

Hands On Skills Exam – CCNAv7 ENSA Skills Assessment (Answers)

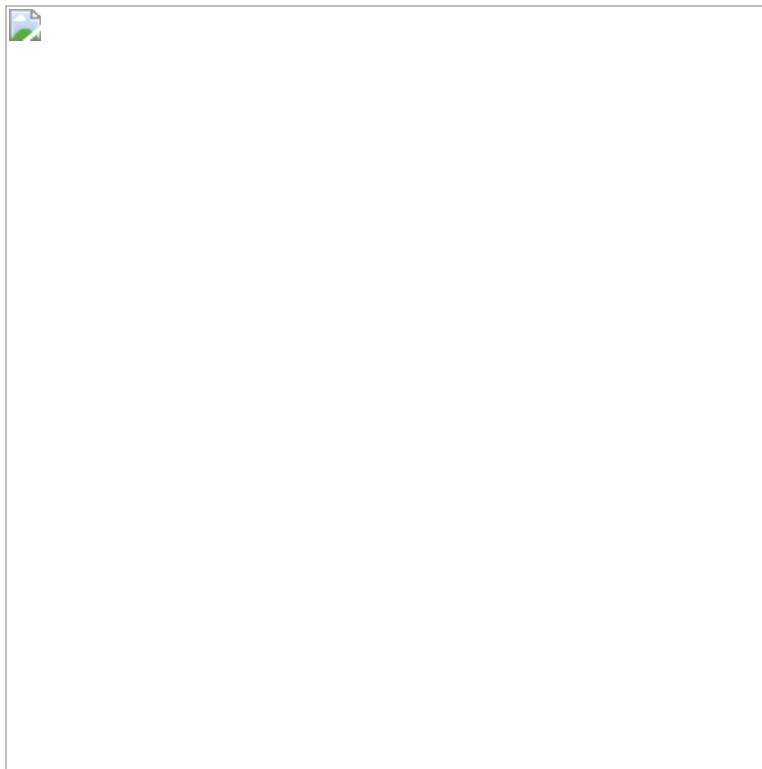
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October 7, 2020

CCNAv7 ENSA Skills Assessment – ENSA Final Skills Exam (Equipment)

Your exam may be different

Topology



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/0/0	10.67.254.2	255.255.255.252	N/A
	G0/0/1	192.168.1.1	255.255.255.0	N/A
	Lo0	10.52.0.1	255.255.255.248	N/A
R2	G0/0/0	10.67.254.1	255.255.255.252	N/A

Device	Interface	IP Address	Subnet Mask	Default Gateway
	Lo0	209.165.201.1	255.255.255.224	N/A
	G0/0/1	10.67.1.1	255.255.255.0	N/A
S1	VLAN 1	192.168.1.2	255.255.255.0	192.168.1.1
S2	VLAN 1	10.67.1.2	255.255.255.0	10.67.1.1

Assessment Objectives

- **Part 1: Initialize, Reload and Configure Basic Device Settings** (40 points, 40 minutes)
- **Part 2: Configure and Single Area OSPFv2** (20 points, 10 minutes)
- **Part 3: Optimize Single Area OSPFv2** (25 points, 20 minutes)
- **Part 4: Configure Access Control, NAT, and perform configuration backup** (15 points, 30 minutes)

Scenario

In this Skills Assessment (SA) you will configure the devices in a small network. You must configure a router, switch and PCs to support IPv4 connectivity for supported hosts. Your router and switch must also be managed securely. You will configure Single-Area OSPFv2, NAT, and access control lists. Further, you will backup up your working configurations to a TFTP server.

Required Resources

- 2 Routers (Cisco 4221 with Cisco IOS XE Release 16.9.4 universal image or comparable)
- 2 Switches (Cisco 2960 with Cisco IOS Release 15.2(2) lanbasek9 image or comparable)
- 2 PCs (Windows with a terminal emulation program, such as Tera Term)
- Console cables to configure the Cisco IOS devices via the console ports
- Ethernet cables as shown in the topology

Instructions

Part 1: Initialize, Reload and Configure Basic Device Settings

Total points: 40

Time: 40 minutes

Step 1: Initialize and reload routers and switches.

Erase the startup configurations and VLANs from the router and switch and reload the devices.

Before proceeding, ask your instructor verify device initializations.

On Router R1-R2

```
Router>enable
Router#erase startup-config
Erasing the nvram filesystem will remove all configuration files! Continue? [confirm]
[OK]
Erase of nvram: complete
%SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram
Router#reload
```

On Switch S1-S2

```
Switch>enable
Switch#erase startup-config
Switch#delete vlan.dat
Delete filename [vlan.dat]?
Delete flash:/vlan.dat? [confirm]

Switch#reload
```

Step 2: Configure the routers.

Configuration tasks for R1 and R2 include the following:

Task	Specification	R1	R2
Disable DNS lookup		0.5 pt	0.5 pt
Router name	R1 or R2, as appropriate	0.5 pt	0.5 pt
Domain name	ccna-lab.com	0.5 pt	0.5 pt
Encrypted privileged EXEC password	ciscoenpass	0.5 pt	0.5 pt
Console access password	ciscoconpass	0.5 pt	0.5 pt
Set the minimum length for passwords	10 characters	0.5 pt	0.5 pt
Create an administrative user in the local database	Username: admin Password: admin1pass	0.5 pt	0.5 pt

Task	Specification	R1	R2
Set login on VTY lines to use local database		0.5 pt	0.5 pt
Set VTY lines to accept SSH connections only		0.5 pt	0.5 pt
Encrypt the clear text passwords		0.5 pt	0.5 pt
Configure an MOTD Banner		0.5 pt	0.5 pt
Configure interface G0/0/1	Set the description Set the Layer 3 IPv4 address Activate Interface	2 pts	2 pts
Configure interface G0/0/0	Set the description Set the Layer 3 IPv4 address Activate Interface	2 pts	2 pts
Configure interface Lo0	Configure IPv4 address	0.5 pt	0.5 pts
Generate an RSA crypto key	1024 bits modulus	0.5 pt	0.5 pt

- Router 1
- Router 2

R1

```

Router>enable
Router#config terminal

Router(config)#no ip domain lookup

Router(config)#hostname R1

R1(config)#ip domain-name ccna-lab.com

R1(config)#enable secret ciscoenpass

R1(config)#line console 0
R1(config-line)#password ciscoconpass
R1(config-line)#login
R1(config-line)#exit

R1(config)#security passwords min-length 10

R1(config)#username admin secret admin1pass

R1(config)#line vty 0 15
R1(config-line)#login local
R1(config-line)#transport input ssh
R1(config-line)#exit

R1(config)#service password-encryption

R1(config)#banner motd #Unauthorized Access is Prohibited#

R1(config)#interface g0/0/0
R1(config-if)#description Connect to R2
R1(config-if)#ip address 10.67.254.2 255.255.255.252
R1(config-if)#no shutdown

R1(config-if)#interface g0/0/1
R1(config-if)#description Connect to LAN A
R1(config-if)#ip address 192.168.1.1 255.255.255.0
R1(config-if)#no shutdown

R1(config-if)##interface loopback 0
R1(config-if)#ip address 10.52.0.1 255.255.255.248
R1(config-if)#exit

R1(config)#crypto key generate rsa
How many bits in the modulus [512]: 1024
R1(config)#

```

R2

```

Router>enable
Router#config terminal

Router(config)#no ip domain lookup

Router(config)#hostname R2

R2(config)#ip domain-name ccna-lab.com

R2(config)#enable secret ciscoenpass

R2(config)#line console 0
R2(config-line)#password ciscoconpass
R2(config-line)#login
R2(config-line)#exit

R2(config)#security passwords min-length 10

R2(config)#username admin secret admin1pass

R2(config)#line vty 0 15
R2(config-line)#login local
R2(config-line)#transport input ssh
R2(config-line)#exit

R2(config)#service password-encryption

R2(config)#banner motd #Unauthorized Access is Prohibited#

R2(config)#interface g0/0/0
R2(config-if)#description Connect to R1
R2(config-if)#ip address 10.67.254.1 255.255.255.252
R2(config-if)#no shutdown

R2(config-if)#interface g0/0/1
R2(config-if)#description Connect to LAN B
R2(config-if)#ip address 10.67.1.1 255.255.255.0
R2(config-if)#no shutdown

R2(config-if)#interface loopback 0
R2(config-if)#ip address 209.165.201.1 255.255.255.224
R2(config-if)#exit

R2(config)#crypto key generate rsa
How many bits in the modulus [512]: 1024
R2(config)#

```

Step 3: Configure S1 and S2.

Configuration tasks for the switches include the following:

Task	Specification	S1	S2
------	---------------	----	----

Task	Specification	S1	S2
Disable DNS lookup		0.5 pt	0.5 pt
Switch name	S1 or S2, as appropriate	0.5 pt	0.5 pt
Domain name	ccna-lab.com	0.5 pt	0.5 pt
Encrypted privileged EXEC password	ciscoenpass	0.5 pt	0.5 pt
Console access password	ciscoconpass	0.5 pt	0.5 pt
Shutdown all unused interfaces		0.5 pt	0.5 pt
Create an administrative user in the local database	Username: admin Password: admin1pass	0.5 pt	0.5 pt
Set login on VTY lines to use local database		0.5 pt	0.5 pt
Set VTY lines to accept SSH connections only		0.5 pt	0.5 pt
Encrypt the clear text passwords		0.5 pt	0.5 pt
Configure an MOTD Banner		0.5 pt	0.5 pt
Generate an RSA crypto key	1024 bits modulus	0.5 pt	0.5 pt
Configure Management Interface (SVI) for VLAN 1 (the Management VLAN)	Set the Layer 3 IPv4 address	0.5 pt	0.5 pt
Configure Default Gateway		0.5 pt	0.5 pt

- Switch 1
- Switch 2

S1

```
Switch>enable
Switch#configure terminal

Switch(config)#no ip domain-lookup

Switch(config)#hostname S1

S1(config)#ip domain-name ccna-lab.com

S1(config)#enable secret ciscoenpass

S1(config)#line console 0
S1(config-line)#password ciscoconpass
S1(config-line)#login
S1(config-line)#exit

S1(config)#interface range f0/1-4, f0/7-24, g0/1-2
S1(config-if-range)#shutdown
S1(config-if-range)#exit

S1(config)#username admin secret admin1pass

S1(config)#line vty 0 15
S1(config-line)#login local
S1(config-line)#transport input ssh
S1(config-line)#exit

S1(config)#service password-encryption

S1(config)#banner motd #Unauthorized access or use prohibited#

S1(config)#crypto key generate rsa
How many bits in the modulus [512]: 1024

S1(config)# interface vlan 1
S1(config-if)#ip address 192.168.1.2 255.255.255.0
S1(config-if)#no shutdown
S1(config-if)#exit

S1(config)#ip default-gateway 192.168.1.1
```

S2


```
Switch>enable
Switch#configure terminal

Switch(config)#no ip domain-lookup

Switch(config)#hostname S2

S2(config)#ip domain-name ccna-lab.com

S2(config)#enable secret ciscoenpass

S2(config)#line console 0
S2(config-line)#password ciscoconpass
S2(config-line)#login
S2(config-line)#exit

S2(config)#interface range f0/1-4, f0/6-17, f0/19-24, g0/1-2
S2(config-if-range)#shutdown
S2(config-if-range)#exit

S2(config)#username admin secret admin1pass

S2(config)#line vty 0 15
S2(config-line)#login local
S2(config-line)#transport input ssh
S2(config-line)#exit

S2(config)#service password-encryption

S2(config)#banner motd #Unauthorized access or use prohibited#

S2(config)#crypto key generate rsa
How many bits in the modulus [512]: 1024

S2(config)# interface vlan 1
S2(config-if)#ip address 10.67.1.2 255.255.255.0
S2(config-if)#no shutdown
S2(config-if)#exit

S2(config)#ip default-gateway 10.67.1.1
```

Points for Step 1 (5 points):

Enter score here.

Points for Step 2 (21 points):

Enter score here.

Points for Step 3 (14 points):

Enter score here.

Instructor Sign-off Part 1:

Instructor Sign-off

Total points for Part 1 (40 points):

Enter score here.

Part 2: Configure Single Area OSPFv2

Total points: 10

Time: 10 minutes

Configuration tasks for R1 and R2 include the following:

Task	Specification	R1	R2
Configure the OSPF routing process	Use process id 1	1 pt	1 pt
Manually configure the router id	Use 0.0.0.1 for R1 and 0.0.0.2 for R2	1 pt	1 pt
Configure network statements	Configure a network statement for each locally attached network using a wild card mask that matches each network's subnet mask Note: R2 Lo0 network should not be included in the OSPF process.	3 pts	3 pts

- [Router 1](#)
- [Router 2](#)

R1

User Access Verification

Password: ciscoconpass

```
R1>enable
```

```
Password: ciscoenpass
```

```
R1#configure terminal
```

```
R1(config)#router ospf 1
```

```
R1(config-router)#router-id 0.0.0.1
```

```
R1(config-router)#network 10.67.254.0 0.0.0.3 area 0
```

```
R1(config-router)#network 192.168.1.0 0.0.0.255 area 0
```

```
R1(config-router)#network 10.52.0.0 0.0.0.7 area 0
```

```
R1(config-router)#
```

R2

User Access Verification

Password: ciscoconpass

R2>enable

Password: ciscoenpass

R2#configure terminal

R2(config)#router ospf 1

R2(config-router)#router-id 0.0.0.2

R2(config-router)#network 10.67.254.0 0.0.0.3 area 0

R2(config-router)#network 10.67.1.0 0.0.0.255 area 0

R2(config-router)#

Instructor Sign-off Part 2

Instruction Sign-off

Total Points (10 points):

Enter score here.

Part 3: Optimize Single-Area OSPFv2

Total points: 20

Time: 20 minutes

Step 1: Configure R1.

Configuration Tasks for R1 include the following:

Task	Specification	Points
Configure passive interfaces	Configure all interfaces that are not directly connected to an OSPF neighbor to be passive	3 points
Configure the reference bandwidth	Adjust the reference bandwidth to 1 Gigabit	2 points
Configure Loopback 0 to report the mask it is configured with instead of a host mask	Configure Loopback0 as a point-to-point network for OSPF	2 points
Tune the timers for your network	Configure the hello time for 30 seconds	1 point

Router 1

```

R1>enable
Password: ciscoenpass
R1#configure terminal

R1(config)#router ospf 1

R1(config-router)#passive-interface g0/0/1
R1(config-router)#passive-interface loopback 0

R1(config-router)#auto-cost reference-bandwidth 1000
R1(config-router)#exit

R1(config)#interface loopback 0
R1(config-if)#ip ospf network point-to-point
R1(config-if)#exit

R1(config)#interface g0/0/0
R1(config-if)#ip ospf hello-interval 30
R1(config-if)#

```

Step 2: Configure R2.

Configuration tasks for R2 include the following:

Task	Specification	Points
Configure passive interfaces	Configure all interfaces that are not directly connected to an OSPF neighbor to be passive	2 points
Configure the reference bandwidth	Adjust the reference bandwidth to 1 Gigabit	2 points
Provide default routing for the OSPF domain	Configure a static default route with loopback 0 as the exit interface, then share the default information with other OSPF speakers	5 points
Tune the timers for your network	Configure the hello time for 30 seconds	1 point
Tune the DR/BDR election to favor R2	Set the OSPF priority for R2 to a value of 50	2 points

Router 2

```

R2>en
Password: ciscoenpass
R2#configure terminal

R2(config)#router ospf 1

R2(config-router)#passive-interface g0/0/1
R2(config-router)#passive-interface loopback 0

R2(config-router)#auto-cost reference-bandwidth 1000

R2(config)#ip route 0.0.0.0 0.0.0.0 loopback 0
R2(config)#router ospf 1
R2(config-router)#default-information originate
R2(config-router)#exit

R2(config)#interface g0/0/0
R2(config-if)#ip ospf hello-interval 30

R2(config-if)#ip ospf priority 50
R2(config-if)#exit
R2(config)#

```

Points for Step 1 (8 points)

Enter score here.

Points for Step 2 (12 points)

Enter score here.

Instructor Sign-off Part 3:

Instructor Sign-off

Total points (20 points):

Enter score here.

Part 4: Configure Access Control, NAT, and perform configuration backup

Total points: 30

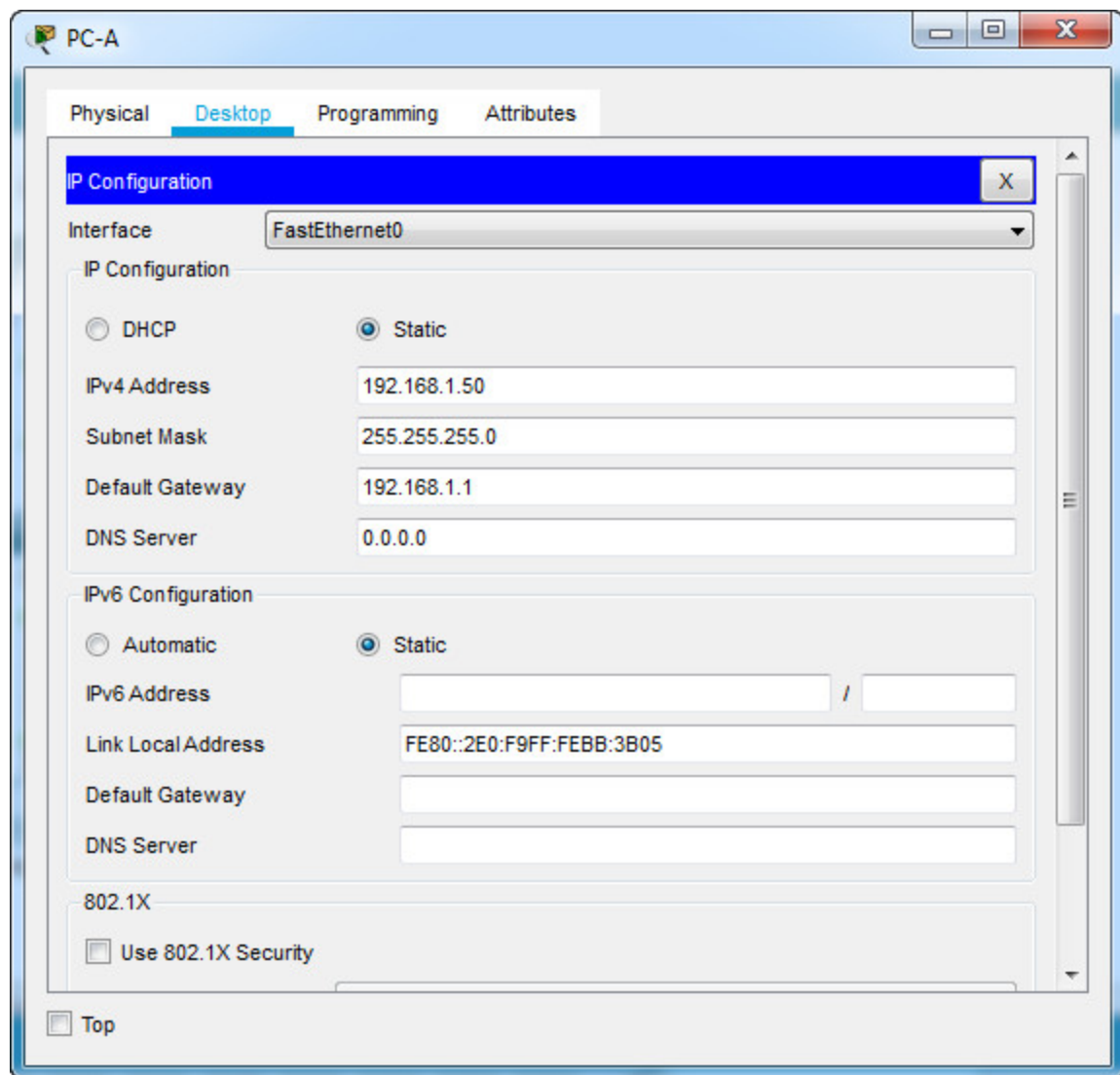
Time: 30 minutes

Step 1: Configure host computers.

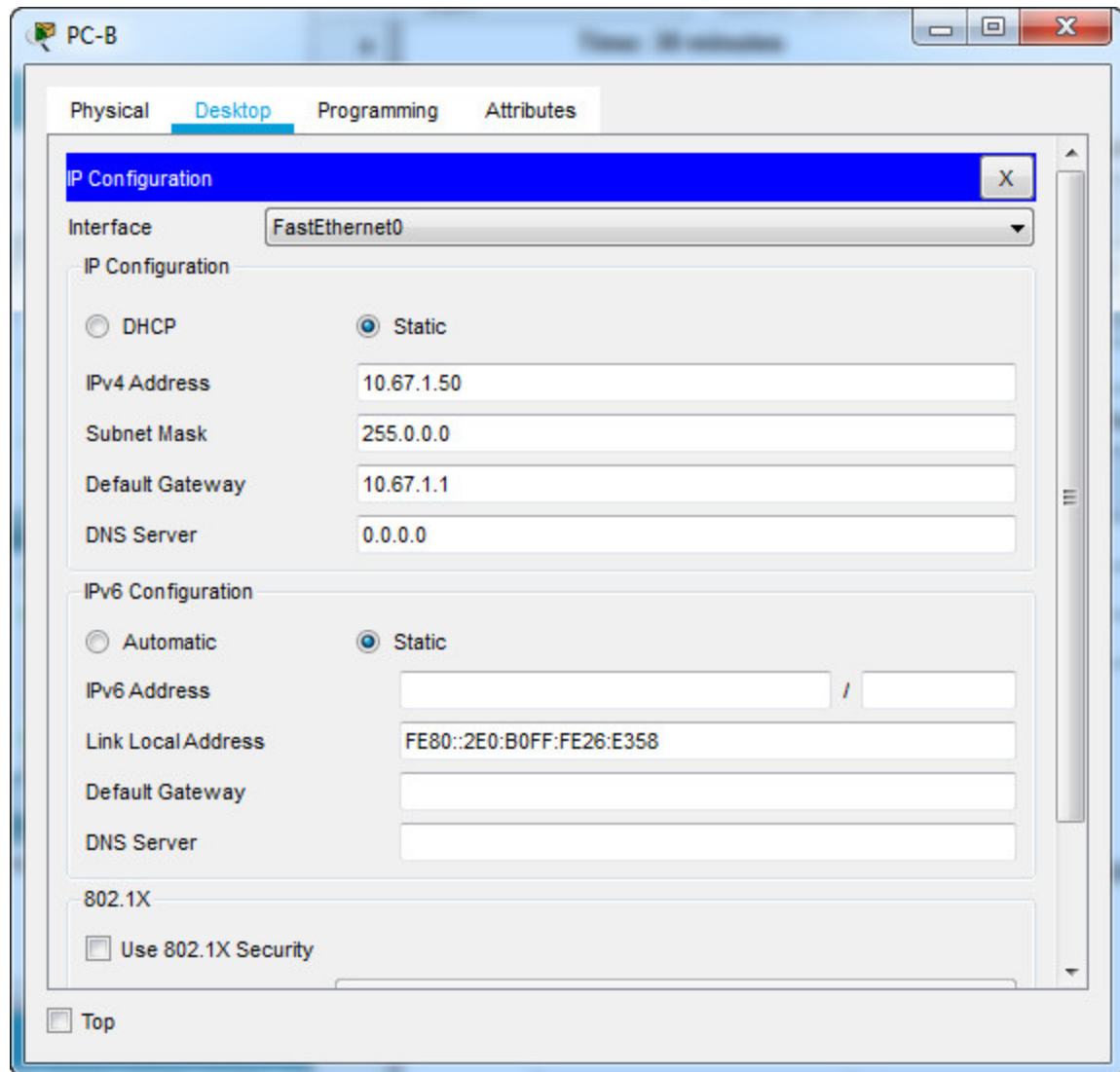
Configure the host computers PC-A and PC-B with IPv4 addresses. (4 points)

Description	PC-A	PC-B
IP Address	192.168.1.50	10.67.1.50
Subnet Mask	255.255.255.0	255.255.255.0
Default Gateway	192.168.1.1	10.67.1.1

PC-A



PC-B



After configuring each host computer, perform the following tests: (4 points)

Source	Target	Protocol	Expected Result
PC-A	PC-B	Ping (<code>C:\>ping 10.67.1.50</code>)	Success
PC-A	https://209.165.201.1	HTTPS (On browser, access: <code>https://209.165.201.1</code>)	Success
PC-A	209.165.201.1	SSH <code>C:\>ssh -l admin 209.165.201.1</code> Enter password: <code>admin1pass</code>	Success
PC-B	209.165.201.1	SSH <code>C:\>ssh -l admin 209.165.201.1</code> Enter password: <code>admin1pass</code>	Success

If you get different results, troubleshoot your OSPF and host configurations.

Note: If you are unable to access 209.165.201.1 via https, enter **ip http secure-server** at R2 CLI.

```
R2(config)# ip http secure-server
```

Step 2: Configure Access Control on R2.

Create and apply an access control list on R2 named **R2-SECURITY** to do the following:

Task	Specification	Points
Create an access control list	R2-SECURITY	2 points
Control HTTP and HTTPS traffic	Only hosts from the 10.0.0.0/8 network are allowed to reach the web server at 209.165.201.1	2 points
Control SSH traffic	SSH is not allowed to the address 209.165.201.1	2 points
Permit traffic	All other traffic, regardless of protocol, is allowed	2 points
Apply the ACL	Filter traffic originating from R1	2 points

On Router R2

```
R2(config)#ip access-list extended R2-SECURITY
R2(config-ext-nacl)#deny tcp any host 209.165.201.1 eq 443
R2(config-ext-nacl)#deny tcp any host 209.165.201.1 eq 22
R2(config-ext-nacl)#permit ip any any
R2(config-ext-nacl)#exit
```

```
R2(config)#interface g0/0/0
R2(config-if)#ip access-group R2-SECURITY in
```

After configuring and applying the ACL, perform the following tests: (2 points)

Source	Target	Protocol	Expected Result
PC-A	PC-B	Ping	Success
PC-A	https://209.165.201.1	HTTPS	Failure
PC-A	209.165.201.1	SSH	Failure
PC-B	209.165.201.1	SSH	Success

If you get different results, double check your ACL configuration and application.

Step 3: Configure NAT.

The decision has been made that the entire organization should be using addresses in the 10.0.0.0/8 network space. R1's LAN is out of compliance. There are applications and services running in the R1 LAN that cannot have their IP address changed without the entire system being rebuilt, so NAT is in order. Here are the configuration tasks at R1:

Task	Specification	Points
Remove 192.168.1.0/24 from OSPF	Remove the appropriate network statement at R1	2 points
Create an ACL to identify hosts allowed to be translated	Create an ACL that matches the 192.168.1.0 network	2 points
Configure Port Address Translation on the outside interface of R1	Configure the NAT association between the ACL and the interface g0/0/0 so that it uses port address translation	2 points
Identify the interfaces involved in NAT	Specify inside or outside on the appropriate interfaces	2 points

On Router R1

```
R1(config)#router ospf 1
R1(config-router)#no network 192.168.1.0 0.0.0.255 area 0
R1(config-router)#exit
```

```
R1(config)#access-list 1 permit 192.168.1.0 0.0.0.255
```

```
R1(config)#ip nat inside source list 1 interface g0/0/0 overload
```

```
R1(config)#interface g0/0/0
R1(config-if)#ip nat outside
R1(config-if)#interface g0/0/1
R1(config-if)#ip nat inside
R1(config-if)#
```

Step 4: Backup all device configurations.

Task	Specification	Points
Using the TFTP server on PC-B, backup the running configuration of all of your devices to PC-B using the TFTP protocol		2 points

On 4 devices: R1, R2, S1, S2:

User Access Verification

Password: ciscoconpass

R1/R2/S1/S2>en

Password: ciscoenpass

R1/R2/S1/S2#copy running-config tftp

Address or name of remote host []? 10.67.1.50

If you are testing on a real device, you can install and use SolarwinTFTP on PC-B as TFTP server

Points for Step 1 (8 points):

Enter score here.

Points for Step 2 (12 points):

Enter score here.

Points for Step 3 (8 points):

Enter score here.

Points for Step 4 (2 points):

Enter score here.

Instructor Sign-off Part 4:

Instructor Sign-off

Total points (30 points):

Enter score here.

Part 5: Cleanup

NOTE: DO NOT PROCEED WITH CLEANUP UNTIL YOUR INSTRUCTOR HAS GRADED YOUR SKILLS EXAM AND HAS INFORMED YOU THAT YOU MAY BEGIN CLEANUP.

Unless directed otherwise by the instructor, restore host computer network connectivity, and then turn off power to the host computers.

Before turning off power to the router and switch, remove the NVRAM configuration files (if saved) from both devices.

Disconnect and neatly put away all LAN cables that were used in the Final.

Router Interface Summary Table

Router Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2
1800	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)

Router Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2
1900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2801	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)
2811	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
4221	Gigabit Ethernet 0/0/0 (G0/0/0)	Gigabit Ethernet 0/0/1 (G0/0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)
4300	Gigabit Ethernet 0/0/0 (G0/0/0)	Gigabit Ethernet 0/0/1 (G0/0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)

Note: To find out how the router is configured, look at the interfaces to identify the type of router and how many interfaces the router has. There is no way to effectively list all the combinations of configurations for each router class. This table includes identifiers for the possible combinations of Ethernet and Serial interfaces in the device.

The table does not include any other type of interface, even though a specific router may contain one. An example of this might be an ISDN BRI interface. The string in parenthesis is the legal abbreviation that can be used in Cisco IOS commands to represent the interface.

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