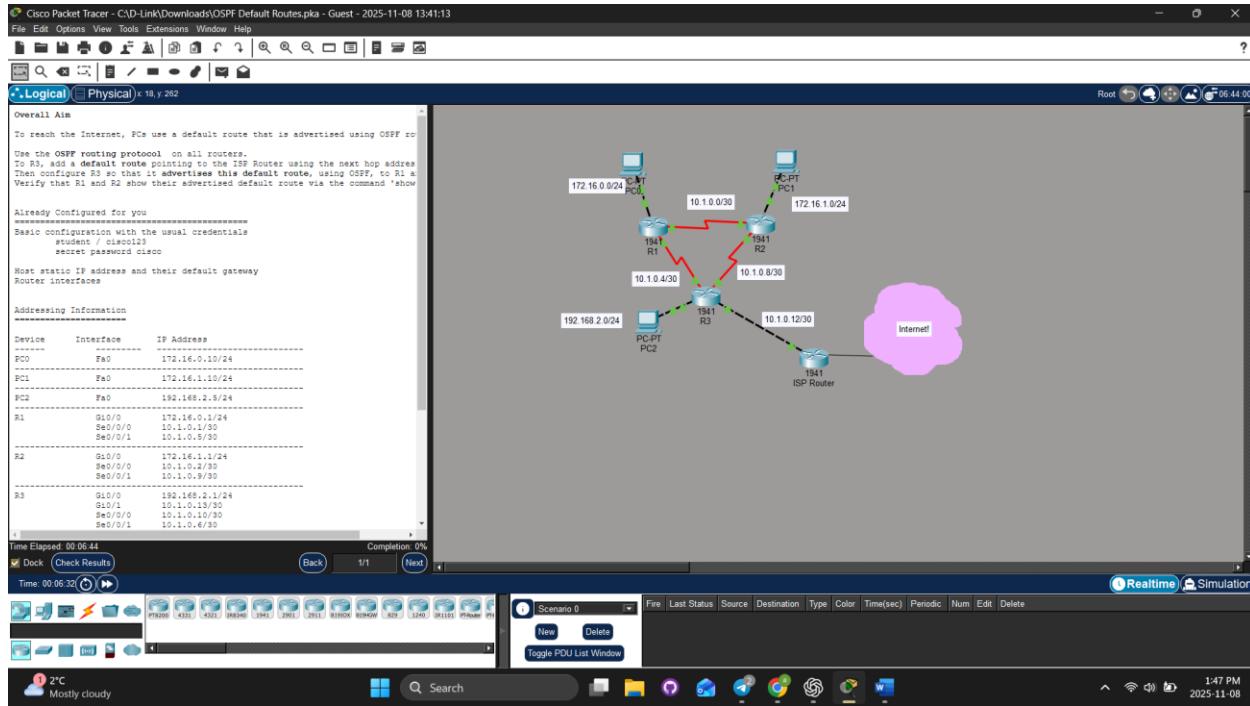


## Assignment 11



### Instructions

To reach the Internet, PCs use a default route that is advertised using OSPF routing.

- Use the OSPF routing protocol on all routers.
- To R3, add a default route pointing to the ISP Router using the next hop address.
- Then configure R3 so that it advertises this default route, using OSPF, to R1 and R2.
- Verify that R1 and R2 show their advertised default route via the command 'show ip route'.

Already Configured for you:

- Basic configuration with the usual credentials
  - student / cisco123
  - secret password cisco
- Host static IP address and their default gateway
- Router interfaces

Addressing Information:

Device	Interface	IP Address
PC0	Fa0	172.16.0.10/24
PC1	Fa0	172.16.1.10/24
PC2	Fa0	192.168.2.5/24
R1	Gi0/0	172.16.0.1/24
	Se0/0/0	10.1.0.1/30
	Se0/0/1	10.1.0.5/30
R2	Gi0/0	172.16.1.1/24
	Se0/0/0	10.1.0.2/30
	Se0/0/1	10.1.0.9/30
R3	Gi0/0	192.168.2.1/24
	Gi0/1	10.1.0.13/30
	Se0/0/0	10.1.0.10/30
	Se0/0/1	10.1.0.6/30
ISP Router	Gi0/0	10.1.0.14/24

Notes:

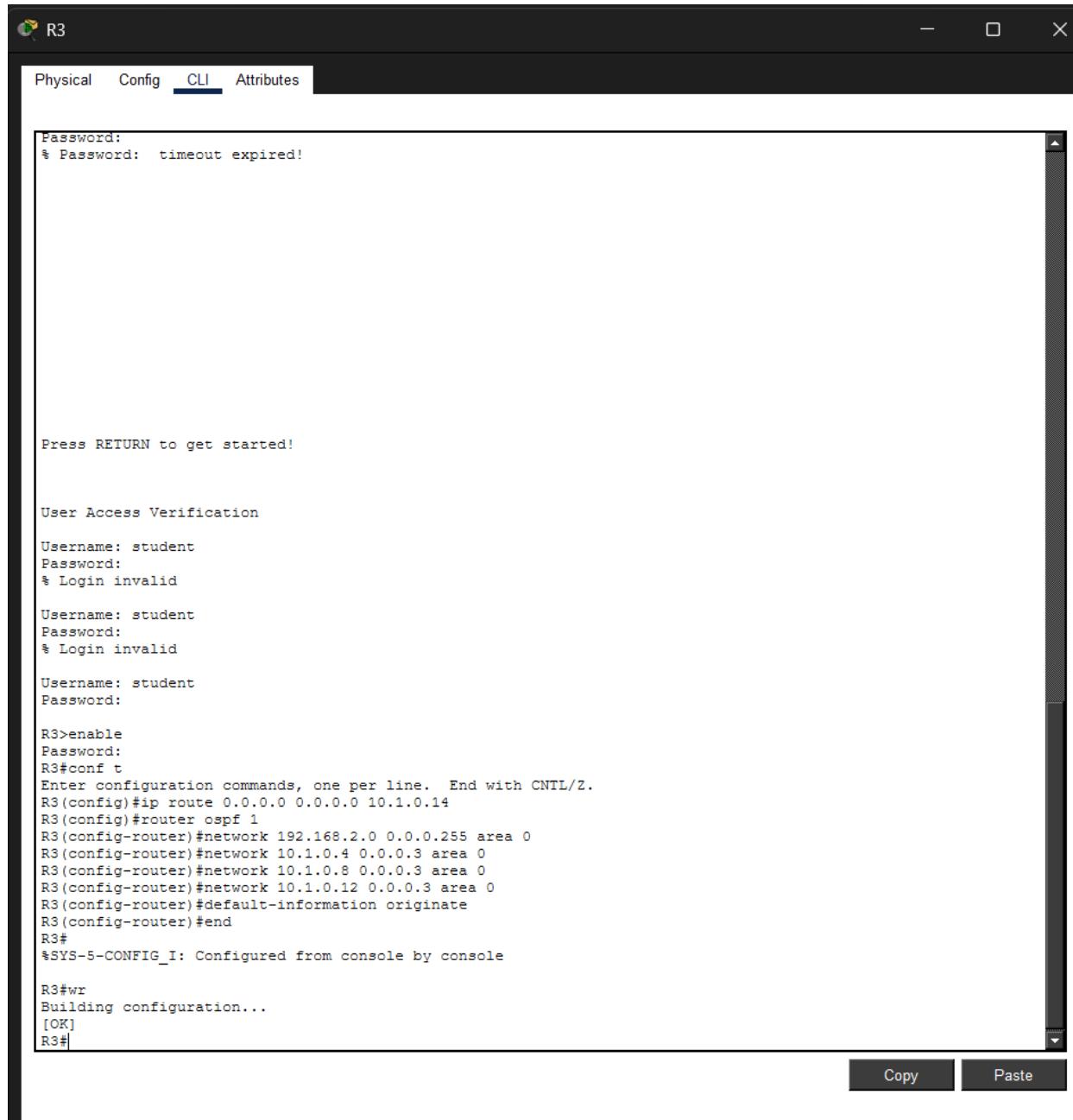
- Use a process ID of 1.
  - R1 - router ID 1.1.1.1
  - R2 - router ID 2.2.2.2
  - R3 - router ID 3.3.3.3

**Deliverable**

Submit your .pka file.

## SOLUTION:

- 1) R3: create the default route to the ISP and advertise it via OSPF:



```
R3
Physical Config CLI Attributes

Password:
% Password: timeout expired!

Press RETURN to get started!

User Access Verification

Username: student
Password:
% Login invalid

Username: student
Password:
% Login invalid

Username: student
Password:

R3>enable
Password:
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#ip route 0.0.0 0.0.0.0 10.1.0.14
R3(config)#router ospf 1
R3(config-router)#network 192.168.2.0 0.0.0.255 area 0
R3(config-router)#network 10.1.0.4 0.0.0.3 area 0
R3(config-router)#network 10.1.0.8 0.0.0.3 area 0
R3(config-router)#network 10.1.0.12 0.0.0.3 area 0
R3(config-router)#default-information originate
R3(config-router)#end
R3#
%SYS-5-CONFIG_I: Configured from console by console

R3#wr
Building configuration...
[OK]
R3#
```

Copy Paste

2) R1: enable OSPF and set router-ID:

```
export@cisco.com.

Cisco CISCO1941/K9 (revision 1.0) with 491520K/32768K bytes of memory.
Processor board ID FTX152400KS
2 Gigabit Ethernet interfaces
2 Low-speed serial(sync/async) network interface(s)
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

Press RETURN to get started!

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up

User Access Verification

Username: student
Password:
% Login invalid

Username: student
Password:

R1>enable
Password:
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router ospf 1
R1(config-router)#router-id 1.1.1.1
R1(config-router)#network 172.16.0.0 0.0.0.255 area 0
R1(config-router)#network 10.1.0.0 0.0.0.3 area 0
R1(config-router)#network 10.1.0.4 0.0.0.3 area 0
R1(config-router)#end
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#wr
Building configuration...
[OK]
R1#
00:32:48: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on Serial0/0/1 from LOADING to FULL, Loading Done

R1#
```

Copy Paste

3) R2: enable OSPF and set router-ID:

```
export@cisco.com.

Cisco CISCO1941/K9 (revision 1.0) with 491520K/32768K bytes of memory.
Processor board ID FTX152400KS
2 Gigabit Ethernet interfaces
2 Low-speed serial(sync/async) network interface(s)
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

Press RETURN to get started!

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up

User Access Verification

Username: student
Password:

R2>enable
Password:
R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#router ospf 1
R2(config-router)#router-id 2.2.2.2
R2(config-router)#network 172.16.1.0 0.0.0.255 area 0
R2(config-router)#network 10.1.0.0 0.0.0.3 area 0
R2(config-router)#
00:35:32: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Serial0/0/0 from LOADING to FULL, Loading Done
R2(config-router)#network 10.1.0.8 0.0.0.3 area 0
R2(config-router)#
R2(config-router)#
00:36:24: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on Serial0/0/1 from LOADING to FULL, Loading Done
R2(config-router)#
R2(config-router)#end
R2#
%SYS-5-CONFIG_I: Configured from console by console
R2#
```

Copy      Paste

Top

4) ISP router

Ensure **Gi0/0 = 10.1.0.14/30** (matching R3's 10.1.0.13/30). No OSPF needed.

The screenshot shows a Cisco IOS CLI interface titled "ISP Router". The "CLI" tab is selected. The screen displays the following information:

(c) of the Commercial Computer Software - Restricted Rights clause at FAR sec. 52.227-19 and subparagraph (c) (1) (ii) of the Rights in Technical Data and Computer Software clause at DFARS sec. 252.227-7013.  
cisco Systems, Inc.  
170 West Tasman Drive  
San Jose, California 95134-1706

Cisco IOS Software, C1900 Software (C1900-UNIVERSALK9-M), Version 15.1(4)M4, RELEASE SOFTWARE (fc2)  
Technical Support: <http://www.cisco.com/techsupport>  
Copyright (c) 1986-2012 by Cisco Systems, Inc.  
Compiled Thurs 5-Jan-12 15:41 by pt\_team  
Image text-base: 0x2100F918, data-base: 0x24729040

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.

A summary of U.S. laws governing Cisco cryptographic products may be found at:  
<http://www.cisco.com/wwl/export/crypto/tool/stqrg.html>

If you require further assistance please contact us by sending email to [export@cisco.com](mailto:export@cisco.com).

Cisco CISCO1941/K9 (revision 1.0) with 491520K/32768K bytes of memory.  
Processor board ID FTX152400KS  
2 Gigabit Ethernet interfaces  
DRAM configuration is 64 bits wide with parity disabled.  
255K bytes of non-volatile configuration memory.  
249856K bytes of ATA System CompactFlash 0 (Read/Write)

Press RETURN to get started!

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

User Access Verification

Username: student  
Password:

ISP\_Router>show ip interface brief

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0	10.1.0.14	YES	manual	up	up
GigabitEthernet0/1	unassigned	YES	unset	administratively down	down
Vlan1	unassigned	YES	unset	administratively down	down

ISP\_Router>

Copy Paste

## VERIFICATIONS:

R1:



```
27500K bytes of AIR System compactFlash 0 (Read/Write)

Press RETURN to get started!

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up

User Access Verification

Username: student
Password:
% Login invalid

Username: student
Password:

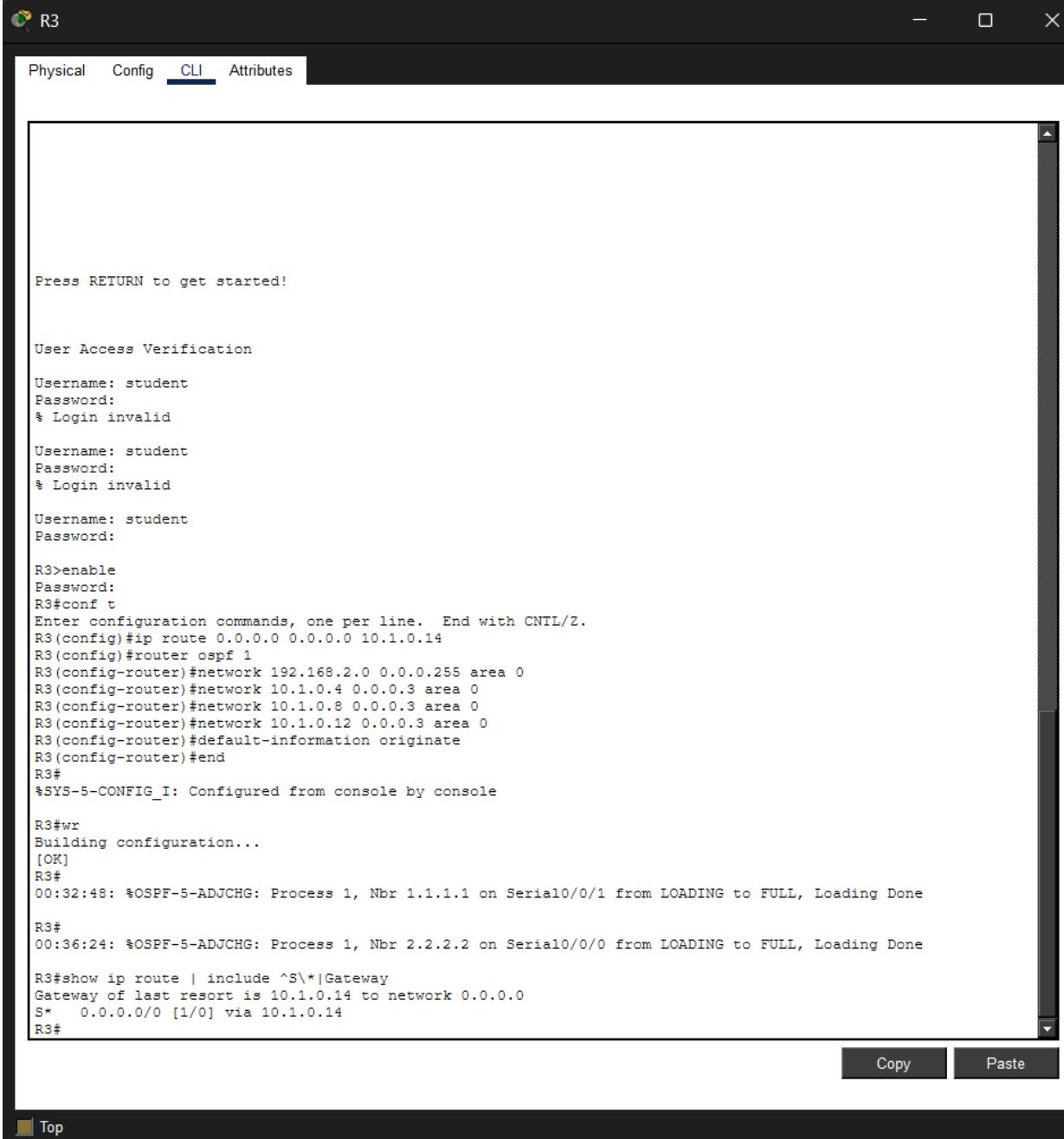
R1>enable
Password:
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router ospf 1
R1(config-router)#router-id 1.1.1.1
R1(config-router)#network 172.16.0.0 0.0.0.255 area 0
R1(config-router)#network 10.1.0.0 0.0.0.3 area 0
R1(config-router)#network 10.1.0.4 0.0.0.3 area 0
R1(config-router)#end
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#wr
Building configuration...
[OK]
R1#
00:32:48: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on Serial0/0/1 from LOADING to FULL, Loading Done
R1#
00:35:32: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial0/0/0 from LOADING to FULL, Loading Done
R1#
R1#show ip route | include 0.0.0.0
Gateway of last resort is 10.1.0.6 to network 0.0.0.0
    10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks
      0*E2 0.0.0.0/0 [110/1] via 10.1.0.6, 00:11:56, Serial0/0/1
R1#
```

Copy      Paste

Top

R3:



The screenshot shows a software window titled "R3" with a tab bar at the top containing "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area displays a command-line interface session. The session starts with a prompt to press RETURN to get started. It then shows multiple failed login attempts for the user "student" with incorrect passwords. Following this, it shows the user entering enable mode, navigating to configuration mode, and defining OSPF networks. It includes commands like "ip route", "router ospf", and "network". After configuration, it performs a write operation ("wr") and shows the router loading OSPF processes. Finally, it runs a show ip route command to display the routing table, which includes a gateway entry. At the bottom right of the window are "Copy" and "Paste" buttons.

```
Press RETURN to get started!

User Access Verification

Username: student
Password: 
% Login invalid

Username: student
Password: 
% Login invalid

Username: student
Password: 

R3>enable
Password:
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#ip route 0.0.0.0 0.0.0.0 10.1.0.14
R3(config)#router ospf 1
R3(config-router)#network 192.168.2.0 0.0.0.255 area 0
R3(config-router)#network 10.1.0.4 0.0.0.3 area 0
R3(config-router)#network 10.1.0.8 0.0.0.3 area 0
R3(config-router)#network 10.1.0.12 0.0.0.3 area 0
R3(config-router)#default-information originate
R3(config-router)#end
R3#
%SYS-5-CONFIG_I: Configured from console by console

R3#wr
Building configuration...
[OK]
R3#
00:32:48: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Serial0/0/1 from LOADING to FULL, Loading Done
R3#
00:36:24: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial0/0/0 from LOADING to FULL, Loading Done
R3#show ip route | include ^S\*|Gateway
Gateway of last resort is 10.1.0.14 to network 0.0.0.0
S*   0.0.0.0/0 [1/0] via 10.1.0.14
R3#
```

Copy      Paste

Top

R2:

The screenshot shows a Cisco Router's Command Line Interface (CLI) window titled "R2". The window has tabs at the top: Physical, Config, CLI (which is selected), and Attributes. The main area displays the following text:

```
Press RETURN to get started!

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up

User Access Verification

Username: student
Password:

R2>enable
Password:
R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#router ospf 1
R2(config-router)#router-id 2.2.2.2
R2(config-router)#network 172.16.1.0 0.0.0.255 area 0
R2(config-router)#network 10.1.0.0 0.0.0.3 area 0
R2(config-router)#
00:35:32: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Serial0/0/0 from LOADING to FULL, Loading Done
R2(config-router)#network 10.1.0.8 0.0.0.3 area 0
R2(config-router)#
R2(config-router)#
00:36:24: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on Serial0/0/1 from LOADING to FULL, Loading Done
R2(config-router)#
R2(config-router)#end
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#show ip route | include 0.0.0.0
Gateway of last resort is 10.1.0.10 to network 0.0.0.0
      10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks
O*E2 0.0.0.0/0 [110/1] via 10.1.0.10, 00:12:42, Serial0/0/1
R2#show ip ospf neighbor

Neighbor ID      Pri      State          Dead Time     Address           Interface
192.168.2.1        0      FULL/       -            00:00:30    10.1.0.10      Serial0/0/1
1.1.1.1          0      FULL/       -            00:00:38    10.1.0.1       Serial0/0/0
R2#
```

At the bottom right of the window are "Copy" and "Paste" buttons. At the bottom left is a "Top" button.

### End-to-end test (from PCs):

- PC0: ping ISP 10.1.0.14

```
C:\>
C:\>pingn 10.1.0.14
Invalid Command.

C:\>ping 10.1.0.14

Pinging 10.1.0.14 with 32 bytes of data:

Reply from 10.1.0.14: bytes=32 time=1ms TTL=253
Reply from 10.1.0.14: bytes=32 time=1ms TTL=253
Reply from 10.1.0.14: bytes=32 time=3ms TTL=253
Reply from 10.1.0.14: bytes=32 time=1ms TTL=253

Ping statistics for 10.1.0.14:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 3ms, Average = 1ms

C:\>
```

## 100@ pka:

Cisco Packet Tracer - C:\Users\Admin\OneDrive\Desktop\Cybersecurity certifications\NAS\OSPF Default Routes.pka - Guest - 2025-11-08 13:41:13

File Edit Options View Tools Extensions Window Help

Logical Physical x 22, y 284

Overall Aim

To reach the Internet, PCs use a default route that is advertised using OSPF to R3, and a default route to the ISP Router using the next hop address. Verify that R3 is what it advertises this default route, using OSPF, to R1 a. Verify that R1 and R2 show their advertised default route via the command 'show

Already Configured for you

Basic configuration with the usual credentials:  
 student / cisco123  
 secret password cisco

Host static IP address and their default gateway  
 Router interfaces

Addressing Information

Device	Interface	IP Address
PC0	Fa0	172.16.0.1/24
PC1	Fa0	172.16.1.10/24
PC2	Fa0	192.168.2.0/24
R1	G1/0/0	172.16.0.1/24
	S0/0/0	10.1.0.1/30
	S0/0/1	10.1.0.5/30
R2	G1/0/0	172.16.1.1/24
	S0/0/0	10.1.0.2/30
	S0/0/1	10.1.0.9/30
R3	G1/0/0	192.168.2.1/24
	G1/0/1	10.1.0.13/30
	S0/0/0	10.1.0.10/30
	S0/0/1	10.1.0.6/30

Time Elapsed: 01:02:25 Completion: 100%

Dock Check Results Back 1/1 Next Time: 01:00:43 Realtime Simulation

Cisco Packet Tracer - C:\Users\Admin\OneDrive\Desktop\Cybersecurity certifications\NAS\OSPF Default Routes.pka - Guest - 2025-11-08 13:41:13

File Edit Options View Tools Extensions Window Help

Activity Results

Congratulations Guest! You completed the activity.

Overall Feedback Assessment Items Connectivity Tests

Expand/Collapse All Show Incorrect Items

Assessment Items	Status	Points	Component(s)	Feedback
- Network				
- R1				
- OSPF				
- Process ID 1				
- Area				
- Area 0	Correct	0	Routing	
- Area Status	Correct	1	Routing	
- Default Information	Correct	1	Routing	
- Networks				
- Route0	Correct	1	Routing	
- Route1	Correct	1	Routing	
- Route2	Correct	1	Routing	
- Router ID	Correct	1	Routing	
- R2				
- OSPF				
- Process ID 1				
- Area				
- Area 0	Correct	0	Routing	
- Area Status	Correct	1	Routing	
- Default Information	Correct	1	Routing	
- Networks				
- Route0	Correct	1	Routing	
- Route1	Correct	1	Routing	
- Route2	Correct	1	Routing	
- Router ID	Correct	1	Routing	
- R3				
- OSPF				
- Process ID 1				
- Area				
- Area 0	Correct	0	Routing	
- Area Status	Correct	1	Routing	
- Default Information	Correct	1	Routing	
- Networks				
- Route0	Correct	1	Routing	
- Route1	Correct	1	Routing	
- Route2	Correct	1	Routing	
- Route3	Correct	1	Routing	
- Router ID	Correct	1	Routing	
- Routes				
- Static Routes				
- Route0	Correct	0	Other	
- Route0	Correct	1	Routing	

Time Elapsed: 01:03:09