CCNAv7 ITN Skills Assessment (Instructor Version)

**Instructor Note**: Red font color or gray highlights indicate text that appears in the instructor copy only.

# Topology



# Assessment Objectives

Part 1: Develop an IP Addressing Scheme (20 points, 25 minutes)

Part 2: Initialize and Reload Devices (10 points, 20 minutes)

Part 3: Configure Device IP address and Security Settings (45 points, 35 minutes)

Part 4: Test and Verify IPv4 and IPv6 End-to-End Connectivity (15 points, 20 minutes)

Part 5: Use the IOS CLI to Gather Device Information (10 points, 10 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 both IPv4 and IPv6 connectivity. You will configure security, including SSH, on the router. In addition, you will test and document the network using common CLI commands.

**Instructor Note**: For the student version of this exam, the instructor should build the network and connect devices prior to the student starting the exam. This will save time and reduce wear on cables and equipment. The student will need to initialize and reload devices.

**Instructor Note**: The router used with this SA is a Cisco 4221 with Cisco IOS XE Release 16.9.4 (universalk9 image). The switches used in the labs are Cisco Catalyst 2960s with Cisco IOS Release 15.2(2) (lanbasek9 image). Other routers, switches, and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and the output produced might vary from what is shown in the labs. Refer to the Router Interface Summary Table at the end of the lab for the correct interface identifiers. Refer to the **Router Interface Summary Table** at the end of the lab for the correct interface identifiers.

**Instructor Note**: For the initial SA setup, the router and switch should have a startup-configuration saved with hostnames (Rtr & Sws). The router should also have a loopback address configured and the switch should have vlan 99 configured. These configurations will be used to verify that the student initialized the devices correctly in Part 2. It is recommended that these configurations are saved to flash as SA\_Init and used to reset the device for the next student.

**Initial Script for SA:**

**Router**

enable

config terminal

hostname Rtr

interface lo1

ip address 10.10.10.10. 255.255.255.255

end

copy run start

**Switch**

enable

config terminal

hostname Sws

vlan 99

end

copy run start

**Instructor Note**: Sample scoring and estimated times for each exam part are provided. These can be adjusted by the instructor as necessary to suit the testing environment. Total points for the exam are 100 and total time is estimated at 110 minutes. The instructor may elect to deduct points if excessive time is taken for a part of the assessment.

# Required Resources

* 1 Router (Cisco 4221 with Cisco IOS XE Release 16.9.4 universal image or comparable)
* 1 Switch (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

## Develop an IP Addressing Scheme

**Ref labs: Lab - Calculate IPv4 Subnets**

**Lab - Design and Implement a VLSM Addressing Scheme**

**Lab – Configure IPv6 Addresses on Network Devices**

**Total points: 20**

**Time: 25 minutes**

* + - 1. Your instructor will assign one of the IPv4 networks from the table below. You will subnet it to provide IP addresses to two subnets that will support the required number of hosts. No subnet calculators may be used. All work must be shown using the IP Addressing worksheet below.

| Network | Number of Hosts in Subnet A | Number of Hosts in Subnet B |
| --- | --- | --- |
| 192.168.10.0/24 | 100 | 50 |
| 172.16.1.0/25 | 60 | 20 |
| 209.165.201.0/27 | 12 | 5 |

IP Addressing Worksheet

| Specification | Subnet A | Subnet B |
| --- | --- | --- |
| Number of bits in the subnet | Answers will vary. | Answers will vary. |
| IP mask (binary) | Answers will vary. | Answers will vary. |
| New IP mask (decimal) | Answers will vary. | Answers will vary. |
| Maximum number of usable subnets (including the 0th subnet) | Answers will vary. | Answers will vary. |
| Number of usable hosts per subnet | Answers will vary. | Answers will vary. |
| IP Subnet | Answers will vary. | Answers will vary. |
| First IP Host address | Answers will vary. | Answers will vary. |
| Last IP Host address | Answers will vary. | Answers will vary. |

* + - 1. Record your subnet assignment in the table below.
         1. Assign the first IPv4 address of each subnet to a router interface

subnet A is hosted on R1 G0/0/1

subnet B is hosted on R1 G0/0/0

* + - * 1. Assign the last IPv4 address of each subnet to the PC NIC
        2. Assign the second IPv4 address of subnet A to S1
        3. List the maximum number of useable hosts per subnet

|  |  |  |
| --- | --- | --- |
| Description | Subnet A | Subnet B |
| First IP address | Answers will vary. | Answers will vary. |
| Last IP address | Answers will vary. | Answers will vary. |
| Maximum number of hosts | Answers will vary. | Answers will vary. |

* + - 1. Record the IP address information for each device:

| Device | IP address | Subnet Mask | Gateway | Points |
| --- | --- | --- | --- | --- |
| PC-A | Answers will vary. | Answers will vary. | Answers will vary. | 2 points |
| R1-G0/0/0 | Answers will vary. | Answers will vary. | N/A | 2 points |
| R1-G0/0/1 | Answers will vary. | Answers will vary. | N/A | 2 points |
| S1 | Answers will vary. | Answers will vary. | Answers will vary. | 2 points |
| PC-B | Answers will vary. | Answers will vary. | Answers will vary. | 2 points |

* + - 1. Use the IPv6 address 2001:db8:acad::/48 and create two subnets for use in this network. Record the IPv6 addresses in the table.

| Assigned to Interface | IPv6 Subnet Address | Prefix Length |
| --- | --- | --- |
| Answers will vary. | Answers will vary. | Answers will vary. |
| Answers will vary. | Answers will vary. | Answers will vary. |

* + - 1. Record the IPv6 address information for each device.

**Note**: Use **FE80::1** as the link-local address on both router interfaces.

| Device | IPv6 address | Prefix Length | Gateway | Points |
| --- | --- | --- | --- | --- |
| R1-G0/0/0 | Answers will vary. | Answers will vary. | N/A | 3 pts |
| R1-G0/0/1 | Answers will vary. | Answers will vary. | N/A | 3 pts |
| S1 | Answers will vary. | Answers will vary. | Answer will vary. | 4 pts |

Before proceeding, verify your IP addressing scheme with the instructor.

**Instructor Sign-off Part 1:**

Instructor Sign-off

**Total Points for Part 1 (20 points):**

Enter score here.

## Initialize and Reload Devices

**Ref labs: 2.9.2 Lab – Basic Switch and End Device Configuration**

**10.4.4 Lab – Build a Switch and Router Network**

**Total points: 10**

**Time: 20 minutes**

* Erase the startup configurations and VLANs from the router and switch and reload the devices.
* After the switch is reloaded, change the SDM template to one that supports IPv6 as necessary, and reload the switch again.

Before proceeding, ask your instructor verify device initializations.

| Task | IOS Command | Points |
| --- | --- | --- |
| Erase the startup-config file on the Router. | Rtr# **erase startup-config** | (2 point) |
| Reload the Router. | Rtr# **reload**  (Verify by using **show run** command to see if loopback address is missing. Hostname should be reset back to **Router**.) | (1 point) |
| Erase the startup-config file on the Switch. | Sws# **erase startup-config** | (2 point) |
| Delete the vlan.dat file on the Switch | Sws# **del vlan.dat**  (Verify by using the **show vlan** command and look for vlan 99, if vlan.dat file was deleted vlan 99 will not be listed.) | (2 point) |
| Reload the Switch. | Sws# **reload**  (To verify check to see if hostname is reset back to **Switch**.) | (1 point) |
| Verify the Switch SDM Template | Switch# **show sdm prefer**  (To verify check to see that the SDM template supports IPv6; this will vary depending upon the switch being used) | (2 point) |

**Instructor Sign-off Part 2:**

Instructor Sign-off

**Total points (10 points):**

Enter score here.

## Configure Device IP Address and Security Settings

**Ref labs: 2.9.2 Lab - Basic Switch and End Device Configuration**

**10.4.4 Lab - Build a Switch and Router Network**

**16.4.7 Lab - Configure Network Devices with SSH**

**16.5.2 Lab - Secure Network Devices**

**Total points: 45**

**Time: 35 minutes**

### Configure R1.

Configuration tasks for R1 include the following:

| Task | Specification | Points |
| --- | --- | --- |
| Disable DNS lookup |  | 1 point |
| Router name | R1 | 1 point |
| Domain name | ccna-lab.com | 1 point |
| Encrypted privileged EXEC password | ciscoenpass | 1 point |
| Console access password | ciscoconpass | 1 point |
| Set the minimum length for passwords | 10 characters | 2 points |
| Create an administrative user in the local database | Username: **admin**  Password: **admin1pass** | 2 points |
| Set login on vty lines to use local database |  | 1 point |
| Set vty lines to accept SSH connections only |  | 1 point |
| Encrypt the clear text passwords |  | 1 point |
| Configure an MOTD Banner |  | 1 point |
| Enable IPv6 Routing |  | 1 point |
| Configure Interface G0/0/0 | Set the description  Set the Layer 3 IPv4 address  Set the IPv6 Link Local Address as **FE80::1**  Set the Layer 3 IPv6 address  Activate Interface | 6 points |
| Configure Interface G0/0/1 | Set the description  Set the Layer 3 IPv4 address  Set the IPv6 Link Local Address as **FE80::1**  Set the Layer 3 IPv6 address  Activate Interface | 6 points |
| Generate an RSA crypto key | 1024 bits modulus | 2 points |

**Instructor Note**: Ask the student to connect to R1, and then verify the proper configuration.

| Task | Specification | IOS Commands |
| --- | --- | --- |
| Disable DNS lookup |  | R1# **show run**  (Look for: **no ip domain lookup**) |
| Router name | R1 | (Look for: **R1>** or **R1#** command prompt) |
| Domain name | ccna-lab.com | R1# **show run**  (Look for: **ip domain name ccna-lab.com**) |
| Encrypted privileged EXEC password | ciscoenpass | R1> **enable**  (Type in privileged EXEC password) |
| Console access password | ciscoconpass | R1# **exit**  (Type in access password) |
| Set the minimum length for passwords | 10 characters | R1# **show run | include security**  (Look for: **security passwords min-length 10**) |
| Create an administrative user the in local database | User: **admin**  Password: **admin1pass** | R1# **ssh -l admin 192.168.10.1** (G0/0/1 interface IP address)  R1# **ssh -l admin 172.16.1.1** (G0/0/1 interface IP address)  R1# **ssh -l admin 209.165.201.1** (G0/0/1 interface IP address)  (Type in the username and password. Type exit to leave SSH session.) |
| MOTD Banner |  | (Verify banner during above step) |
| Set login on vty lines to use local database |  | R1# **show run | section vty**  (Look under line vty 0 4 for: **login local**) |
| Set vty lines to accept SSH connections only |  | R1# **show run | section vty**  (Look under line vty 0 4 for: **transport input ssh**) |
| Encrypt the plain text passwords |  | R1# **show run | include password**  (Look for: **service password-encryption**) |
| Enable IPv6 Routing |  | R1# **show run | include routing**  (Look for **ipv6 unicast-routing**) |
| Interface G0/0/0 | Set the description  Set the Layer 3 IPv4 address  Set the IPv6 Link Local Address as FE80::1  Set the Layer 3 IPv6 address  Activate Interface | R1# **show interface g0/0/0**  R1# **show ipv6 interface g0/0/0**  (Look for IP address, description, and verify that interface is not administratively down.) |
| Interface G0/0/1 | Set the description  Set the Layer 3 IPv4 address  Set the IPv6 Link Local Address as FE80::1  Set the Layer 3 IPv6 address  Activate Interface | R1# **show ip interface g0/0/1**  R1# **show ipv6 interface g0/0/1**  (Look for IP address, description, and verify that interface is not administratively down.) |
| Generate an RSA crypto key. | 1024 bits modulus | R1# **show crypto key mypubkey rsa**  (Look for Key name= R1.ccna-lab.com.) |

### Configure S1.

Configuration tasks for S1 include the following:

| Task | Specification | Points |
| --- | --- | --- |
| Disable DNS lookup |  | 1 point |
| Switch name | S1 | 1 point |
| Domain name | ccna-lab.com | 1 point |
| Encrypted privileged EXEC password | ciscoenpass | 1 point |
| Console access password | ciscoconpass | 1 point |
| Shutdown all unused interfaces | F0/1-4, F0/7-24, G0/1-2 | 1 point |
| Create an administrative user in the local database | Username: **admin**  Password: **admin1pass** | 1 point |
| Set login on vty lines to use local database |  | 1 point |
| Set vty lines to accept SSH connections only |  | 1 point |
| Encrypt the clear text passwords |  | 1 point |
| Configure an MOTD Banner |  | 1 point |
| Generate an RSA crypto key | 1024 bits modulus | 2 points |
| Configure Management Interface (SVI) on VLAN1 | Set the description  Set the Layer 3 IPv4 address  Set the IPv6 Link Local Address as **FE80::2**  Set the Layer 3 IPv6 address | 2 points |

**Instructor Note**: Have the student connect to S1, and then verify the proper configuration.

| Task | Specification | IOS Commands |
| --- | --- | --- |
| Disable DNS lookup |  | S1# **show run | inc domain**  (Look for: **no ip domain lookup**) |
| Switch name | S1 | (Look for: **S1>** or **S1#** command prompt) |
| Domain name | ccna-lab.com | S1# **show run | include domain**  (Look for: **ip domain name ccna-lab.com**) |
| Encrypted privileged EXEC password | ciscoenpass | S1> **enable**  (Type in privileged EXEC password) |
| Console access password | ciscoconpass | S1> **exit**  (Type in console access password) |
| Interfaces shutdown | Interfaces F0/1-4, F0/7-24, G0/1-2 | S1# **show ip interface brief**  (all interfaces should be administratively down, except F0/5, F0/6, and VLAN 1) |
| Create an administrative user the in local database | User: **admin**  Password: **admin1pass** | S1# **ssh -l admin 192.168.10.2** (VLAN 1 interface IP address)  S1# **ssh -l admin 172.16.1.2** (VLAN 1 interface IP address)  S1# **ssh -l admin 209.165.201.2** (VLAN 1 interface IP address)  (Type in the username and password. Type exit to leave SSH session.) |
| MOTD Banner |  | (Verify banner during above step) |
| Set login on vty lines to use local database |  | S1# **show run | section vty**  (Look under line vty 0 4 for: **login local**) |
| Set vty lines to accept SSH connections only |  | S1# **show run | section vty**  (Look under line vty 0 4 for: **transport input ssh**) |
| Encrypt the plain text passwords |  | S1# **show run | include password**  (Look for: **service password-encryption**) |
| Generate an RSA crypto key. | 1024 bits modulus | S1# **show crypto key mypubkey rsa**  (Look for Key name= S1.ccna-lab.com.) |
| Configure Management Interface (SVI) | Set the description  Set the Layer 3 IPv4 address  Set the IPv6 Link Local Address as FE80::2  Set the Layer 3 IPv6 address | S1# **show interface vlan 1**  S1# **show ipv6 interface vlan 1**  (Look at interface VLAN1 and verify that the correct IP address has been assigned.) |

### Configure host computers.

After configuring each host computer, record the host network settings with the **ipconfig /all** command. (2 points)

| PC-A Network Configuration (1 point) | |
| --- | --- |
| Description | Answers will vary. |
| Physical Address | Answers will vary. |
| IPv4 Address | Answers will vary. |
| Subnet Mask | Answers will vary. |
| IPv4 Default Gateway | Answers will vary. |
| IPv6 Address | Answers will vary. |
| IPv6 Default Gateway | Answers will vary. |

| PC-B Network Configuration (1 point) | |
| --- | --- |
| Description | Answers will vary. |
| Physical Address | Answers will vary. |
| IP Address | Answers will vary. |
| Subnet Mask | Answers will vary. |
| Default Gateway | Answers will vary. |
| IPv6 Address | Answers will vary. |
| IPv6 Default Gateway | Answers will vary. |

**Points for Step 1 (28 points):**

Enter score here.

**Points for Step 2 (15 points):**

Enter score here.

**Points for Step 3 (2 points):**

Enter score here.

**Instructor Sign-off Part 4:**

Instructor Sign-off

**Total Points for Part 3 (45 points)**

Enter score here.

## Test and Verify End-to-End Connectivity

**Ref lab: 13.3.2 Lab – Use Ping and Traceroute to Test Network Connectivity**

**Total points: 15**

**Time: 10 minutes**

Use the ping command to test IPv4 and IPv6 connectivity between all network devices.

**Note**: If pings to host computers fail, temporarily disable the computer firewall and retest.

Use the following table to methodically verify connectivity with each network device. Take corrective action to establish connectivity if a test fails:

| From | To | Protocol | IP Address | Ping Results | Points |
| --- | --- | --- | --- | --- | --- |
| PC-A | R1 G0/0/0 | IPv4 | Answers will vary. | Should be successful. | 1 point |
| PC-A | R1 G0/0/0 | IPv6 | Answers will vary. | Should be successful. | 1 point |
| PC-A | R1 G0/0/1 | IPv4 | Answers will vary. | Should be successful. | 1 point |
| PC-A | R1 G0/0/1 | IPv6 | Answers will vary. | Should be successful. | 1 point |
| PC-A | S1 VLAN 1 | IPv4 | Answers will vary. | Should be successful. | 1 point |
| PC-A | S1 VLAN 1 | IPv6 | Answers will vary. | Should be successful. | 1 point |
| PC-A | PC-B | IPv4 | Answers will vary. | Should be successful. | 1 point |
| PC-A | PC-B | IPv6 | Answers will vary. | Should be successful. | 1 point |
| PC-B | R1 G0/0/0 | IPv4 | Answers will vary. | Should be successful. | 1 point |
| PC-B | R1 G0/0/0 | IPv6 | Answers will vary. | Should be successful. | 1 point |
| PC-B | R1 G0/0/1 | IPv4 | Answers will vary. | Should be successful. | 1 point |
| PC-B | R1 G0/0/1 | IPv6 | Answers will vary. | Should be successful. | 1 point |
| PC-B | S1 VLAN1 | IPv4 | Answers will vary. | Should be successful. | 1 point |
| PC-B | S1 VLAN1 | IPv6 | Answers will vary. | Should be successful. | 1 point |

#### Question:

In addition to the ping command, what other command is useful in displaying network delay and breaks in the path to the destination? (1 point)

Type your answers here.

tracert or traceroute

**Instructor Sign-off Part 4:**

Instructor Sign-off

**Total points for Part 4 (15 points):**

Enter score here.

## Use the IOS CLI to Gather Device Information

**Ref labs: 2.9.2 Lab – Basic Switch and End Device Configuration**

**10.4.3 Lab – Build a Switch and Router Network**

**Total points: 10**

**Time: 10 minutes**

### Issue the appropriate command to discover the following information:

**Instructor Note**: Answers for step 1 will vary based on router model and IOS.

|  |  |  |
| --- | --- | --- |
| Description |  | Points |
| Router Model | Answers will vary. | 1/3 point |
| IOS Image File | Answers will vary. | 1/3 point |
| Total RAM | Answers will vary. | 1/3 point |
| Total Flash Memory | Answers will vary. | 1/3 point |
| Configuration Register | Answers will vary. | 1/3 point |
| CLI Command Used | show version | 1/3 point |

### Enter the appropriate CLI command needed to display the following on R1:

| Command Description | Command | Points |
| --- | --- | --- |
| Display a summary of important information about the IPv4 interfaces on R1. | show ip interface brief | 1 point |
| Display the IPv4 routing table. | show ip route | 1 point |
| Display the Layer 2 to Layer 3 mapping of addresses on R1. | show arp | 1 point |
| Display detailed IPv4 information about interface G0/0/0 on R1. | show interface g0/0/0 | 1 point |
| Display the IPv6 routing table. | show ipv6 route | 1 point |
| Display a summary of IPv6 interface addresses and status. | show ipv6 interface brief | 1 point |
| Display information about the devices connected to R1. Information should include Device ID, Local Interface, Hold time, Capability, Platform, and Port ID. | show cdp neighbor | 1 point |
| Save the current configuration so it will be used the next time the router is started. | copy running-config startup-config | 1 point |

**Instructor Sign-off Part 5:**

Instructor Sign-off

**Total points for Part 5 (10 points):**

Enter score here.

## 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) |
| 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.

End of document

# Answer key for 192.168.10.0 /24

| Specification | Subnet A (192.168.10.0 /24) | Subnet B (192.168.10.0 /24) |
| --- | --- | --- |
| Number of bits in the subnet | 7 | 6 |
| IP mask (binary) | 11111111.11111111.11111111.10000000 | 11111111.11111111.11111111.11000000 |
| New IP mask (decimal) | 255.255.255.128 | 255.255.255.192 |
| Maximum number of usable hosts per subnet | 126 | 62 |
| Maximum usable subnets | 2 | 4 |
| IP Subnet | 192.168.10.0 | 192.168.10.128 |
| First IP Host address | 192.168.10.1 | 192.168.10.129 |
| Last IP Host address | 192.168.10.126 | 192.168.10.190 |

| Device | IP Address | Subnet Mask | Default Gateway |
| --- | --- | --- | --- |
| PC-A | 192.168.10.125 | 255.255.255.128 | 192.168.10.1 |
| S1-VLAN1 | 192.168.10.2 | 255.255.255.128 | 192.168.10.1 |
| Router1-G0/0/0 | 192.168.10.129 | 255.255.255.192 | N/A |
| Router1-G0/0/1 | 192.168.10.1 | 255.255.255.128 | N/A |
| PC-B | 192.168.10.190 | 255.255.255.192 | 192.168.10.129 |

# Answer key for 172.16.1.0 /25

| Specification | Subnet A | Subnet B |
| --- | --- | --- |
| Number of bits in the subnet | 6 | 5 |
| IP mask (binary) | 11111111.11111111.11111111.11000000 | 11111111.11111111.11111111.11100000 |
| New IP mask (decimal) | 255.255.255.192 | 255.255.255.224 |
| Maximum number of usable hosts per subnet | 62 | 60 |
| Maximum usable subnets | 2 | 4 |
| IP Subnet | 172.16.1.0 | 172.16.1.64 |
| First IP Host address | 172.16.1.1 | 172.16.1.65 |
| Last IP Host address | 172.16.1.62 | 172.16.1.94 |

|  |  |  |  |
| --- | --- | --- | --- |
| Device | IP address | Subnet Mask | Default Gateway |
| PC-A | 172.16.1.62 | 255.255.255.192 | 172.16.1.1 |
| S1-VLAN1 | 172.16.1.2 | 255.255.255.192 | 172.16.1.1 |
| Router1-G0/0/0 | 172.16.1.65 | 255.255.255.224 | N/A |
| Router1-G0/0/1 | 172.16.1.1 | 255.255.255.192 | N/A |
| PC-B | 172.16.1.94 | 255.255.255.224 | 172.16.1.65 |

# Answer key for 209.165.201.0 /27

| Specification | Subnet A | Subnet B |
| --- | --- | --- |
| Number of bits in the subnet | 4 | 3 |
| IP mask (binary) | 11111111.11111111.11111111.11110000 | 11111111.11111111.11111111.11111000 |
| New IP mask (decimal) | 255.255.255.240 | 255.255.255.248 |
| Maximum number of usable hosts per subnet | 14 | 6 |
| Maximum usable subnets | 2 | 4 |
| IP Subnet | 209.165.201.0 | 209.165.201.16 |
| First IP Host address | 209.165.201.1 | 209.165.201.17 |
| Last IP Host address | 209.165.201.14 | 209.165.201.22 |

| Device | IP address | Subnet Mask | Default Gateway |
| --- | --- | --- | --- |
| PC-A | 209.165.201.14 | 255.255.255.240 | 209.165.201.1 |
| S1-VLAN1 | 209.165.201.2 | 255.255.255.240 | 209.165.201.1 |
| Router1-G0/0/0 | 209.165.201.17 | 255.255.255.248 | N/A |
| Router1-G0/0/1 | 209.165.201.1 | 255.255.255.240 | N/A |
| PC-B | 209.165.201.22 | 255.255.255.248 | 209.165.201.17 |

# Device Configs

# Router R1 (Final)

R1# show run

Building configuration...

Current configuration : 1996 bytes

!

version 16.9

service timestamps debug datetime msec

service timestamps log datetime msec

service password-encryption

platform qfp utilization monitor load 80

no platform punt-keepalive disable-kernel-core

!

hostname R1

!

boot-start-marker

boot-end-marker

!

!

vrf definition Mgmt-intf

!

address-family ipv4

exit-address-family

!

address-family ipv6

exit-address-family

!

security passwords min-length 10

enable secret 5 $1$tb37$HEFly7HEQ9wFtxe8mOxge1

!

no aaa new-model

!

!

no ip domain lookup

ip domain name ccna-lab.com

!

login on-success log

!

subscriber templating

!

ipv6 unicast-routing

multilink bundle-name authenticated

!

spanning-tree extend system-id

!

username admin secret 5 $1$v7EB$LvxDoR.KMsSFTmxJHIuyz0

!

redundancy

mode none

!

!

interface GigabitEthernet0/0/0

description Connection to PC-B

ip address 192.168.10.129 255.255.255.192

! ip address 172.16.1.65 255.255.255.224

! ip address 209.165.201.17 255.255.255.248

negotiation auto

ipv6 address FE80::1 link-local

ipv6 address 2001:DB8:ACAD:A::1/64

!

interface GigabitEthernet0/0/1

description Connection to S1

ip address 192.168.10.1 255.255.255.128

! ip address 172.16.1.1 255.255.255.192

! ip address 209.165.201.1 255.255.255.240

negotiation auto

ipv6 address FE80::1 link-local

ipv6 address 2001:DB8:ACAD:B::1/64

!

interface Serial0/1/0

no ip address

!

interface Serial0/1/1

no ip address

!

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

negotiation auto

!

ip forward-protocol nd

no ip http server

ip http secure-server

ip tftp source-interface GigabitEthernet0

!

!

control-plane

!

banner motd ^C Authorized Users Only! ^C

!

line con 0

password 7 070C285F4D061A0A19020A1F17

logging synchronous

login

transport input none

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login local

transport input ssh

!

!

end

# Switch S1 (Final)

S1#show run

Building configuration...

Current configuration : 1738 bytes

!

version 15.2

no service pad

service timestamps debug datetime msec

service timestamps log datetime msec

service password-encryption

!

hostname S1

!

boot-start-marker

boot-end-marker

!

enable secret 5 $1$U.Gu$rthhg.cuhJEl8OG614qNh/

!

username admin secret 5 $1$c0St$WJhIQdKvG3VLq/6rqysLE.

no aaa new-model

system mtu routing 1500

!

!

no ip domain lookup

ip domain-name ccna-lab.com

!

!

!

spanning-tree mode rapid-pvst

spanning-tree extend system-id

!

vlan internal allocation policy ascending

!

!

interface FastEthernet0/1

shutdown

!

interface FastEthernet0/2

shutdown

!

interface FastEthernet0/3

shutdown

!

interface FastEthernet0/4

shutdown

!

interface FastEthernet0/5

!

interface FastEthernet0/6

!

interface FastEthernet0/7

shutdown

!

interface FastEthernet0/8

shutdown

!

interface FastEthernet0/9

shutdown

!

interface FastEthernet0/10

shutdown

!

interface FastEthernet0/11

shutdown

!

interface FastEthernet0/12

shutdown

!

interface FastEthernet0/13

shutdown

!

interface FastEthernet0/14

shutdown

!

interface FastEthernet0/15

shutdown

!

interface FastEthernet0/16

shutdown

!

interface FastEthernet0/17

shutdown

!

interface FastEthernet0/18

shutdown

!

interface FastEthernet0/19

shutdown

!

interface FastEthernet0/20

shutdown

!

interface FastEthernet0/21

shutdown

!

interface FastEthernet0/22

shutdown

!

interface FastEthernet0/23

shutdown

!

interface FastEthernet0/24

shutdown

!

interface GigabitEthernet0/1

shutdown

!

interface GigabitEthernet0/2

shutdown

!

interface Vlan1

description Connection to R1

ip address 192.168.10.2 255.255.255.128

! ip address 172.16.1.2 255.255.255.192

! ip address 209.165.2201.2 255.255.255.240

ipv6 address FE80::2 link-local

ipv6 address 2001:DB8:ACAD:A::2/64

!

ip default-gateway 192.168.10.1

! ip default-gateway 172.16.1.1

! ip default-gateway 209.165.201.1

ip http server

ip http secure-server

!

!

banner motd ^C Authorized Users Only! ^C

!

line con 0

password 7 094F471A1A0A141D051C053938

login

line vty 0 4

login local

transport input ssh

line vty 5 15

login

!

end