

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,
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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 unauthorized 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-config]?
```

```
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 unauthorised 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 unauthorised 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 unauthorised access allowed!

R1>en

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

R1#

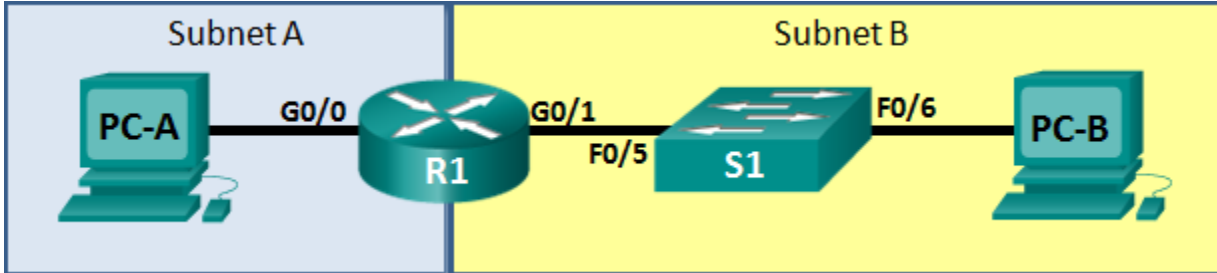
After you complete up to this point, please submit your packet tracer file to the dropbox in D2L.

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

Cisco Skill Assessment

Sample

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
Number of bits in the subnet id		3
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	

Part 1: 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.	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.