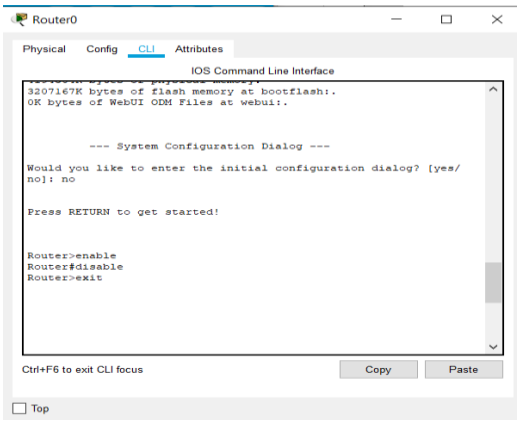
CMPE – 206 LAB REPORT

LAB 2.1 - Router Basics I

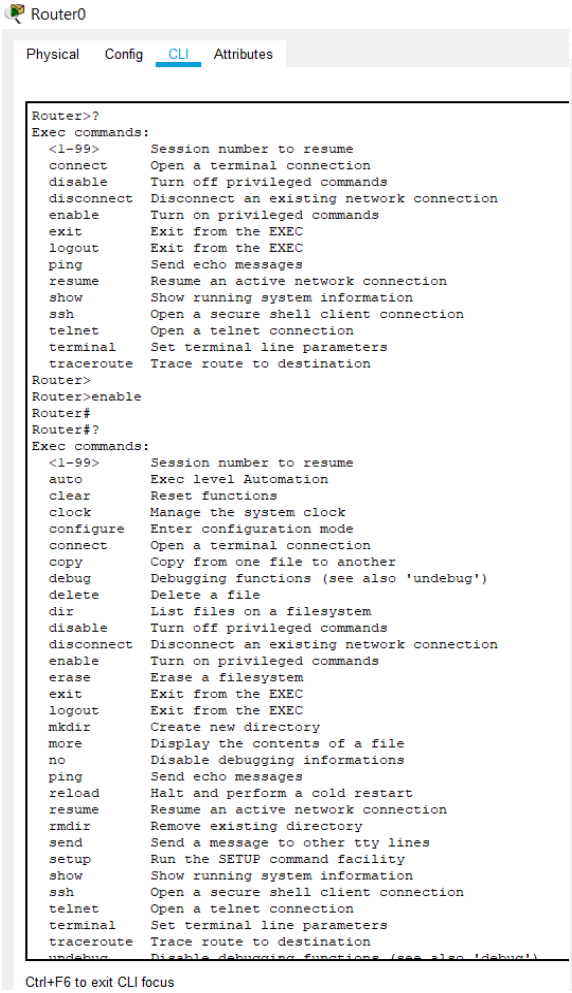
TASK 1 : Connect to a Router

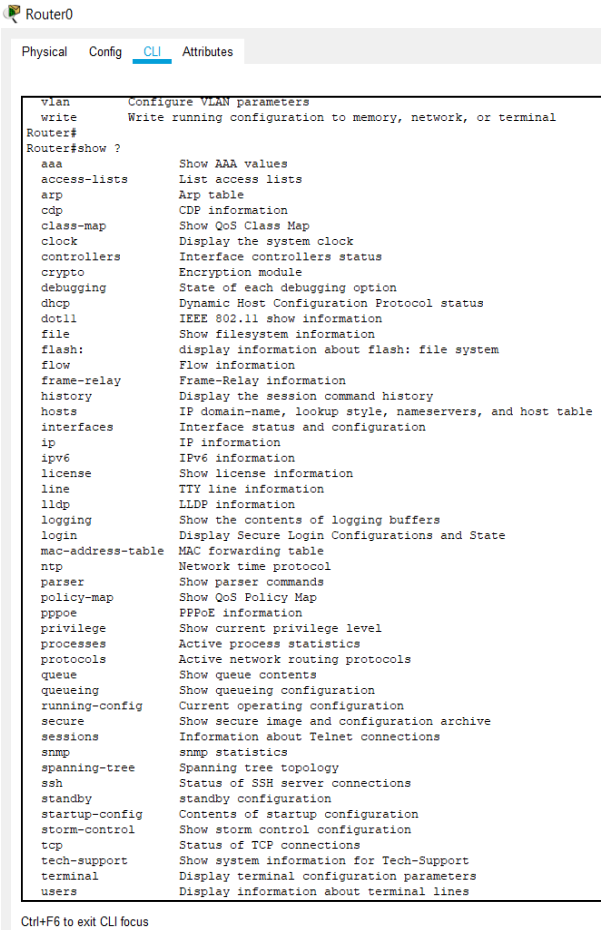
2. Router mode : USER EXEC mode

Name : Router



Task 2: Learn the Basic User Interface





Router0

Physical Config CLI Attributes

```
Router#
Router#show run?
running-config
Router#show run
Router#show running-config
Building configuration...

Current configuration : 648 bytes
!
version 16.6.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Router
!
!
!
!
!
!
!
!
ip cef
no ipv6 cef
!
!
!
!
!
!
!
!
!
!
!
spanning-tree mode pvst
!
!
!
!
!
!
interface GigabitEthernet0/0/0
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface GigabitEthernet0/0/1
 no ip address
```

Ctrl+F6 to exit CLI focus

Router0

Physical Config CLI Attributes

```
!
ip flow-export version 9
!
!
!
!
!
!
!
!
line con 0
!
line aux 0
!
line vty 0 4
 login
!
!
!
end

Router#logout



Router con0 is now available


Press RETURN to get started.
```

Task 3: Configure Basic Security

- 2. Configure terminal command is used to access global config mode.

Router0

Physical Config CLI Attributes

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname Router1
Router1(config)#enable password CMPE-206-5
Router1(config)#enable secret cisco
Router1(config)#end
Router1#
%SYS-5-CONFIG_I: Configured from console by console

Router1#logout



Router1 con0 is now available


Press RETURN to get started.


Router1>en
Password:
Password:
Router1#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router1(config)#line console 0
Router1(config-line)#password cisco
Router1(config-line)#login
Router1(config-line)#password cisco
Router1(config-line)#end
```

Ctrl+F6 to exit CLI focus

Router0

Physical Config CLI Attributes

```
Router1>en
Password:
Password:
Router1#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router1(config)#line console 0
Router1(config-line)#password cisco
Router1(config-line)#login
Router1(config-line)#password cisco
Router1(config-line)#end
Router1#
%SYS-5-CONFIG_I: Configured from console by console

Router1#exit



Router1 con0 is now available


Press RETURN to get started.


User Access Verification

Password:

Router1>en
Password:
Router1#
```

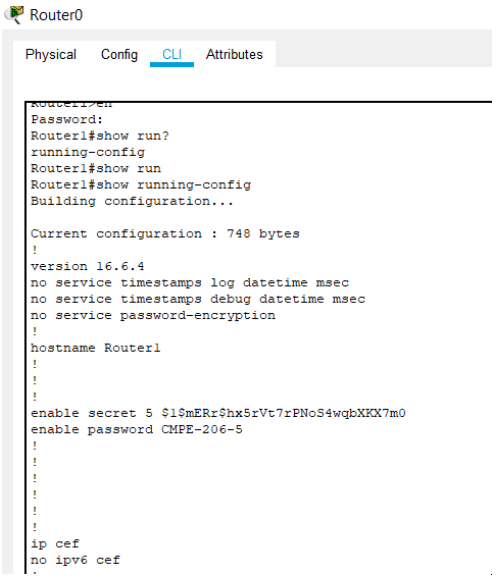
Ctrl+F6 to exit CLI focus

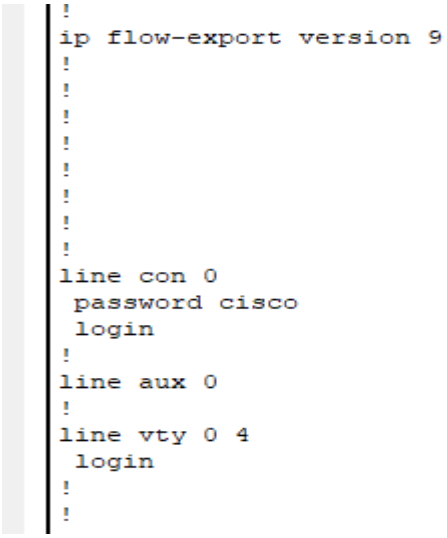
LAB 2.2 - Router Basics II

Task 1: Perform Initial Router Configuration on Router1

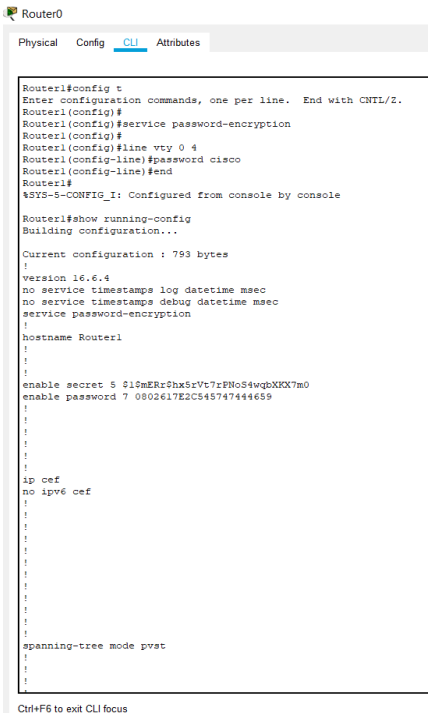
NOTE : Until step 5 the Router1 is configured in LAB2.1 Task 3.

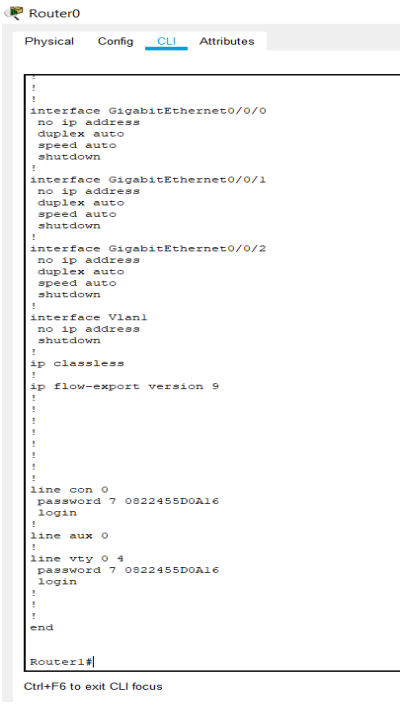
- Password stored before encryption





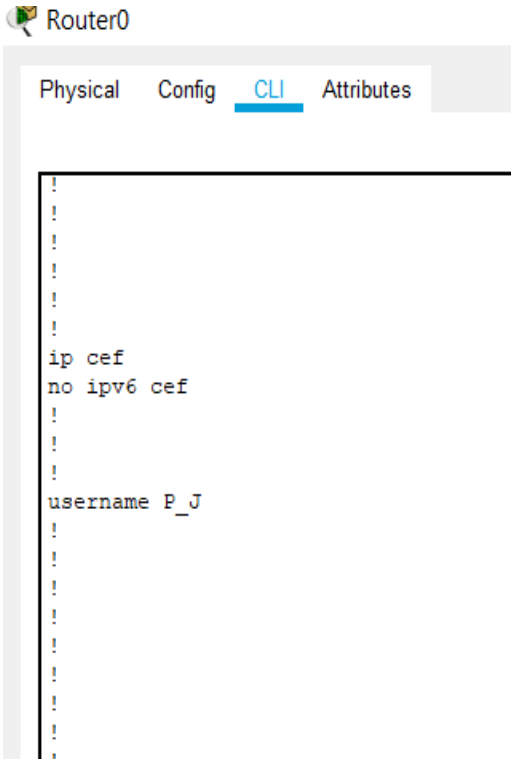
- After encryption and with remote access line configured





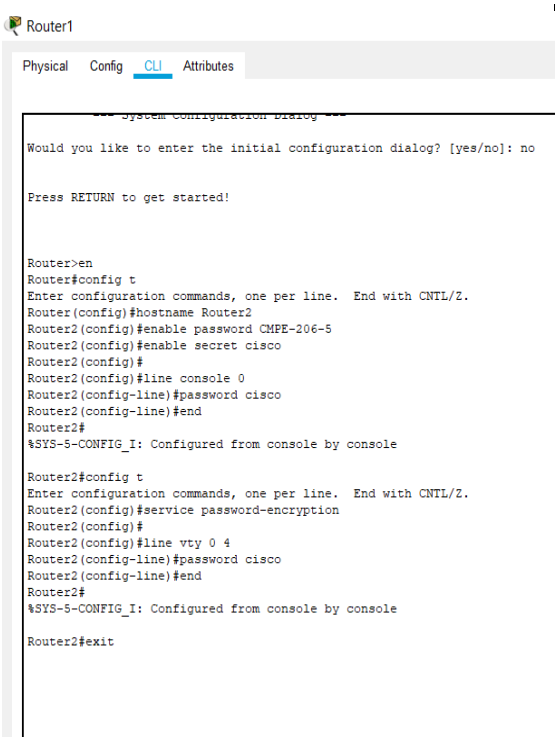
Task 2: Configure Banner Messages on Router1

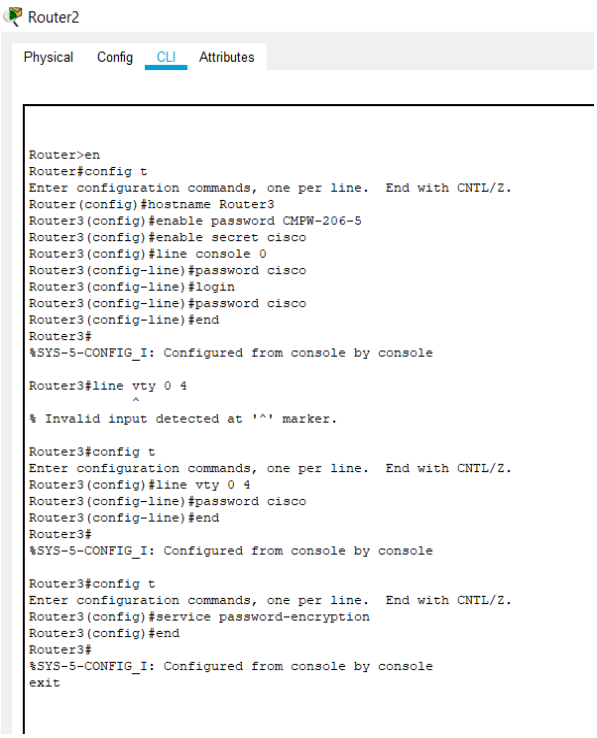
- MOTD and login banner set with username



Task 3: Perform Initial Router Configuration on Router2 and Router3

- Router2 and Router3 configured





- 2. Yes enable secret password is required to login
- 4. Displayed as plain Text(not encrypted)
- 6. i) remote access lines support 5 concurrent sessions(0-4)
  ii) Passwords are encrypted using MD5- based cipher by default

Task 4: Configure Banner Messages on Router2 and Router3

Lab 2.3 - Router Basics III

Task 1: Learn the Basic Show Commands

Router0

Physical Config CLI Attributes

```
Router1>en
Password:
Router1#show ?
  aaa                 Show AAA values
  access-lists        List access lists
  arp                 Arp table
  cdp                 CDP information
  class-map           Show QoS Class Map
  clock               Display the system clock
  controllers         Interface controllers status
  crypto              Encryption module
  debugging           State of each debugging option
  dhcp                Dynamic Host Configuration Protocol status
  dot11               IEEE 802.11 show information
  file                Show filesystem information
  flash:              display information about flash: file system
  flow                Flow information
  frame-relay         Frame-Relay information
  history             Display the session command history
  hosts               IP domain-name, lookup style, nameservers, and host table
  interfaces          Interface status and configuration
  ip                  IP information
  ipv6                IPv6 information
  license             Show license information
  line                TTY line information
  lldp                LLDP information
  logging             Show the contents of logging buffers
  login               Display Secure Login Configurations and State
  mac-address-table   MAC forwarding table
  ntp                 Network time protocol
  parser              Show parser commands
  policy-map          Show QoS Policy Map
  pppoe               PPPoE information
  privilege           Show current privilege level
  processes           Active process statistics
  protocols           Active network routing protocols
  queue               Show queue contents
  queueing            Show queueing configuration
  running-config      Current operating configuration
  secure              Show secure image and configuration archive
  sessions            Information about Telnet connections
  snmp                snmp statistics
  spanning-tree       Spanning tree topology
  ssh                 Status of SSH server connections
  standby             standby configuration
  startup-config      Contents of startup configuration
  storm-control       Show storm control configuration
  tcp                 Status of TCP connections
  tech-support        Show system information for Tech-Support
  terminal            Display terminal configuration parameters
  users               Display information about terminal lines
```

Ctrl+F6 to exit CLI focus

Router0

Physical Config CLI Attributes

```
version 16.6.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname Router1
!
!
!
enable secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
enable password 7 0802617E2C545747444659
!
!
!
!
!
!
ip cef
no ipv6 cef
!
!
!
username P_J
!
!
!
!
!
!
!
!
!
!
spanning-tree mode pvst
!
!
!
!
!
!
interface GigabitEthernet0/0/0
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface GigabitEthernet0/0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
```

Ctrl+F6 to exit CLI focus

Router0

Physical Config CLI Attributes

```
!
interface GigabitEthernet0/0/0
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface GigabitEthernet0/0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface GigabitEthernet0/0/2
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
ip classless
!
ip flow-export version 9
!
!
!
banner login ^CYou must be an autherized user to access this device^C
banner motd ^CCreate your own banner here^C
!
!
!
!
!
line con 0
 password 7 0822455D0A16
 login
!
line aux 0
!
line vty 0 4
 password 7 0822455D0A16
 login
!
!
!
end

Router1#
```

Ctrl+F6 to exit CLI focus

Router0

Physical Config CLI Attributes

```
Router1#show flash

System flash directory:
File  Length   Name/status
  3   486899872isr4300-universalk9.16.06.04.SPA.bin
  2   28282    sigdef-category.xml
  1   227537   sigdef-default.xml
[487155691 bytes used, 2761893909 available, 3249049600 total]
3.17338e+06K bytes of processor board System flash (Read/Write)


Router1#show history
  en
  show running-config
  show flash
  show history
Router1#
Router1#show terminal
Line 0, Location: , Type:
Length: 24 lines, Width: 80 columns
Baud rate (TX/RX) is 9600/9600, no parity, 1 stopbits, 8 databits
Status: PSI Enabled, Ready, Active, Automore On
Capabilities: none
Modem state: Ready
Modem hardware state: CTS* noDSR  DTR RTS
Special Chars: Escape  Hold  Stop  Start  Disconnect  Activation
                ^^x    none   -     -       none
Timeouts:      Idle EXEC    Idle Session   Modem Answer  Session   Dispatch
               00:10:00        never                        none     not set
                            Idle Session Disconnect Warning
                              never
                            Login-sequence User Response
                             00:00:30
                            Autoselect Initial Wait
                              not set
Modem type is unknown.
Session limit is not set.
Time since activation: 00:03:04
Editing is enabled.
History is enabled, history size is 10.
DNS resolution in show commands is enabled
Full user help is disabled
Allowed input transports are All.
Allowed output transports are pad telnet rlogin.
Preferred transport is telnet.
No output characters are padded
No special data dispatching characters
Router1#
Router1#terminal history size 100
Router1#show terminal
Line 0, Location: , Type:
```

Ctrl+F6 to exit CLI focus

Router0

Physical Config CLI Attributes

```
History is enabled, history size is 100.
DNS resolution in show commands is enabled
Full user help is disabled
Allowed input transports are All.
Allowed output transports are pad telnet rlogin.
Preferred transport is telnet.
No output characters are padded
No special data dispatching characters
Router1#
Router1#show protocols
Global values:
  Internet Protocol routing is enabled
GigabitEthernet0/0/0 is administratively down, line protocol is down
GigabitEthernet0/0/1 is administratively down, line protocol is down
GigabitEthernet0/0/2 is administratively down, line protocol is down
Vlan1 is administratively down, line protocol is down
Router1#
Router1#show version
Cisco IOS Software [Everest], ISR Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Versi
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2018 by Cisco Systems, Inc.
Compiled Sun 08-Jul-18 04:33 by mcpre

Cisco IOS-XE software, Copyright (c) 2005-2018 by cisco Systems, Inc.
All rights reserved.  Certain components of Cisco IOS-XE software are
licensed under the GNU General Public License ("GPL") Version 2.0.  The
software code licensed under GPL Version 2.0 is free software that comes
with ABSOLUTELY NO WARRANTY.  You can redistribute and/or modify such
GPL code under the terms of GPL Version 2.0.  For more details, see the
documentation or "License Notice" file accompanying the IOS-XE software,
or the applicable URL provided on the flyer accompanying the IOS-XE
software.


ROM: IOS-XE ROMMON

Router uptime is 6 hours, 18 minutes, 38 seconds
Uptime for this control processor is 6 hours, 18 minutes, 38 seconds
System returned to ROM by power-on
System image file is "bootflash:isr4300-universalk9.16.06.04.SPA.bin"
Last reload reason: PowerOn


This product contains cryptographic features and is subject to United
States and local country laws governing import, export, transfer and
use. Delivery of Cisco cryptographic products does not imply
third-party authority to import, export, distribute or use encryption.
Importers, exporters, distributors and users are responsible for
compliance with U.S. and local country laws. By using this product you
agree to comply with applicable laws and regulations. If you are unable
to comply with U.S. and local laws, return this product immediately.
```

Ctrl+F6 to exit CLI focus

Router0

Physical Config CLI Attributes

```
History is enabled, history size is 100.
DNS resolution in show commands is enabled
Full user help is disabled
Allowed input transports are All.
Allowed output transports are pad telnet rlogin.
Preferred transport is telnet.
No output characters are padded
No special data dispatching characters
Router1#
Router1#show protocols
Global values:
  Internet Protocol routing is enabled
GigabitEthernet0/0/0 is administratively down, line protocol is down
GigabitEthernet0/0/1 is administratively down, line protocol is down
GigabitEthernet0/0/2 is administratively down, line protocol is down
Vlan1 is administratively down, line protocol is down
Router1#
Router1#show version
Cisco IOS Software [Everest], ISR Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Versi
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2018 by Cisco Systems, Inc.
Compiled Sun 08-Jul-18 04:33 by mcpre

Cisco IOS-XE software, Copyright (c) 2005-2018 by cisco Systems, Inc.
All rights reserved.  Certain components of Cisco IOS-XE software are
licensed under the GNU General Public License ("GPL") Version 2.0.  The
software code licensed under GPL Version 2.0 is free software that comes
with ABSOLUTELY NO WARRANTY.  You can redistribute and/or modify such
GPL code under the terms of GPL Version 2.0.  For more details, see the
documentation or "License Notice" file accompanying the IOS-XE software,
or the applicable URL provided on the flyer accompanying the IOS-XE
software.


ROM: IOS-XE ROMMON

Router uptime is 6 hours, 18 minutes, 38 seconds
Uptime for this control processor is 6 hours, 18 minutes, 38 seconds
System returned to ROM by power-on
System image file is "bootflash:isr4300-universalk9.16.06.04.SPA.bin"
Last reload reason: PowerOn


This product contains cryptographic features and is subject to United
States and local country laws governing import, export, transfer and
use. Delivery of Cisco cryptographic products does not imply
third-party authority to import, export, distribute or use encryption.
Importers, exporters, distributors and users are responsible for
compliance with U.S. and local country laws. By using this product you
agree to comply with applicable laws and regulations. If you are unable
to comply with U.S. and local laws, return this product immediately.
```

Ctrl+F6 to exit CLI focus

Router0

Physical Config CLI Attributes

```
Router1#
Router1#clock set 05:11:45 14 Apr 2020
Router1#show clock
5:12:3.834 UTC Tue Apr 14 2020
Router1#
Router1#show interfaces
GigabitEthernet0/0/0 is administratively down, line protocol is down (disabled)
  Hardware is ISR4331-3x1GE, address is 0090.21ed.0c01 (bia 0090.21ed.0c01)
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive not supported
  Full Duplex, 1000Mbps, link type is auto,  media type is Auto Select
  output flow-control is on, input flow-control is on
  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: 0/375/0 (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 IP multicasts)
     0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 watchdog, 1017 multicast, 0 pause input
     0 input packets with dribble condition detected
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 unknown protocol drops
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
GigabitEthernet0/0/1 is administratively down, line protocol is down (disabled)
  Hardware is ISR4331-3x1GE, address is 0090.21ed.0c02 (bia 0090.21ed.0c02)
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive not supported
  output flow-control is on, input flow-control is on
  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: 0/375/0 (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 IP multicasts)
```

Ctrl+F6 to exit CLI focus

Router0

Physical Config CLI Attributes

```
  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: 0/375/0 (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 IP multicasts)
     0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 watchdog, 1017 multicast, 0 pause input
     0 input packets with dribble condition detected
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 unknown protocol drops
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
Vlan1 is administratively down, line protocol is down
  Hardware is CPU Interface, address is 0000.0c6b.eb85 (bia 0000.0c6b.eb85)
  MTU 1500 bytes, BW 100000 Kbit, DLY 1000000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 21:40:21, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); 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
     1682 packets input, 530955 bytes, 0 no buffer
     Received 0 broadcasts (0 IP multicast)
     0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     563859 packets output, 0 bytes, 0 underruns
     0 output errors, 23 interface resets
     0 output buffer failures, 0 output buffers swapped out

Router1#show ip interface breif
                         ^
% Invalid input detected at '^' marker.

Router1#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0/0   unassigned      YES unset  administratively down down
GigabitEthernet0/0/1   unassigned      YES unset  administratively down down
GigabitEthernet0/0/2   unassigned      YES unset  administratively down down
Vlan1                  unassigned      YES unset  administratively down down
Router1#
```

Lab 2.4 - Router Basics IV

Task 1: Enable Router Interfaces

Router0

Physical Config CLI Attributes

```
Router1>en
Password:
Router1#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router1(config)#interface GigabitEthernet0/0/0
Router1(config-if)#?
  arp                 Set arp type (arpa, probe, snap) or timeout
  bandwidth           Set bandwidth informational parameter
  cdp                 CDP interface subcommands
  channel-group       Add this interface to an Etherchannel group
  crypto              Encryption/Decryption commands
  custom-queue-list   Assign a custom queue list to an interface
  delay               Specify interface throughput delay
  description         Interface specific description
  duplex              Configure duplex operation.
  exit                Exit from interface configuration mode
  fair-queue          Enable Fair Queuing on an Interface
  hold-queue          Set hold queue depth
  ip                  Interface Internet Protocol config commands
  ipv6                IPv6 interface subcommands
  lldp                LLDP interface subcommands
  mac-address         Manually set interface MAC address
  media-type          Configure media type
  mtu                 Set the interface Maximum Transmission Unit (MTU)
  no                  Negate a command or set its defaults
  pppoe               pppoe interface subcommands
  pppoe-client        pppoe client
  priority-group      Assign a priority group to an interface
  service-policy      Configure QoS Service Policy
  shutdown            Shutdown the selected interface
  speed               Configure speed operation.
  standby             HSRP interface configuration commands
  tx-ring-limit       Configure PA level transmit ring limit
Router1(config-if)#no shutdown

Router1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up
no no shutdown
                  ^
% Invalid input detected at '^' marker.

Router1(config-if)#




Router1 con0 is now available
```

Ctrl+F6 to exit CLI focus

Router0

Physical Config CLI Attributes

```
Create your own banner here
You must be an authorized user to access this device

User Access Verification

Password:

Router1>en
Password:
Router1#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router1(config)#interface GigabitEthernet0/0/0
Router1(config-if)#description Serial 0/0/0 interface on Router1
Router1(config-if)#end
Router1#
%SYS-5-CONFIG_I: Configured from console by console

Router1#show interfaces
GigabitEthernet0/0/0 is up, line protocol is down (disabled)
  Hardware is ISR4331-3x1GE, address is 0090.21ed.0c01 (bia 0090.21ed.0c01)
  Description: Serial 0/0/0 interface on Router1
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive not supported
  Full Duplex, 1000Mbps, link type is auto,  media type is Auto Select
  output flow-control is on, input flow-control is on
  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: 0/375/0 (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 IP multicasts)
     0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 watchdog, 1017 multicast, 0 pause input
--More--
```

Ctrl+F6 to exit CLI focus

Router1

Physical Config CLI Attributes

```
Router2>en
Password:
Router2#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router2(config)#interface GigabitEthernet0/0/0
Router2(config-if)#
Router2(config-if)#no shutdown

Router2(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up

Router2(config-if)#shutdown

Router2(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to administratively down

Router2(config-if)#no shutdown

Router2(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up

Router2(config-if)#description Serial 0/0/0 ineterface on Router2
Router2(config-if)#
Router2(config-if)#end
Router2#
%SYS-5-CONFIG_I: Configured from console by console

Router2#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router2(config)#inetrface GigabitEthernet0/0/1
               ^
% Invalid input detected at '^' marker.

Router2(config)#ineterface GigabitEthernet0/0/1
                ^
% Invalid input detected at '^' marker.

Router2(config)#interface GigabitEthernet0/0/1
Router2(config-if)#no shutdown

Router2(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/1, changed state to up
description Serial 0/0/1 interface on Router2
Router2(config-if)#end
Router2#
%SYS-5-CONFIG_I: Configured from console by console
show interfaces
GigabitEthernet0/0/0 is up, line protocol is down (disabled)
  Hardware is ISR4331-3x1GE, address is 0001.6482.6a01 (bia 0001.6482.6a01)
  Description: Serial 0/0/0 ineterface on Router2
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
```

Ctrl+F6 to exit CLI focus

Router2

Physical Config CLI Attributes

```
User Access Verification

Password:

Router3>en
Password:
Router3#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router3(config)#interface GigabitEthernet0/0/0
Router3(config-if)#no shutdown

Router3(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up

Router3(config-if)#description Serial 0/0/0 interface on Router3
Router3(config-if)#end
Router3#
%SYS-5-CONFIG_I: Configured from console by console

Router3#show interfaces
GigabitEthernet0/0/0 is up, line protocol is down (disabled)
  Hardware is ISR4331-3x1GE, address is 00d0.58d3.2901 (bia 00d0.58d3.2901)
  Description: Serial 0/0/0 interface on Router3
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive not supported
  Full Duplex, 1000Mbps, link type is auto,  media type is Auto Select
  output flow-control is on, input flow-control is on
  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: 0/375/0 (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 IP multicasts)
     0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 watchdog, 1017 multicast, 0 pause input
     0 input packets with dribble condition detected
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 unknown protocol drops
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
GigabitEthernet0/0/1 is administratively down, line protocol is down (disabled)
```

Ctrl+F6 to exit CLI focus

- 4. Line protocol changes to up which opens the link for transferring messages when no shutdown issued.
- 9. Until a message is passed through the link it defaults to down and when messages are sent in goes up.

Task 2: Configure IP Addresses

- Ip address configured for Router1

Router0

Physical Config CLI Attributes

```
Router1#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router1(config)#interface GigabitEthernet0/0/0
Router1(config-if)#ip address 10.1.1.5 255.255.255.0
Router1(config-if)#end
Router1#
%SYS-5-CONFIG_I: Configured from console by console
show run?
running-config
Router1#show run
Router1#show running-config
Building configuration...

Current configuration : 991 bytes
!
version 15.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname Router1
!
```

```
!
!
spanning-tree mode pvst
!
!
!
!
!
!
interface GigabitEthernet0/0/0
 description Serial 0/0/0 interface on Router1
 ip address 10.1.1.5 255.255.255.0
 duplex auto
 speed auto
```

- Ip address configured for Router2

Router1

Physical Config CLI Attributes

```
Router2#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router2(config)#interface GigabitEthernet0/0/0
Router2(config-if)#ip address 10.1.1.4 255.255.255.0
Router2(config-if)#end
Router2#
%SYS-5-CONFIG_I: Configured from console by console
interface GigabitEthernet0/0/1
                ^
% Invalid input detected at '^' marker.

Router2#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router2(config)#interface GigabitEthernet0/0/1
Router2(config-if)#ip address 172.16.10.4 255.255.255.0
Router2(config-if)#end
Router2#
%SYS-5-CONFIG_I: Configured from console by console
show run?
running-config
Router2#show run
Router2#show running-config
Building configuration...

Current configuration : 1063 bytes
!
version 15.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname Router2
!
!
!
enable secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
enable password 7 0802617E2C545747444659
!
!
```

Router1

Physical Config CLI Attributes

```
!
!
!
!
!
ip cef
no ipv6 cef
!
!
!
username P_J
!
!
!
!
!
!
!
!
!
spanning-tree mode pvst
!
!
!
!
!
!
interface GigabitEthernet0/0/0
 description Serial 0/0/0 ineterface on Router2
 ip address 10.1.1.4 255.255.255.0
 duplex auto
 speed auto
!
interface GigabitEthernet0/0/1
 description Serial 0/0/1 interface on Router2
 ip address 172.16.10.4 255.255.255.0
 duplex auto
 speed auto
!
interface GigabitEthernet0/0/2
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
 --More--
```

Ctrl+F6 to exit CLI focus

- Ip address configured for Router3

Router2

Physical Config CLI Attributes

```
Router3>en
Password:
Router3#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router3(config)#interface GigabitEthernet0/0/0
Router3(config-if)#ip address 172.16.10.5 255.255.255.0
Router3(config-if)#end
Router3#
%SYS-5-CONFIG_I: Configured from console by console
show run?
running-config
Router3#show run
Router3#show running-config
Building configuration...

Current configuration : 995 bytes
!
version 15.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname Router3
!
!
!
enable secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
enable password 7 0802617E3E545747444659
!
!
!
!
!
!
ip cef
no ipv6 cef
```

Router2

Physical Config CLI Attributes

```
!
!
!
!
!
ip cef
no ipv6 cef
!
!
!
username P_J
!
!
!
!
!
!
!
!
!
!
spanning-tree mode pvst
!
!
!
!
!
!
!
interface GigabitEthernet0/0/0
 description Serial 0/0/0 interface on Router3
 ip address 172.16.10.5 255.255.255.0
 duplex auto
 speed auto
!
interface GigabitEthernet0/0/1
```

- Pings successful

Router1

Physical Config CLI Attributes

IOS Command Line Interface

```
This device is used to route traffic between departments
You must be an authorized user to access this device

User Access Verification

Password:

Router2>en
Password:
Router2#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router2(config)#interface GigabitEthernet0/0/1
Router2(config-if)#no shutdown
Router2(config-if)#cdp enable
Router2(config-if)#end
Router2#
%SYS-5-CONFIG_I: Configured from console by console

Router2#ping 172.16.10.5

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.10.5, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms

Router2#ping 10.1.1.5

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.1.5, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/1 ms

Router2#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0/0   10.1.1.4        YES manual up                    up
GigabitEthernet0/0/1   172.16.10.4     YES manual up                    up
GigabitEthernet0/0/2   unassigned      YES unset  administratively down down
Vlan1                  unassigned      YES unset  administratively down down
Router2#
```

- Running config to verify ip address

Router1

Physical Config CLI Attributes

```
!
!
!
!
!
!
spanning-tree mode pvst
!
!
!
!
!
!
interface GigabitEthernet0/0/0
 description Serial 0/0/0 ineterface on Router2
 ip address 10.1.1.4 255.255.255.0
 duplex auto
 speed auto
!
interface GigabitEthernet0/0/1
 description Serial 0/0/1 interface on Router2
 ip address 172.16.10.4 255.255.255.0
 duplex auto
 speed auto
!
interface GigabitEthernet0/0/2
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Vlan1
 no ip address
```

- Verified line protocols and displayed interfaces info on Router2

Router1

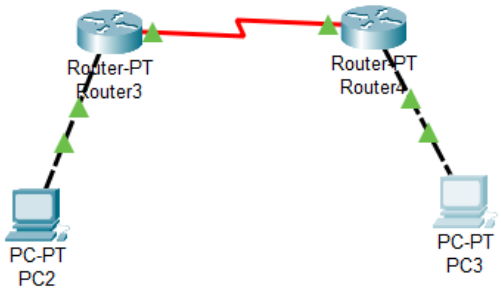
Physical Config CLI Attributes

```
Router2#show protocols
Global values:
  Internet Protocol routing is enabled
GigabitEthernet0/0/0 is up, line protocol is up
  Internet address is 10.1.1.4/24
GigabitEthernet0/0/1 is up, line protocol is up
  Internet address is 172.16.10.4/24
GigabitEthernet0/0/2 is administratively down, line protocol is down
Vlan1 is administratively down, line protocol is down
Router2#show ip interface
GigabitEthernet0/0/0 is up, line protocol is up (connected)
  Internet address is 10.1.1.4/24
  Broadcast address is 255.255.255.255
  Address determined by setup command
  MTU is 1500 bytes
  Helper address is not set
  Directed broadcast forwarding is disabled
  Outgoing access list is not set
  Inbound  access list is not set
  Proxy ARP is enabled
  Security level is default
  Split horizon is enabled
  ICMP redirects are always sent
  ICMP unreachables are always sent
  ICMP mask replies are never sent
  IP fast switching is disabled
  IP fast switching on the same interface is disabled
  IP Flow switching is disabled
  IP Fast switching turbo vector
  IP multicast fast switching is disabled
  IP multicast distributed fast switching is disabled
  Router Discovery is disabled
  IP output packet accounting is disabled
  IP access violation accounting is disabled
  TCP/IP header compression is disabled
  RTP/IP header compression is disabled
  Probe proxy name replies are disabled
  Policy routing is disabled
  Network address translation is disabled
  BGP Policy Mapping is disabled
  Input features: MCI Check
  WCCP Redirect outbound is disabled
  WCCP Redirect inbound is disabled
  WCCP Redirect exclude is disabled
GigabitEthernet0/0/1 is up, line protocol is up (connected)
  Internet address is 172.16.10.4/24
  Broadcast address is 255.255.255.255
  Address determined by setup command
  MTU is 1500 bytes
  Helper address is not set
  Directed broadcast forwarding is disabled
```

Ctrl+F6 to exit CLI focus

Lab 2.5 OSPF Basics

TOPOLOGY :



Tasks :

- Router1 configured:

Router3

Physical Config CLI Attributes

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#exit
Router(config)#hostname ROuter1
ROuter1(config)#
ROuter1(config)#interface FastEthernet0/0
ROuter1(config-if)#
ROuter1(config-if)#exit
ROuter1(config)#interface FastEthernet0/0
ROuter1(config-if)#ip address 192.168.1.1 255.255.255.0
ROuter1(config-if)#ip address 192.168.1.1 255.255.255.0
ROuter1(config-if)#no shutdown
ROuter1(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
%IP-4-DUPADDR: Duplicate address 192.168.1.1 on FastEthernet0/0, sourced by 0001.9773.366B

ROuter1(config-if)#exit
ROuter1(config)#interface Serial2/0
ROuter1(config-if)#ip address 192.168.2.1 255.255.255.0
ROuter1(config-if)#ip address 192.168.2.1 255.255.255.0
ROuter1(config-if)#no shutdown
ROuter1(config-if)#clock rate 64000
ROuter1(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

ROuter1(config-if)#exit
ROuter1(config)#router ospf 1
ROuter1(config-router)#nwnetwork 192.168.1.0 0.0.0.255 area 0
ROuter1(config-router)#network 192.168.2.0 0.0.0.255 area 0
ROuter1(config-router)#exit
ROuter1(config)#
ROuter1(config)#end
ROuter1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
ROuter1#
%SYS-5-CONFIG_I: Configured from console by console

00:17:39: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.3.1 on Serial2/0 from LOADING to FULL, Loading Done
%IP-4-DUPADDR: Duplicate address 192.168.1.1 on FastEthernet0/0, sourced by 0001.9773.366B
%IP-4-DUPADDR: Duplicate address 192.168.1.1 on FastEthernet0/0, sourced by 0001.9773.366B
```

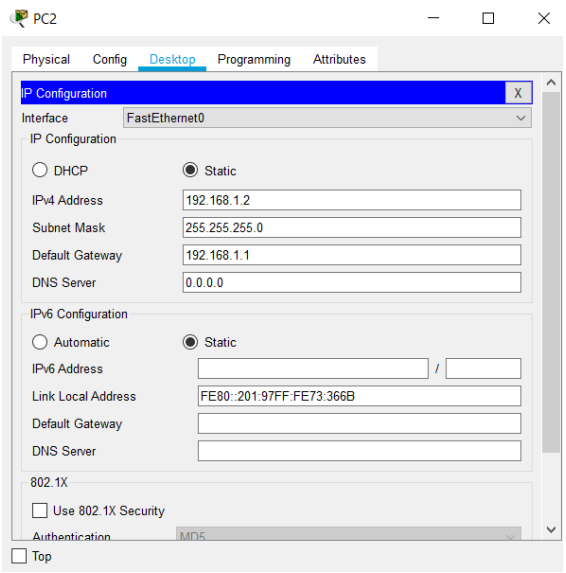
- Router2 configured:

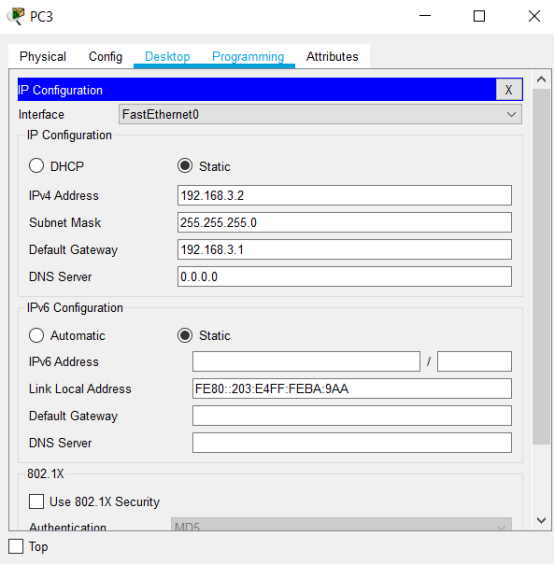
Router4

Physical Config CLI Attributes

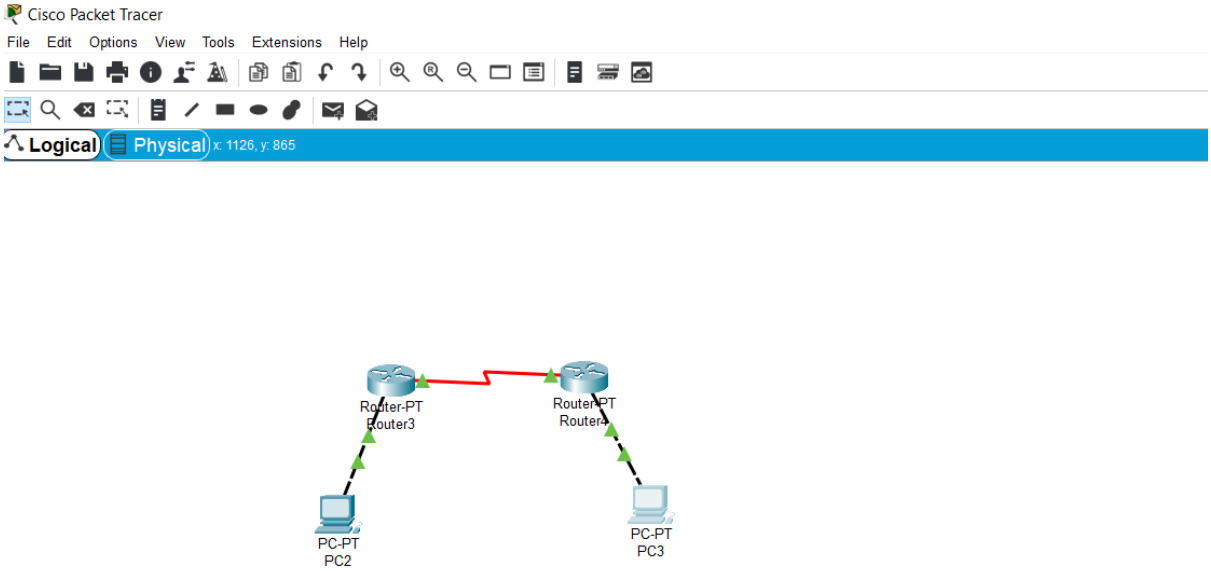
```
         --- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]: n


Press RETURN to get started!



Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address
% Incomplete command.
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
ip address 192.168.3.1 255.255.255.0
Router(config-if)#ip address 192.168.3.1 255.255.255.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#ip address 192.168.2.2 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Router(config-if)#exit
Router(config)#rirouter ospf 1
Router(config-router)#network 192.168.2.0 0.0.0.255 area 0
Router(config-router)#network 192.1
00:17:34: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on Serial2/0 from LOADING to FULL, network 192.1
                                  ^
% Invalid input detected at '^' marker.

Router(config-router)#network 192.168.3.0 0.0.0.255 area 0
Router(config-router)#exit
Router(config)#
Router(config)#end
Router#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router#
%SYS-5-CONFIG_I: Configured from console by console
```

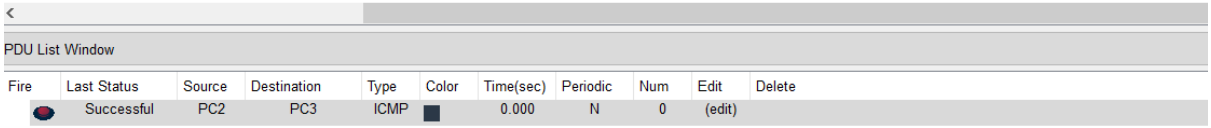
- Host A and Host B configured:

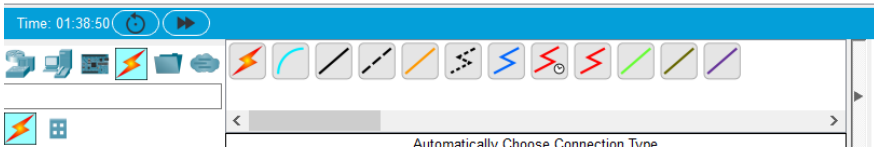




- Verifying ping from PC2 TO PC3 through PDU Successful:







Lab 2.6 OSPF

Task 1: Configure the Routers

- Router1 configured

Router1

Physical Config CLI Attributes

```
2 Low-speed serial(sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
63488K bytes of ATA CompactFlash (Read/Write)


         --- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]: n


Press RETURN to get started!



Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#exit
Router(config)#hostname Router1
Router1(config)#
Router1(config)#interface FastEthernet0/0
Router1(config-if)#
Router1(config-if)#exit
Router1(config)#interface FastEthernet0/0
Router1(config-if)#no shutdown
Router1(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
ip address 10.0.0.1 255.0.0.0
Router1(config-if)#ip address 10.0.0.1 255.255.255.0
Router1(config-if)#
Router1(config-if)#exit
Router1(config)#interface Serial2/0
Router1(config-if)#ip address
% Incomplete command.
Router1(config-if)#
Router1(config-if)#exit
Router1(config)#interface FastEthernet0/0
Router1(config-if)#
Router1(config-if)#exit
Router1(config)#interface Serial2/0
Router1(config-if)#ip address 192.168.1.1 255.255.255.0
Router1(config-if)#no shutdown
Router1(config-if)#clock rate 64000
Router1(config-if)#
Router1(config-if)#exit
Router1(config)#end
Router1#
%SYS-5-CONFIG_I: Configured from console by console

Router1#
```

Ctrl+F6 to exit CLI focus

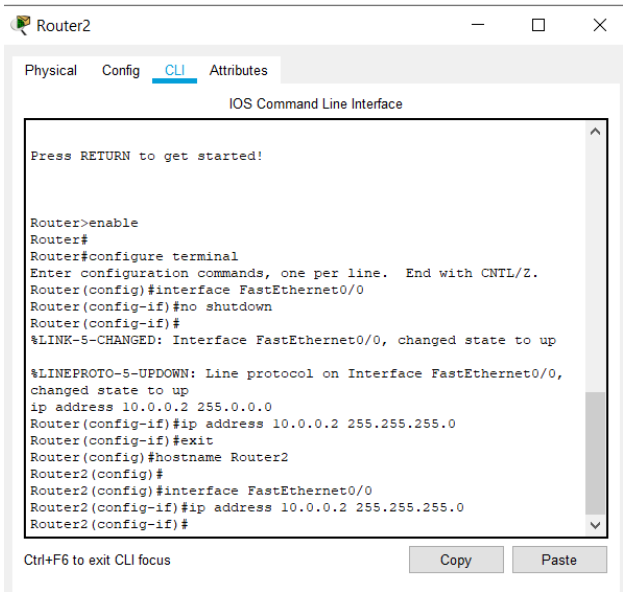
- Router4 configured

Router4

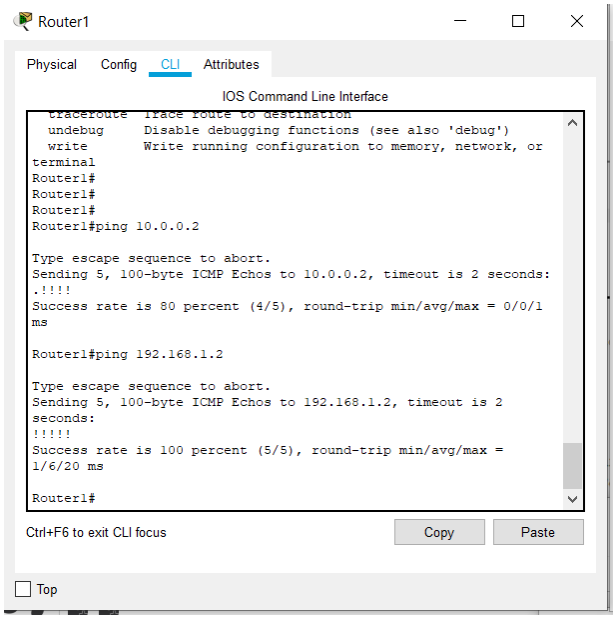
Physical Config CLI Attributes

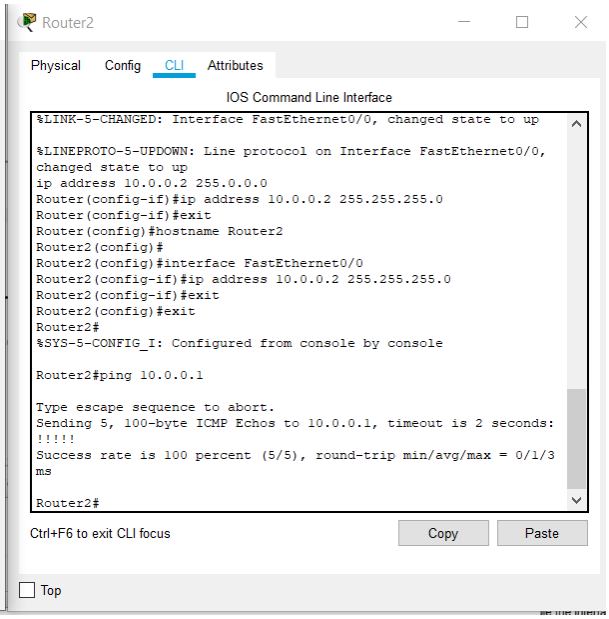
```
            cisco Systems, Inc.
            170 West Tasman Drive
            San Jose, California 95134-1706



Cisco Internetwork Operating System Software
IOS (tm) PT1000 Software (PT1000-I-M), Version 12.2(28), RELEASE SOFTWARE (fc5)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2005 by cisco Systems, Inc.
Compiled Wed 27-Apr-04 19:01 by miwang

PT 1001 (PTSC2005) processor (revision 0x200) with 60416K/5120K bytes of memory
.
Processor board ID PT0123 (0123)
PT2005 processor: part number 0, mask 01
Bridging software.
X.25 software, Version 3.0.0.
4 FastEthernet/IEEE 802.3 interface(s)
2 Low-speed serial(sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
63488K bytes of ATA CompactFlash (Read/Write)


         --- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]: no


Press RETURN to get started!



Router>
Router>en
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname Router4
Router4(config)#
Router4(config)#interface Serial2/0
Router4(config-if)#no shutdown
Router4(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
ip address 192.168.1.2 255.255.255.0
Router4(config-if)#ip address 192.168.1.2 255.255.255.0
Router4(config-if)#exit
Router4(config)#end
Router4#
%SYS-5-CONFIG_I: Configured from console by console
```

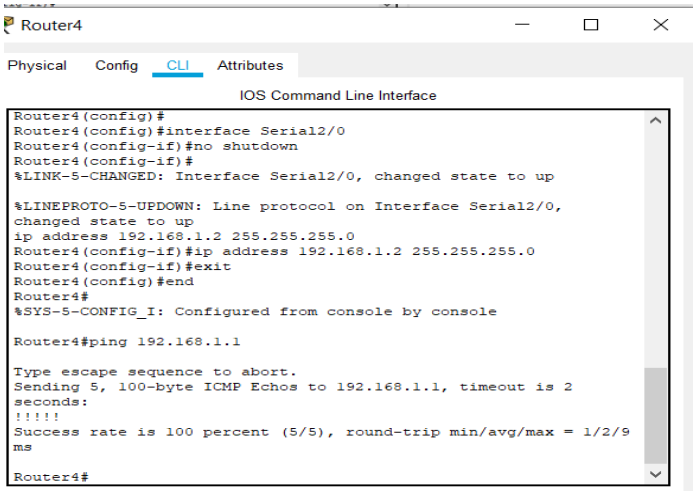
- Router2 configured



- All pings successful

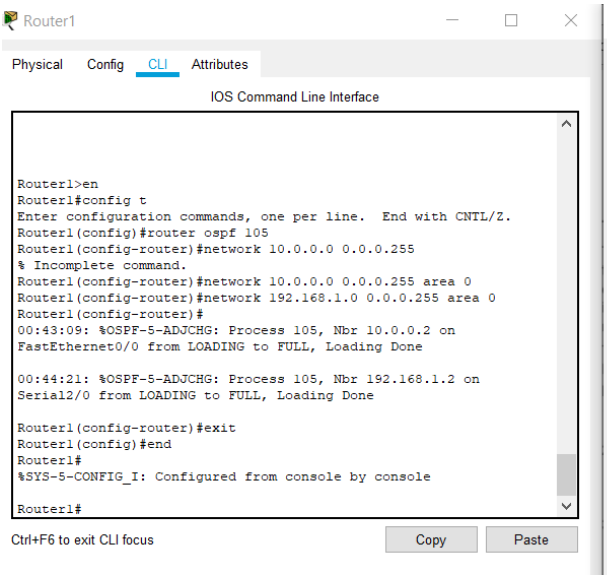


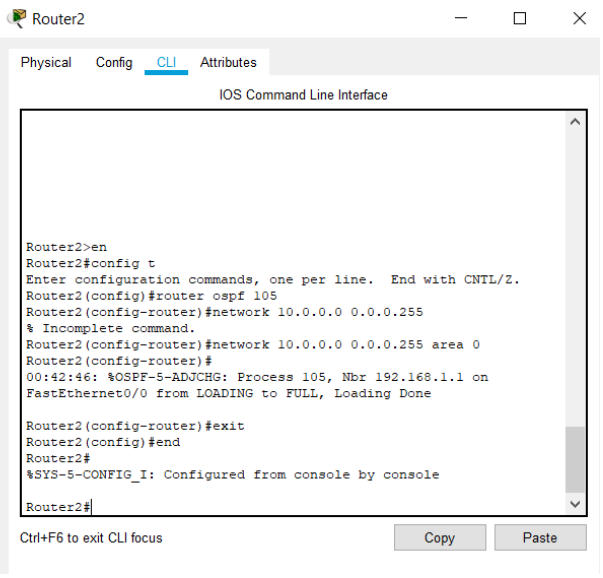


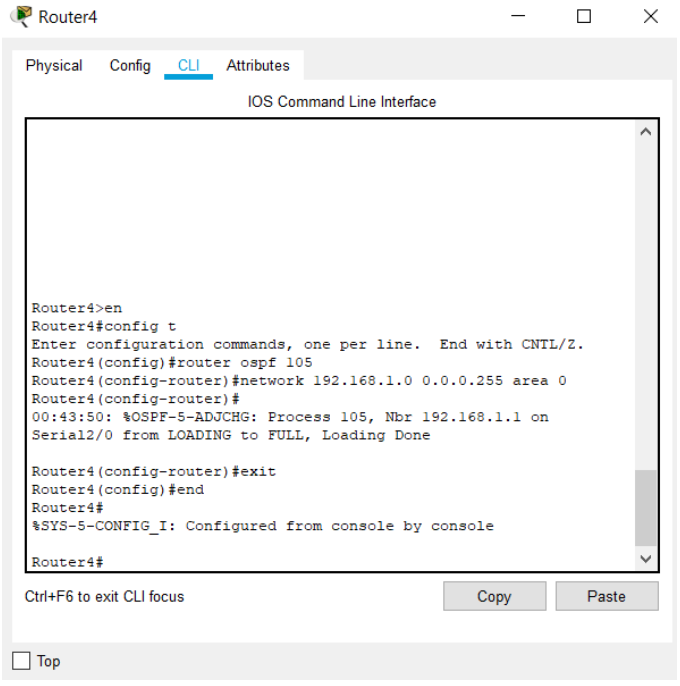


Task 2: Configure OSPF

- Ospf configured for all routers with process ID 105 and area 0

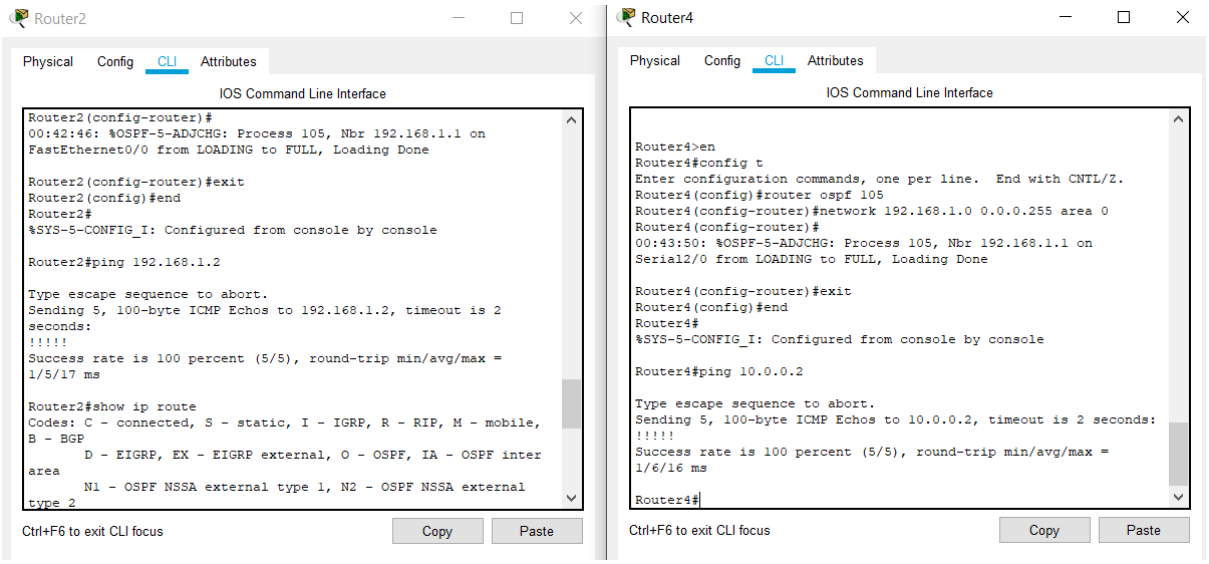




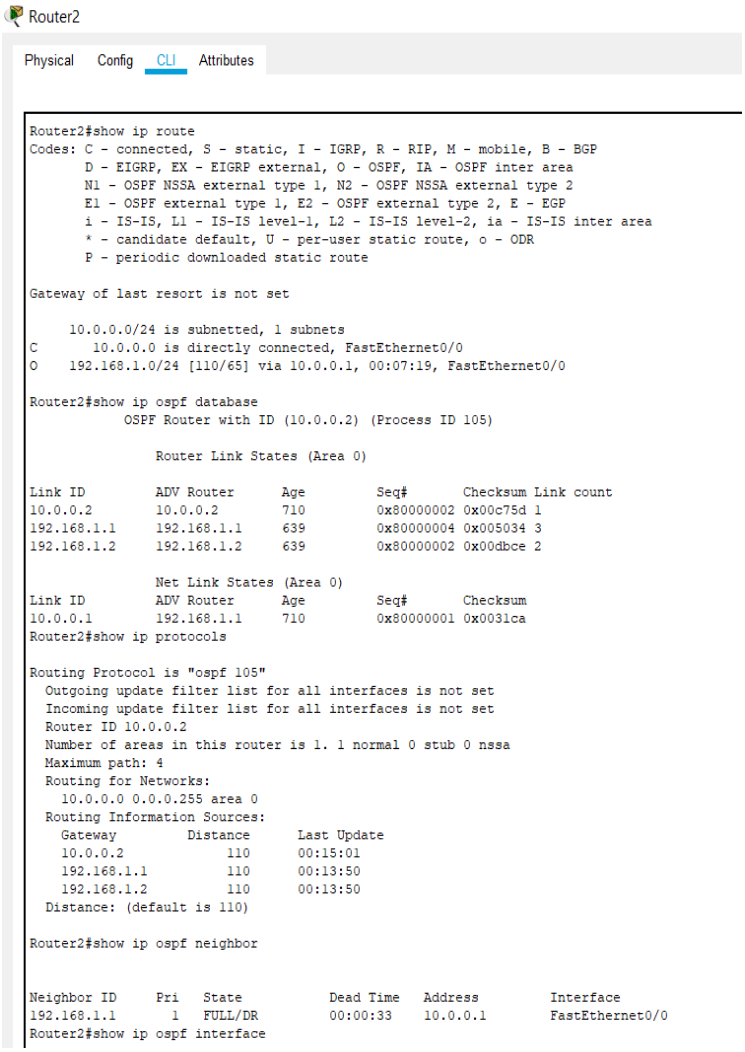


Task 3: Verify OSPF

- Pings successful for both Router2 and Router4



- Show commands for Router2



```
    Gateway         Distance      Last Update
    10.0.0.2             110      00:15:01
    192.168.1.1          110      00:13:50
    192.168.1.2          110      00:13:50
  Distance: (default is 110)

Router2#show ip ospf neighbor


Neighbor ID     Pri   State           Dead Time   Address         Interface
192.168.1.1       1   FULL/DR         00:00:33    10.0.0.1        FastEthernet0/0
Router2#show ip ospf interface

FastEthernet0/0 is up, line protocol is up
  Internet address is 10.0.0.2/24, Area 0
  Process ID 105, Router ID 10.0.0.2, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State BDR, Priority 1
  Designated Router (ID) 192.168.1.1, Interface address 10.0.0.1
  Backup Designated Router (ID) 10.0.0.2, Interface address 10.0.0.2
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:01
  Index 1/1, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 1
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 1, Adjacent neighbor count is 1
    Adjacent with neighbor 192.168.1.1  (Designated Router)
  Suppress hello for 0 neighbor(s)
Router2#
Router2#
Router2#exit
```

- 2. Administrative distance of 192.168.1.0 is [110/65]
- 4. OSPF Router with ID (10.0.0.2) (Process ID 105)
- 5. Interface 192.168.1.1 is indicated as FULL in the state field
- 6. Backup state indicate the Designated Router ID 10.0.0.2

Lab Topology: