *"?"* = help command (any where)
- *"conf t"* or *"configure"* or *"configure terminal"* command at the privileged EXEC mode to enter Global Configuration mode

Note:

When use "?":

- the list of commands available for each command (or command mode) will appear
- press "*SPACE*" to continue or "*Ctrl + Z*" to exit

```
Router>
Router>en
Router# ?
Exec commands:
  <1-99>      Session number to resume
  auto        Exec level Automation
  clear       Reset functions
  clock       Manage the system clock
  configure   Enter configuration mode
  connect     Open a terminal connection
  copy        Copy from one file to another
  debug       Debugging functions (see also 'undebug')
  delete      Delete a file
  dir         List files on a filesystem
  disable     Turn off privileged commands
  disconnect  Disconnect an existing network connection
  enable      Turn on privileged commands
  erase       Erase a filesystem
  exit        Exit from the EXEC
  logout      Exit from the EXEC
  mkdir       Create new directory
  more        Display the contents of a file
  no          Disable debugging informations
  ping        Send echo messages
  reload      Halt and perform a cold restart

Router# conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#
```

Router's Command Modes

Router Cisco 2811 – Common commands

Some common commands:

Use "*exit*" or "*end*" command or press "*Ctrl + Z*" to exit

- Global Configuration mode to come back privileged EXEC mode

Use "*exit*" or "*logout*" or "*disable*" command to exit

- privileged EXEC mode to come back user EXEC mode

```
Router(config)# ?
Configure commands:
  aaa                 Authentication, Authorization and Accounting.
  access-list         Add an access list entry
  banner              Define a login banner
  bba-group           Configure BBA Group
  boot                Modify system boot parameters
  cdp                 Global CDP configuration subcommands
  class-map           Configure Class Map
  clock               Configure time-of-day clock
  config-register     Define the configuration register
  crypto              Encryption module
  default             Set a command to its defaults
  dial-peer           Dial Map (Peer) configuration commands
  do                  To run exec commands in config mode
  dot11               IEEE 802.11 config commands
  enable              Modify enable password parameters
  end                 Exit from configure mode
  ephone              define ethernet phone
  ephone-dn           Configure ephone phone lines (Directory Numbers)
  exit                Exit from configure mode
  flow                Global Flow configuration subcommands
  hostname            Set system's network name

Router(config)# exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#
Router#exit
```

Show information on the Router

Router Cisco 2811 – Basic commands

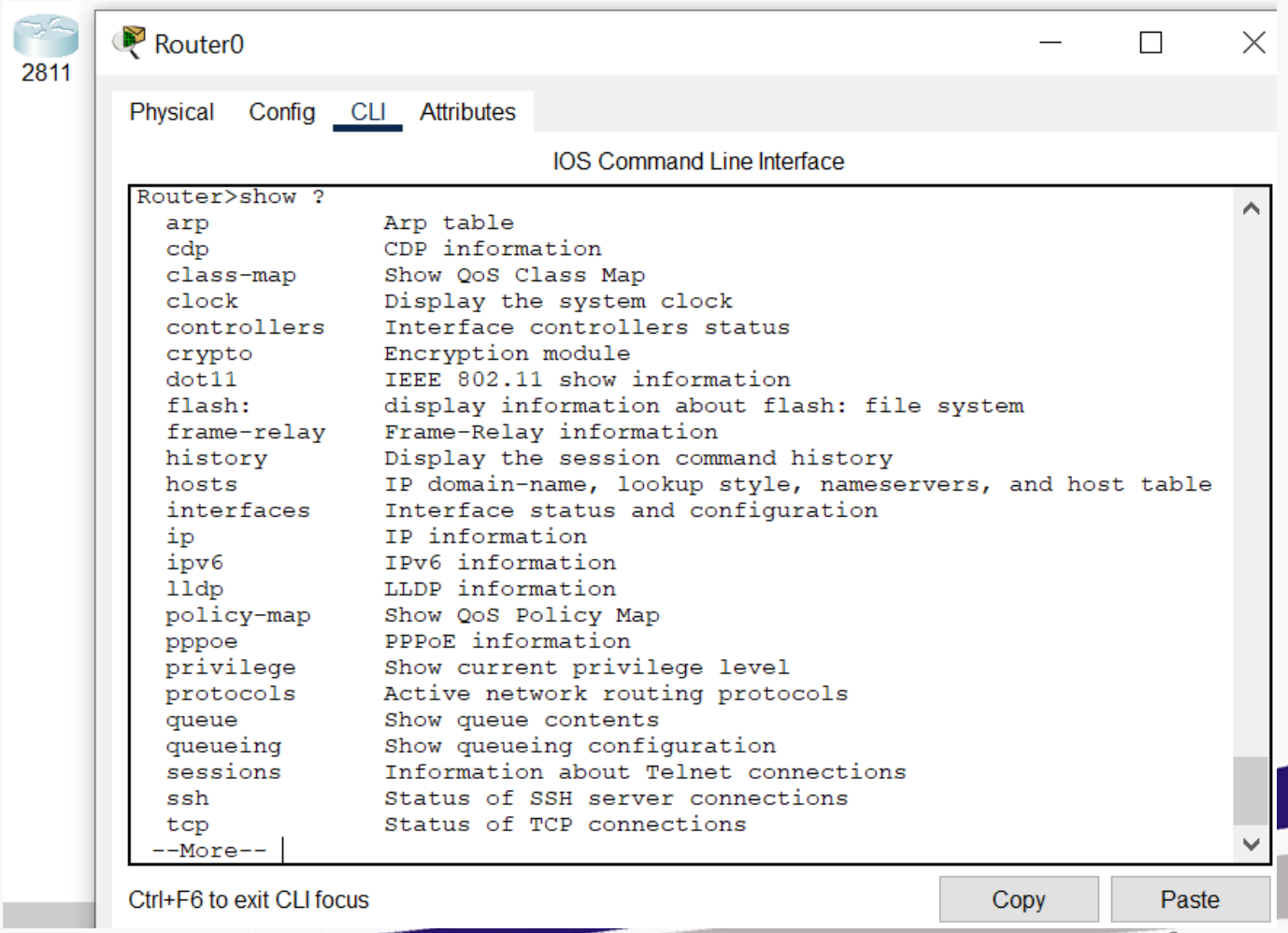
"Show" command to display running system information

In the User EXEC mode

- *show interfaces*: Interface status and configuration
- *show ip*: IP information
- *show ipv6*: IPv6 information
- *show protocols*: Active network routing protocols
- *show ip route*: IPv4 routing table
- *show ip cef*: Cisco Express Forwarding (v4)
- *show ipv6 route*: IPv6 routing table
- *show ipv6 cef*: Cisco Express Forwarding (v6)

In the Privileged EXEC Mode

- *show running-config*: Current operating configuration



Show information on the Router

Router Cisco 2811 – Basic commands

Some basic *"show"* commands:

"show int fa0/1"

- Display information about interface Fa0/1

"show int"

- Display information about all interfaces

```
Router>
Router>show interfaces fastEthernet 0/1
FastEthernet0/1 is administratively down, line protocol is down (disabled)
  Hardware is Lance, address is 0030.a3e1.5a02 (bia 0030.a3e1.5a02)
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Full-duplex, 100Mb/s, media type is RJ45
  ARP type: ARPA, ARP Timeout 04:00:00,
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 input packets with dribble condition detected
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out

Router>
```

Show information on the Router

Router Cisco 2811 – Basic commands

Some basic *"show"* commands:

"show ip"

- Display IP information

"show ipv6"

- Display IPv6 information

```
Router>
Router>show ip ?
  arp         IP ARP table
  bgp         BGP information
  dhcp        Show items in the DHCP database
  eigrp       IP-EIGRP show commands
  interface   IP interface status and configuration
  nbar        Network-Based Application Recognition
  ospf        OSPF information
  protocols   IP routing protocol process parameters and statistics
  rip         IP RIP show commands
  route       IP routing table
  ssh         Information on SSH
Router>
Router>show ipv6 ?
  access-list      Summary of access lists
  eigrp            EIGRP show commands
  general-prefix   IPv6 general prefixes
  inspect          CBAC (Context Based Access Control) information
  interface        IPv6 interface status and configuration
  nat              IPv6 NAT-PT information
  neighbors        Show IPv6 neighbor cache entries
  ospf             OSPF information
  protocols        IPv6 Routing Protocols
  rip              RIP routing protocol status
  route            Show IPv6 route table entries
  static           IPv6 static routes
Router>
```

Show information on the Router

Router Cisco 2811 – Basic commands

Some basic *"show"* commands:

"show protocols"

- Active network routing protocols

```
Router>
Router>show protocols
Global values:
  Internet Protocol routing is enabled
FastEthernet0/0 is administratively down, line protocol is down
FastEthernet0/1 is administratively down, line protocol is down
Vlan1 is administratively down, line protocol is down
Router>
```

Examples

The following is sample output from the **show protocols** command.

```
Router# show protocols
Global values:
  Internet Protocol routing is enabled
FastEthernet0/0 is up, line protocol is up
  Internet address is 10.4.9.14/24
vmi1 is down, line protocol is down
FastEthernet0/1 is up, line protocol is up
  Internet address is 10.4.8.14/24
ATM2/0 is administratively down, line protocol is down
ATM2/0.1 is administratively down, line protocol is down
ATM2/0.2 is administratively down, line protocol is down
ATM2/0.200 is administratively down, line protocol is down
Ethernet3/0 is administratively down, line protocol is down
Ethernet3/0.1 is administratively down, line protocol is down
Ethernet3/1 is administratively down, line protocol is down
Ethernet3/2 is administratively down, line protocol is down
Ethernet3/3 is administratively down, line protocol is down
ATM6/0 is administratively down, line protocol is down
SSLVPN-VIF0 is up, line protocol is up
  Interface is unnumbered. Using address of SSLVPN-VIF0 (0.0.0.0)
Virtual-Access1 is down, line protocol is down
Virtual-Template1 is down, line protocol is down
Virtual-Access2 is up, line protocol is up
Port-channel5 is down, line protocol is down
Port-channel5.1 is down, line protocol is down
Port-channel15 is down, line protocol is down
Virtual-Template100 is down, line protocol is down
  Interface is unnumbered. Using address of vmi1 (0.0.0.0)
Dialer3 is up, line protocol is up
```

Show information on the Router

Router Cisco 2811 – Basic commands

Some basic *"show"* commands:

"show ip route"
- IPv4 routing table

"show ip cef"
- Cisco Express Forwarding (v4)

```
Router#
Router#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set


Router#
Router#
Router#
Router#show ip cef
Prefix              Next Hop            Interface
0.0.0.0/0           drop                Null0 (default route handler entry)
0.0.0.0/8           drop
0.0.0.0/32          receive
127.0.0.0/8         drop
224.0.0.0/4         drop
224.0.0.0/24        receive
240.0.0.0/4         drop
255.255.255.255/32  receive
Router#
```

Show information on the Router

Router Cisco 2811 – Basic commands

Some basic *"show"* commands:

"show ipv6 route"

- IPv6 routing table

"*show ipv6 cef*"

- Cisco Express Forwarding (v6)
- Must enable IPv6 routing and IPv6 cef first, then run this command

```
Router#
Router#show ipv6 route
IPv6 Routing Table - 1 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
       U - Per-user Static route, M - MIPv6
       I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
       ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
       O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
       D - EIGRP, EX - EIGRP external
L   FF00::/8 [0/0]
     via Null0, receive
Router#
Router#
Router#show ipv6 cef
::/0
  no route
::/127
  discard
FE80::/10
  receive for Null0
FF00::/8
  Multicast
Router#
```

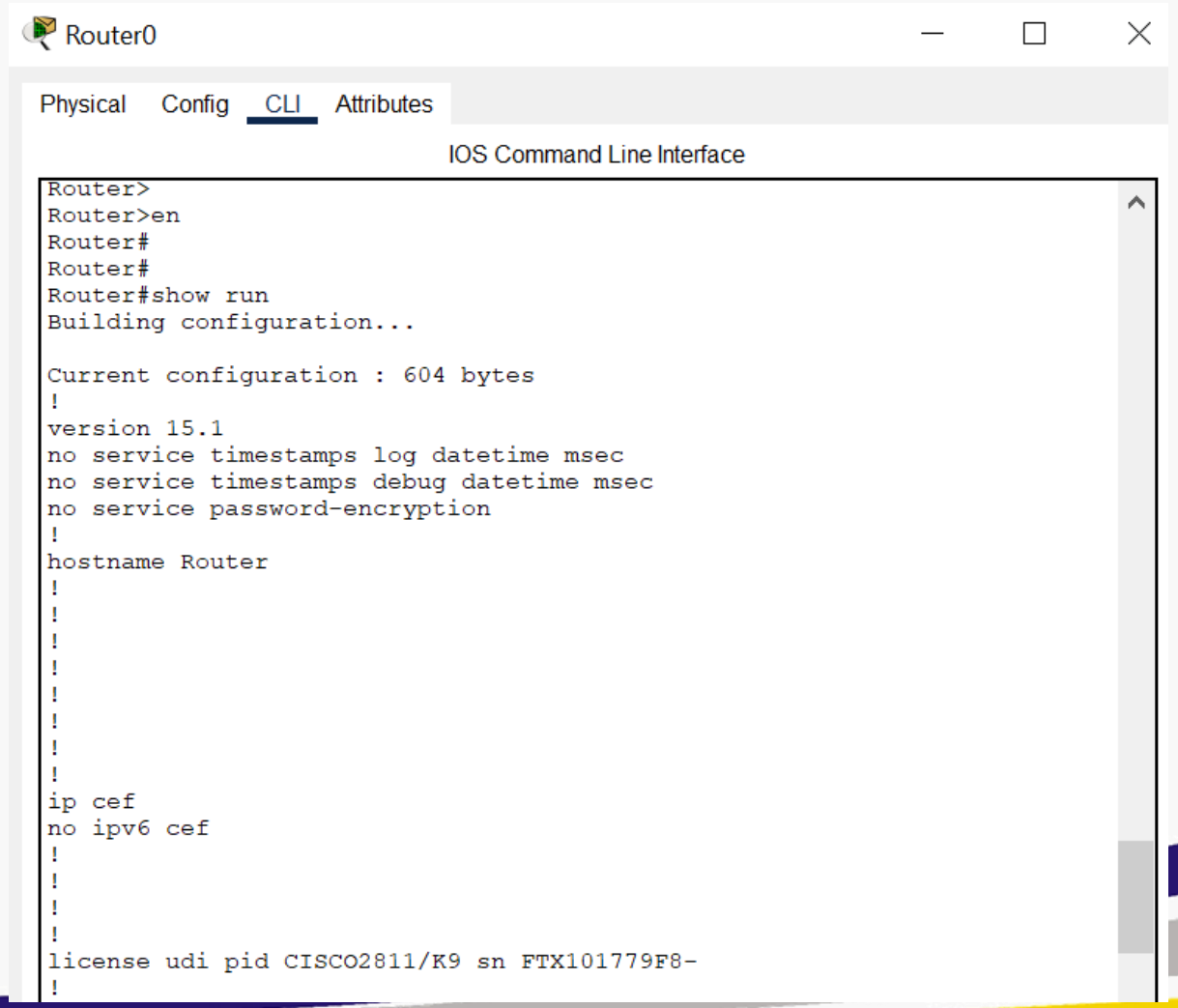
Show information on the Router

Router Cisco 2811 – Basic commands

Some basic *"show"* commands:

"show running-config"

- Display current operating configuration



Show information on the Router

Router Cisco 2811 – Basic commands

Some other basic commands:

In the Privileged EXEC Mode

- *"write memory"* : write running configuration to memory

In the any Configuration Mode

- *"no xyx"* : Negate a command (ex. xyz) or set its defaults

In the Interface Configuration Mode

- *"speed 100"* : Force "speed = 100 Mbps"
- *"duplex full"* : Force full duplex operation
- *"shutdown"* : Shutdown the selected interface
- *"no shutdown"* : Turn on the selected interface

```
Router(config)#
Router(config)#interface fa0/1
Router(config-if)#
Router(config-if)#description "To UTC-Router-A8"
Router(config-if)#
Router(config-if)#no description "To UTC-Router-A8"
Router(config-if)#
Router(config-if)#shutdown
Router(config-if)#
Router(config-if)#no shutdown
```

Basic Router Configuration

Router Cisco 2811 – Configure Global Parameters

Specify the name for the Router:

- A Cisco IOS router has a default name “Router”
- A device should be to give it a unique hostname

- To set new name for router, use the "*hostname*" global config command
- To return to the default name in the node, use the "*no hostname*“ command

```
Router>
Router>en
Router#
Router#
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname Router-UTC
Router-UTC(config)#
Router-UTC(config)#end
Router-UTC#
%SYS-5-CONFIG_I: Configured from console by console

Router-UTC#wr
Building configuration...
[OK]
Router-UTC#
Router-UTC#
Router-UTC#
```

Basic Router Configuration

Router Cisco 2811 – Configure Global Parameters

Configure Passwords to access privileged EXEC mode

Specifies an encrypted password to prevent unauthorized access to the Router

- First enter global configuration mode.
- Next, use the "*enable secret password*" command (ex, password = UTC@123)

```
Router-UTC#
Router-UTC#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router-UTC(config)#enable secret UTC@123
Router-UTC(config)#
Router-UTC(config)#end
Router-UTC#
%SYS-5-CONFIG_I: Configured from console by console

Router-UTC#
Router-UTC#wr
Building configuration...
[OK]
Router-UTC#
```

Router Cisco 2811 – Configure Global Parameters

Disable DNS lookup on Router

- Disables the Router from translating unfamiliar words (typos) into IP addresses
- Use the "*no ip domain-lookup*" command

```
Router>
Router>en
Router#
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#
Router(config)#no ip domain-lookup
Router(config)#
Router(config)#exit
Router#
```

Router Cisco 2811 – Configure Global Parameters

Enable "IPv6 routing" and "IPv6 cef" on Router

- The "*ipv6 unicast-routing*" command is used to enable the forwarding of IPv6 packets between interfaces on the Router.
- The "ipv6 cef" is used to activate IPv6 on network interfaces

```
Router#
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#
Router(config)#ipv6 unicast-routing
Router(config)#
Router(config)#ipv6 cef
Router(config)#
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#wr
Building configuration...
[OK]
Router#
```

Basic Router Configuration

Router Cisco 2811 – Configure Interfaces

Some commonly used commands on the interface

- Router#configure terminal
- Router(config)#inter FastEthernet *interface_number*
- Router(config-if)#speed 100
- Router(config-if)#duplex full
- Router(config-if)#ip address *IPv4_Address Subnet_Mask*
- Router(config-if)#ipv6 address *IPv6_Prefix*
- Router(config-if)#end
- Router#

```
Router(config)#
Router(config)#inter FastEthernet 0/0
Router(config-if)#
Router(config-if)#speed 100
Router(config-if)#
Router(config-if)#duplex full
Router(config-if)#
Router(config-if)#ip address 23.109.19.14 255.255.255.0
Router(config-if)#
Router(config-if)#ipv6 address 20ab:8a1f::6/64
Router(config-if)#
Router(config-if)#end
Router#
```

Note

- If speed and duplex parameters are set on a Router interface, set the same ones for the Switch's port connected to the Router

Basic Router Configuration

Router Cisco 2811 – Static and Default Route

Configure a static route for IPv4, IPv6

- Router(config)#ip route *Destination_prefix Destination_prefix_mask Next-hop_address*
- Router(config)#ipv6 route *IPv6_prefix IPv6_address_of_next-hop*

Configure default gateway for IPv4, IPv6

- Router(config)#ip route 0.0.0.0 0.0.0.0 *IP_address_of_default_gateway*
- Router(config)#ipv6 route ::/0 *IPv6_address_of_default_gateway*

```
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#
Router(config)#ip route  123.98.45.0  255.255.255.0  67.89.31.24
Router(config)#
Router(config)#ipv6 route  2001:CEDF::/64  20EE:4312::2468
Router(config)#
Router(config)#ip route  0.0.0.0  0.0.0.0  11.22.33.44
Router(config)#
Router(config)#ipv6 route ::/0  3000:FEDC::6789
Router(config)#
Router(config)#end
Router#
```

Questions and Answers