

**GDT2JM DATAKOMMUNIKATION1 NÄTVERKSLABORATION V1**

# Topology



# Assessment Objectives

**Part 1: Develop an IP Addressing Scheme**

**Part 2: Initialize and Reload Devices**

**Part 3: Configure Device IP address and Security Settings**

**Part 4: Test and Verify IPv4 and IPv6 End-to-End Connectivity**

**Part 5: Use the IOS CLI to Gather Device Information**

# 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.

# Required Resources

* 1 Router (Cisco 2911)
* 1 Switch (Cisco 2960)
* 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

# Övrig examinationsinformation

* Maximal tid = 4 timmar
* Tillåtna hjälpmedel = Kommando-guiden

## Instructions Part 1: Develop an IP Addressing Scheme

1. You will use the IPv4 network found in 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** |
| 140.12.0.128/25 | **54** | **30** |

**IP Addressing Worksheet**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Specification** |  |  | **Subnet A** | |  | | **Subnet B** | |
| Number of bits in the subnet | 26 |  |  | | *27* | |  | |
| 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 subnets (including  the 0th subnet) | *4* |  |  | | *8* | |  | |
| Number of usable hosts per subnet | *62* |  |  | | *30* | |  | |
| IP Subnet | *140.12.0.128* |  | |  | | 140.12.0.192 | |  | |
| First IP Host address | 140.12.0.129 |  | |  | | 140.12.0.193 | |  | |
| Last IP Host address | 140.12.0.190 |  | |  | | 140.12.0.222 | |  | |

1. Record your subnet assignment in the table below.
   1. Assign the first IPv4 address of each subnet to a router interface
      1. subnet A is hosted on R1 G0/0/1
      2. subnet B is hosted on R1 G0/0/0
   2. Assign the last IPv4 address of each subnet to the PC NIC
   3. Assign the second IPv4 address of subnet A to S1
   4. List the maximum number of useable hosts per subnet

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Description** |  | **Subnet A** |  | **Subnet B** |
| First IP address | 140.12.0.129 |  | 140.12.0.193 |  |
| Last IP address | 140.12.0.190 |  | 140.12.0.222 |  |
| Maximum number of hosts | 62 |  | 30 |  |

1. Record the IP address information for each device:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Device** |  | **IP address** | **Subnet Mask** | **Gateway** |
| PC-A | 140.12.0.190 |  | *255.255.255.192* | 140.12.0.129 |
| R1-G0/0/0 | 140.12.0.193 |  | *255.255.255.224* | N/A |
| R1-G0/0/1 | 140.12.0.129 |  | *255.255.255.192* | N/A |
| S1 | 140.12.0.130 |  | 140.12.0.129 | *255.255.255.192* |
| PC-B | 140.12.0.222 |  | *255.255.255.224* | 140.12.0.193 |
|  |  |  |  |  |

1. Use the IPv6 address abcd:1111:2222::/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** |
| R1-G0/1 | *abcd:1111:2222::* |  | *64* |
| R1-G0/0 | *abcd:1111:2222::* |  | *64* |

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** |
| R1-G0/0/0 | *abcd:1111:2222:b::1* |  | *64* | N/A |
| R1-G0/0/1 | *abcd:1111:2222:a::1* |  | *64* | N/A |
| S1 | *abcd:1111:2222:a::2* |  | *64* | *abcd:1111:2222:a:: 1* |

## Part 2: Initialize and Reload Devices

* 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.

## Part 3: Configure Device IP Address and Security Settings

**Step 1: Configure R1.**

Configuration tasks for R1 include the following:

|  |  |  |
| --- | --- | --- |
| **Task** |  | **Specification** |
| Disable DNS lookup | no ip domain lookup |  |
| Router name | R1 |  |
| Domain name | ccna-lab.com |  |
| Encrypted privileged EXEC password | ciscoenpass |  |
| **Task** | **Specification** | |
| Console access password | ciscoconpass | |
| Set the minimum length for passwords | 10 characters | |
| Create an administrative user in the local database | Username: **admin**  Password: **admin1pass** | |
| Set login on vty lines to use local database | line vty 0 15 | |
| Set vty lines to accept SSH connections only | transport input ssh | |
| Encrypt the clear text passwords | service password-encryption | |
| Configure an MOTD Banner | banner motd "Unauthorized Access is Prohibited!" | |
| Enable IPv6 Routing | ipv6 unicast-routing | |
| 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 | |
| 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 | |
| Generate an RSA crypto key | 1024 bits modulus | |

**Step 2: Configure S1.**

Configuration tasks for S1 include the following:

|  |  |
| --- | --- |
| **Task** | **Specification** |
| Disable DNS lookup | no ip domain lookup |
| Switch name | S1 |
| Domain name | ccna-lab.com |
| Encrypted privileged EXEC password | ciscoenpass |
| Console access password | ciscoconpass |
| Shutdown all unused interfaces | F0/1-4, F0/7-24, G0/1-2 |
| Create an administrative user in the local database | Username: **admin**  Password: **admin1pass** |
| Set login on vty lines to use local database | line vty 0 15 |
| Set vty lines to accept SSH connections only | transport input ssh |
| **Task** | **Specification** |
| Encrypt the clear text passwords | service password-encryption |
| Configure an MOTD Banner | banner motd "Unauthorized Access is Prohibited!" |
| Generate an RSA crypto key | 1024 bits modulus |
| 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 |

**Step 3: Configure host computers.**

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

|  |  |  |
| --- | --- | --- |
|  | **PC-A Network Configuration** | |
| Description |  |  |
| Physical Address |  | 0030.F24C.C805 |
| IPv4 Address |  | *140.12.0.190* |
| Subnet Mask |  | *255.255.255.192* |
| IPv4 Default Gateway |  | *140.12.0.129* |
| IPv6 Address |  | *abcd:1111:2222:a::a* |
| IPv6 Default Gateway |  | *FE80::1* |

|  |  |  |
| --- | --- | --- |
|  | **PC-B Network Configuration** | |
| Description |  |  |
| Physical Address |  | 0002.16AB.9589 |
| IP Address |  | *140.12.0.222* |
| Subnet Mask |  | *255.255.255.224* |
| Default Gateway |  | *140.12.0.193* |
| IPv6 Address |  | *abcd:1111:2222:b::b* |
| IPv6 Default Gateway |  | *FE80::1* |

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

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** |
| PC-A  *PC-A*  *PC-A*  *PC-A*  *PC-A*  *PC-A*  *PC-A*  *PC-A* | R1 G0/0/0  *R1 G0/0/0* | IPv4 | 140.12.0.193 | *success* |
| IPv6 | *abcd:1111:2222:b::1* | *success* |
| R1 G0/0/1  *R1 G0/0/1* | IPv4 | 140.12.0.129 | *success* |
| IPv6 | *abcd:1111:2222:a::1* | *success* |
| S1 VLAN 1  *S1 VLAN 1* | IPv4 | 140.12.0.130 | *success* |
| IPv6 | *abcd:1111:2222:a::2* | *success* |
| PC-B  *PC-B* | IPv4 | 140.12.0.222 | *success* |
| IPv6 | *abcd:1111:2222:b::b* | *success* |
| PC-B  *PC-B*  *PC-B*  *PC-B*  *PC-B*  *PC-B* | R1 G0/0/0  *R1 G0/0/0* | IPv4 | 140.12.0.193 | *success* |
| IPv6 | *abcd:1111:2222:b::1* | *success* |
| R1 G0/0/1  *R1 G0/0/1* | IPv4 | 140.12.0.129 | *success* |
| IPv6 | *abcd:1111:2222:a::1* | *success* |
| S1 VLAN1  *S1 VLAN1* | IPv4 | 140.12.0.130 | *success* |
| IPv6 | *abcd:1111:2222:a::2* | *success* |

Question:

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

## Part 5: Use the IOS CLI to Gather Device Information

**Step 1: Issue the appropriate command to discover the following information: show version**

|  |  |
| --- | --- |
| **Description** |  |
| Router Model | CISCO2911/K9 |
| IOS Image File | flash0:c2900-universalk9-mz.SPA.151-1.M4.bin |
| Total RAM | 491520K |
| Total Flash Memory | 249856K |
| Configuration Register | 0x2102 |
| CLI Command Used | *Show version* |

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

|  |  |  |
| --- | --- | --- |
| **Command Description** |  | **Command** |
| Display a summary of important information about the IPv4 interfaces on R1. | *Show ip interface brief* |  |
| Display the IPv4 routing table. | *Show ip route* |  |
| Display the Layer 2 to Layer 3 mapping of addresses on R1. | *Show arp* |  |
| Display detailed IPv4 information about interface G0/0/0 on R1. | *Show interface g0/0* |  |
| Display the IPv6 routing table. | *Show ipv6 route* |  |
| Display a summary of IPv6 interface addresses and status. | *Show ipv6 interface brief* |  |
| 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* |  |
| Save the current configuration so it will be used the next time the router is started. | *Copy running-config startup-config* |  |