**Cisco Network Academy**

**CCNA 1 Introduction to Networks**

Note: This lab guide is written by me using an example from the following website: <http://www.danscourses.com/>

* **Cisco IOS Command Hierarchy:**

<https://www.cisco.com/E-Learning/bulk/public/tac/cim/cib/using_cisco_ios_software/02_cisco_ios_hierarchy.htm>

* **In this lab, you will learn how to configure the following tasks:**

**IPv4 Addressing**

1. Divide the 192.168.4.0 /24 network into the following subnets.

Subnet A (not shown) : 52 hosts

IP addr range: 192.168.4.0/26 ~ 192.168.4.63/26

Subnet B (green): 50 hosts

IP addr range: 192.168.4.64/26 ~ 192.168.4.127/26

Subnet C (not shown) : 40 hosts

IP addr range: 192.168.4.128/26 ~ 192.168.4.191/26

Subnet D (yellow): 14 hosts

IP addr range: 192.168.4.192/28 ~ 192.168.4.207/28

2. The router get the first usable address in the subnet

3. The PCs get 5th and 6th, usable address in the green subnet, and the 5th in the yellow subnet

4. The switches get the last usable address in the subnet.

5. The server gets the second address in the subnet

**IPv6 Addressing**

**Green Network:** 2001:DB8:CCCC:1::/64
    R1 -- :1
    PC0 -- :A
    PC1 -- :B

**Yellow Network:** 2001:DB8:CCCC:2::/64
    R1 -- :1
    PC2 -- :A
    Server -- :F

**Link-local:**
    R1 -- FE80::1

**Note:** You will need to configure the router and both switches using the console connection and the desktop terminal program

**Configuration Tasks**

**On R1, S1, S2:**
1. hostnames: R1, S1, S2
2. R1 minimum password length 10 characters
3. user account: admin, encrypted password: danscourses
4. console line: login using local database
5. enable password: class12345 (encrypted)
6. password encryption on all lines
7. banner message of the day: No unauthorized access allowed!
8. domain name: danscourses.com
9. ssh version 2
10 timeout after 5 minutes on all console and vty lines
11 security keys: rsa 1024 modulus
12. R1: vty 0 4,
    S1: vty 0 15,
    secure SSH access using local database
13. enable ipv6 routing on R1
14. configure PCs with IPv4 and IPv6 addresses,
    network prefix or subnet mask, and default gateway
15. R1 interfaces with IPv4 and IPv6 addressing
16. S1 & S2 interface VLAN1 with IPv4 address
    and subnet mask
17. S1 & S2 with default gateway
18. backup R1, S1, S2 running-config to the tftp server
    (accept the default name)
19. Copy running-config to startup-config

**Lab Guide**

**First of all, configure IP addresses on each PC as follows:**

* + Green Subnet (192.168.4.64/26 ~ 192.168.4.64/26)

On PC0

 Double click on the PC0 🡪 select Desktop 🡪 select IP configuration

 (IP address) 192.168.4.69

 (Subnet Mask) 255.255.255.192

 (Default Gateway) 192.168.4.65

 (IPv6 Address) 2001:DB8:CCCC:1::A/64

 (IPv6 Gateway) FE80::1 🡨 link-local address of the router

On PC1

Double click on the PC0 🡪 select Desktop 🡪 select IP configuration

 (IP address) 192.168.4.70

 (Subnet Mask) 255.255.255.192

 (Default Gateway) 192.168.4.65

 (IPv6 Address) 2001:DB8:CCCC:1::B/64

 (IPv6 Gateway) FE80::1 🡨 link-local address of the router

* + Yellow Subnet (192.168.4.192/28 ~192.168.4.207/28)

On PC2

Double click on the PC0 🡪 select Desktop 🡪 select IP configuration

 (IP address) 192.168.4.197

 (Subnet Mask) 255.255.255.240

 (Default Gateway) 192.168.4.193

 (IPv6 Address) 2001:DB8:CCCC:2::A/64

 (IPv6 Gateway) FE80::1 🡨 link-local address of the router

 On the TFTP Server

Double click on the PC0 🡪 select Desktop 🡪 select IP configuration

 (IP address) 192.168.4.194

 (Subnet Mask) 255.255.255.240

 (Default Gateway) 192.168.4.193

 (IPv6 Address) 2001:DB8:CCCC:2::F/64

 (IPv6 Gateway) FE80::1 🡨 link-local address of the router

**Now, we will configure the following tasks on R1, S1, and S2:**

1. hostnames: R1, S1, S2
2. R1 minimum password length 10 characters
3. user account: admin, encrypted password: danscourses
4. console line: login using local database
5. enable password: class12345 (encrypted)
6. password encryption on all lines
7. banner message of the day: No unauthorized access allowed!
8. domain name: danscourses.com
9. ssh version 2
10 timeout after 5 minutes on all console and vty lines
11 security keys: rsa 1024 modulus
12. R1: vty 0 4,
    S1: vty 0 15,
    secure SSH access using local database
13. enable ipv6 routing on R1
14. configure PCs with IPv4 and IPv6 addresses,
    network prefix or subnet mask, and default gateway
15. R1 interfaces with IPv4 and IPv6 addressing
16. S1 & S2 interface VLAN1 with IPv4 address
    and subnet mask
17. S1 & S2 with default gateway
18. backup R1, S1, S2 running-config to the tftp server
    (accept the default name)
19. Copy running-config to startup-config

**Now, we will configure the router R1.**

Router>enable

Router#configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#hostname R1

R1(config)#banner motd "No unautorised access allowed!""

R1(config)#security passwords min-length 10

R1(config)#username admin secret danscourses

R1(config)#line console 0

R1(config-line)#login local

R1(config-line)#exit

R1(config)#enable secret class1234

% Password too short - must be at least 10 characters. Password not configured.

R1(config)#enable secret class12345

R1(config)#service password-encryption

R1(config)#ip domain-name danscourses.com

R1(config)#ip ssh version 2

Please create RSA keys (of at least 768 bits size) to enable SSH v2.

R1(config)#crypto key generate rsa

The name for the keys will be: R1.danscourses.com

Choose the size of the key modulus in the range of 360 to 2048 for your

General Purpose Keys. Choosing a key modulus greater than 512 may take

a few minutes.

How many bits in the modulus [512]: **1024**

% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

\*Mar 1 0:55:50.968: %SSH-5-ENABLED: SSH 2 has been enabled

R1(config)#ip ssh version 2

R1(config)#line console 0

R1(config-line)#exec-timeout 5 0

R1(config-line)#exit

R1(config)#line vty 0 4

R1(config-line)#login local

R1(config-line)#exec-timeout 5 0

R1(config-line)#transport input ssh

R1(config-line)#exit

R1(config)#ipv6 unicast-routing

R1(config)#interface gigabitEthernet 0/0

R1(config-if)#ip address 192.168.4.65 255.255.255.192

R1(config-if)#no shutdown

R1(config-if)#ipv6 address 2001:DB8:CCCC:1::1/64

R1(config-if)#ipv6 address FE80::1 link-local

R1(config-if)#int g0/1

R1(config-if)#ip address 192.168.4.193 255.255.255.240

R1(config-if)#no shut

R1(config-if)#ipv6 address 2001:DB8:CCCC:2::1/64

R1(config-if)#ipv6 address FE80::1 link-local

R1(config-if)#exit

R1(config)#exit

R1#copy run start

Destination filename [startup-config]?

Building configuration...

[OK]

R1#copy run tftp

Address or name of remote host []? **192.168.4.194**

Destination filename [R1-confg]?

Writing running-config....!!

[OK - 1098 bytes]

1098 bytes copied in 3.004 secs (365 bytes/sec)

R1#show run

Building configuration...

Current configuration : 1098 bytes

!

version 15.1

no service timestamps log datetime msec

no service timestamps debug datetime msec

service password-encryption

security passwords min-length 10

!

hostname R1

!

!

!

enable secret 5 $1$mERr$8BPXRaZKXzJUe84Ckfffz.

!

!

!

!

ip cef

ipv6 unicast-routing

!

no ipv6 cef

!

!

!

username admin secret 5 $1$mERr$p3HOT7heFTqvFIYQsDEhe0

!

!

license udi pid CISCO1941/K9 sn FTX1524CPNG

!

!

!

!

!

!

!

!

!

ip ssh version 2

ip domain-name danscourses.com

!

!

spanning-tree mode pvst

!

!

!

!

!

!

interface GigabitEthernet0/0

ip address 192.168.4.65 255.255.255.192

duplex auto

speed auto

ipv6 address FE80::1 link-local

ipv6 address 2001:DB8:CCCC:1::1/64

!

interface GigabitEthernet0/1

ip address 192.168.4.193 255.255.255.240

duplex auto

speed auto

ipv6 address FE80::1 link-local

ipv6 address 2001:DB8:CCCC:2::1/64

!

interface Vlan1

no ip address

shutdown

!

ip classless

!

ip flow-export version 9

!

!

!

banner motd ^CNo unautorised access allowed!^C

!

!

!

!

line con 0

exec-timeout 5 0

login local

!

line aux 0

!

line vty 0 4

exec-timeout 5 0

login local

transport input ssh

!

!

!

end

R1#ping 192.168.4.69

R1#ping 192.168.4.70

R1#exit

**At this point, when you try to access the router R1 again by pressing <Enter> key, you will see the following:**

No unautorised access allowed!

User Access Verification

Username: admin

Password: 🡨 you need to type the password “danscourses”

R1>en

Password: 🡨 you need to type the password “class12345”

R1#

**At this point, please close the terminal and open the command prompt on PC0. Then, you can test if the ssh setup works.**

PC> ssh -?

PC> ssh -l admin 192.168.4.65

Open

Password: 🡨 you need to type the password “danscourses”

No unautorised access allowed!

R1>en

Password: 🡨 you need to type the password “class12345”

R1#

**After you complete up to this point, please submit your packet tracer file to the dropbox in D2L.**

**For your own practice, please continue to configure the switches S1 and S2.**

**Cisco Skill Assessment**

**Sample**

1. Topology



Given an IP address and mask of 192.168.77.0/24 (address/mask), design an IP addressing scheme that satisfies the following requirements:

|  |  |
| --- | --- |
| Subnet | Number of Hosts |
| Subnet A | 2 hosts |
| Subnet B | 25 hosts |

|  |
| --- |
| Subnet A |
| Specification | Student Input | Points |
| Number of bits in the subnet id | 6 | (5 points) |
| IP subnet mask (binary) | 11111111.11111111.11111111.11111100 |  |
| IP subnet mask (decimal) | 255.255.255.252 |  |
| Maximum Number of usable hosts per subnet | 2 |
| IP address of this subnet | 192.168.77.32 |
| First usable IP Host address | 192.168.77.33 |
| Last usable IP Host address | 192.168.77.34 |

|  |
| --- |
| Subnet B |
| Specification | Student Input | Points |
| Number of bits in the subnet id | 3 | (5 points) |
| IP subnet mask (binary) | 11111111.11111111.11111111.11100000 |  |
| IP subnet mask (decimal) | 255.255.255.224 |  |
| Number of usable hosts per subnet | 30 |
| IP address of this subnet | 192.168.77.0 |
| First usable IP Host address | 192.168.77.1 |
| Last usable IP Host address | 192.168.77.30 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Device | IP address | Mask | Gateway | Points |
| PC-A | 192.168.77.33 | 255.255.255.252 | 192.168.25.34 |  (5 points) |
| Router1-G0/0 | 192.168.77.34 | 255.255.255.252 | N/A |
| Router1-G0/1 | 192.168.77.30 | 255.255.255.224 | N/A |
| S1-VLAN1 | 192.168.77.29 | 255.255.255.224 | N/A |
| PC-B | 192.168.77.1 | 255.255.255.224 | 192.168.25.30 |

1. Initialize and Reload Devices

**Total points: 10**

**Time: 5 minutes**

* 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. | 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**.)  | (2 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**.) | (2 point) |

**After the Part 1, a list of configuration tasks will be given.**