**CCNA: Introduction to Networks**
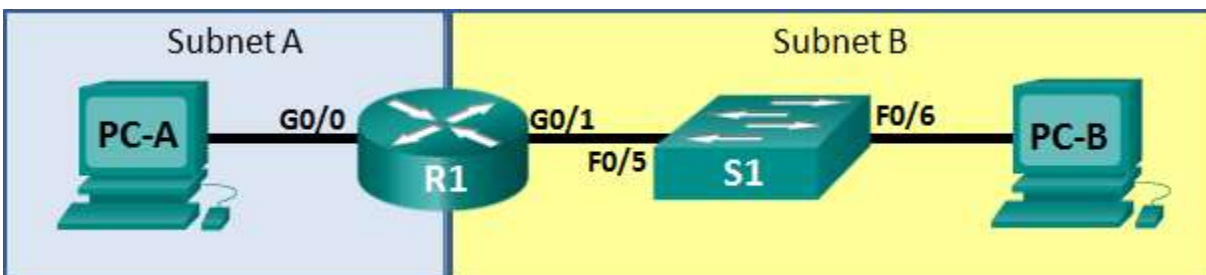
# Skills Assessment – Student Training Exam

## Topology



## Assessment Objectives

> **Part 1: Develop the IPv4 Address Scheme** (15 points, 20 minutes)
>
> **Part 2: Initialize and Reload Devices** (10 points, 5 minutes)
>
> **Part 3: Configure Device IPv4 and Security Settings** (30 points, 20 minutes)
>
> **Part 4: Test and Verify IPv4 End-to-End Connectivity** (8 points, 10 minutes)
>
> **Part 5: Configure IPv6 Addressing on R1** (10 points, 10 minutes)
>
> **Part 6: Test and Verify IPv6 End-to-End Connectivity** (7 points, 10 minutes)
>
> **Part 7: Use the IOS CLI to Gather Device Information** (10 points, 10 minutes)
>
> **Part 8: Save the R1 Configuration to a TFTP Server** (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. You will test and document the network using common CLI commands. Finally, you will save the router configuration to a TFTP server.

## Required Resources

- 1 Router (Cisco 1941 with Cisco IOS Release 15.2(4)M3 universal image or comparable)
- 1 Switch (Cisco 2960 with Cisco IOS Release 15.0(2) lanbasek9 image or comparable)
- 2 PCs (Windows 7, Vista, or XP with terminal emulation program, such as Tera Term)
- Console cable to configure the Cisco IOS devices via the console ports
- Ethernet cables as shown in the topology

**Instructor Note**: Part 8 requires a TFTP server. Tftpd32 is recommended and must be preinstalled on PC-A.

**Instructor Note**: If Windows XP hosts are used, it may be necessary to install IPv6. Refer to Lab 0.0.0.2: *Installing the IPv6 Protocol with Windows XP* in the Instructor Lab Manual.

# Part 1:   Develop the IPv4 Addressing Scheme

**Total points: 15**

**Time: 20 minutes**

Given an IP address and mask of _____ (address / mask), design an
IP addressing scheme that satisfies the following requirements. Network address/mask and the number of
hosts for Subnets A and B will be provided by your instructor.

| Subnet | Number of Hosts |
|---|---|
| Subnet A | |
| Subnet B | |

The $0^{th}$ subnet is used. No subnet calculators may be used. All work must be shown on the other side of this
page.

| Subnet A | | |
|---|---|---|
| **Specification** | **Student Input** | **Points** |
| Number of bits in the subnet | | (5 points) |
| IP mask (binary) | | |
| New IP mask (decimal) | | |
| Maximum number of usable subnets (including the $0^{th}$ subnet) | | |
| Number of usable hosts per subnet | | |
| IP Subnet | | |
| First IP Host address | | |
| Last IP Host address | | |

| Subnet B | | |
|---|---|---|
| **Specification** | **Student Input** | **Points** |
| Number of bits in the subnet | | (5 points) |
| IP mask (binary) | | |
| New IP mask (decimal) | | |
| Maximum number of usable subnets (including the 0th subnet) | | |
| Number of usable hosts per subnet | | |
| IP Subnet | | |
| First IP Host address | | |
| Last IP Host address | | |

Host computers will use the first IP address in the subnet. The network router will use the LAST network host
address. The switch will use the second to the last network host address.

Write down the IP address information for each device:

| Device | IP address | Subnet Mask | Gateway | Points |
|--------|-----------|-------------|---------|--------|
| PC-A | | | | (5 points) |
| R1-G0/0 | | | N/A | |
| R1-G0/1 | | | N/A | |
| S1 | | | | |
| PC-B | | | | |

**Before proceeding, verify your IP addresses with the instructor.**

**Instructor Sign-off Part 1:** _____

**Points:** _____ **of 15**

# Part 2:  Initialize and Reload Devices

**Total points: 10**

**Time: 5 minutes**

### Step 1:  Initialize and reload router and switch. (10 points)

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

Before proceeding, have your instructor verify device initializations.

| Task | IOS Command | Points |
|------|-------------|--------|
| Erase the startup-config file on the Router. | | (2 point) |
| Reload the Router. | | (2 point) |
| Erase the startup-config file on the Switch. | | (2 point) |
| Delete the vlan.dat file on the Switch | | (2 point) |
| Reload the Switch. | | (2 point) |

**Instructor Sign-off Part 2:** _____

**Points:** _____ **of 10**

# Part 3:  Configure Device IPv4 and Security Settings

**Total points: 30**

**Time: 20 minutes**

### Step 1:  Configure host computers.

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

| PC-A Network Configuration | | Points |
|---|---|---|
| Description | | (2 points) |
| Physical Address | | |
| IP Address | | |
| Subnet Mask | | |
| Default Gateway | | |

| PC-B Network Configuration | | Points |
|---|---|---|
| Description | | (2 points) |
| Physical Address | | |
| IP Address | | |
| Subnet Mask | | |
| Default Gateway | | |

## Step 2:   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) |
| Telnet access password | ciscovtypass | (1 point) |
| Set the minimum length for passwords | 10 characters | (2 points) |
| Create an administrative user in the local database | Username: admin<br>Password: admin1pass | (2 points) |
| Set login on VTY lines to use local database | | (1 point) |
| Set VTY lines to accept ssh and telnet connections only | | (2 points) |
| Encrypt the clear text passwords | | (1 point) |
| MOTD Banner | | (1 point) |
| Interface G0/0 | Set the description<br>Set the Layer 3 IPv4 address<br>Activate Interface | (2 points) |
| Interface G0/1 | Set the description<br>Set the Layer 3 IPv4 address<br>Activate Interface | (2 points) |
| Generate a RSA crypto key | 1024 bits modulus | (2 points) |

### Step 3: Configure S1.

Configuration tasks for R1 include the following:

| Task | Specification | Points |
|---|---|---|
| Switch name | S1 | (1 point) |
| Configure Management Interface (SVI) | Set the Layer 3 IPv4 address | (1 point) |
| Encrypted privileged exec password | ciscoenpass | (1 point) |
| Console access password | ciscoconpass | (1 point) |
| Telnet access password | ciscovtypass | (1 point) |

**Instructor Sign-off Part 3:** _____

**Points:** _____ of <u>30</u>

# Part 4: Test and Verify IPv4 End-to-End Connectivity

**Total points: 8**

**Time: 10 minutes**

## Step 1: Verify network connectivity.

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

**Note**: If pings to host computers fail, temporarily disable the computer firewall and retest. To disable a Windows 7 firewall, select Start > Control Panel > System and Security > Windows Firewall > Turn Windows Firewall on or off, select **Turn off Windows Firewall**, and click **OK**.

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

| From | To | IP Address | Ping Results | Points |
|------|------|------------|--------------|--------|
| PC-A | R1, G0/0 | | | (1 point) |
| PC-A | R1, G0/1 | | | (1 point) |
| PC-A | S1 VLAN 1 | | | (1 point) |
| PC-A | PC-B | | | (1 point) |
| PC-B | R1, G0/1 | | | (1 point) |
| PC-B | R1, G0/0 | | | (1 point) |
| PC-B | S1 VLAN 1 | | | (1 point) |

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)

_____

tracert or traceroute

**Instructor Sign-off Part 4:** _____

**Points:** _____ of **8**

# Part 5: Configure IPv6 Addressing on R1

**Total points: 10**

**Time: 10 minutes**

Given an IPv6 network address of **2001:DB8:ACAD::/48**, configure IPv6 addresses for the Gigabit interfaces on R1. Use **FE80::1** as the link-local address on both interfaces.

## Step 1: Configure R1.

Configuration tasks for R1 include the following:

| Task | Specification | Points |
|---|---|---|
| Configure G0/0 to use the first address in subnet A. | Assign the IPv6 unicast address <br> Assign the IPv6 link-local address | (4 points) |
| Configure G0/1 to use the first address in subnet B. | Assign the IPv6 unicast address <br> Assign the IPv6 link-local address | (4 points) |
| Enable IPv6 unicast routing. | | (2 points) |

**Instructor Sign-off Part 5:** _____

**Points:** _____ of **10**

# Part 6:  Test and Verify IPv6 End-to-End Connectivity

**Total points: 7**

**Time: 10 minutes.**

## Step 1:  Obtain the IPv6 address assigned to host PCs.

| PC-A IPv6 Network Configuration | | Points |
|---|---|---|
| Description | | (1 point) |
| Physical Address | | |
| IPv6 Address | | |
| Default Gateway | | |

| PC-B IPv6 Network Configuration | | Points |
|---|---|---|
| Description | | (1 point) |
| Physical Address | | |
| IPv6 Address | | |
| IPv6 Default Gateway | | |

## Step 2:  Use the ping command to verify network connectivity.

IPv6 network connectivity can be verified with the ping command. Use the following table to methodically verify connectivity with each network device. Take corrective action to establish connectivity if a test fails:

| From | To | IP Address | Ping Results | Points |
|------|------|------------|--------------|--------|
| PC-A | R1, G0/0 |  |  | (1 point) |
| PC-A | R1, G0/1 |  |  | (1 point) |
| PC-A | PC-B |  |  | (1 point) |
| PC-B | R1, G0/1 |  |  | (1 point) |
| PC-B | R1, G0/0 |  |  | (1 point) |

**Instructor Sign-off Part 6:** _____

**Points:** _____ of **7**

# Part 7:   Use the IOS CLI to Gather Device Information

**Total points: 10**

**Time: 10 minutes**

### Step 1:   Issue the appropriate command to discover the following information:

| Description | Student Input | Points |
|-------------|---------------|--------|
| Router Model |  | (2 points) |
| IOS Image File |  |  |
| Total RAM |  |  |
| Total Flash Memory |  |  |
| Configuration Register |  |  |
| CLI Command Used |  |  |

**Step 2:   Enter the appropriate CLI command needed to display the following on R1:**

| Command Description | Student Input (command) | Points |
|---|---|---|
| Display a summary of important information about the interfaces on R1. | | (1 point) |
| Display the IPv4 routing table. | | (1 point) |
| Display the Layer 2 to Layer 3 mapping of addresses on R1. | | (1 point) |
| Display detailed IPv4 information about interface G0/0 on R1. | | (1 point) |
| Display the IPv6 routing table. | | (1 point) |
| Display a summary of IPv6 interface addresses and status. | | (1 point) |
| Display information about the devices connected to R1. Information should include Device ID, Local Interface, Hold time, Capability, Platform, and Port ID. | | (1 point) |
| Save the current configuration so it will be used the next time the router is started. | | (1 point) |

**Instructor Sign-off Part 7:** _____

**Points:** _____ of **10**

# Part 8:   Save the R1 Configuration to a TFTP Server.

**Total points: 10**

**Time: 10 minutes**

Save the current configuration for R1 to the TFTP Server on PC-A. Tftpd32 software has been installed on PC-A. You will need to start this program before you begin. Document the command used below:

| Description | Student Input | Points |
|---|---|---|
| CLI Command | | (5 Points) |
| Address of remote host | | |
| Destination Filename | | |

**Instructor Sign-off Part 8:** _____

**Points:** _____ of **10**

# Part 9:   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 Interface Summary | | | | |
|---|---|---|---|---|
| **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) |
| **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. | | | | |