

Explore The Network and Configure a Network Operating System

Introduction to Networks v6.0



Chapter 2: Configure a Network Operating System

Pertemuan ke 2

Kompetensi Khusus

- Mahasiswa menjelaskan bagaimana setiap perangkat dapat terhubung dalam jaringan komputer, dan menjelaskan tren pemanfaatan jaringan yang mempengaruhi cara kerja dan berinteraksi seperti BYOD, kolaborasi online, video, dan komputasi awan (C2)

Materi:

1. IOS Bootcamp
2. Basic Device Configuration
3. Address Schemes

1. IOS Bootcamp

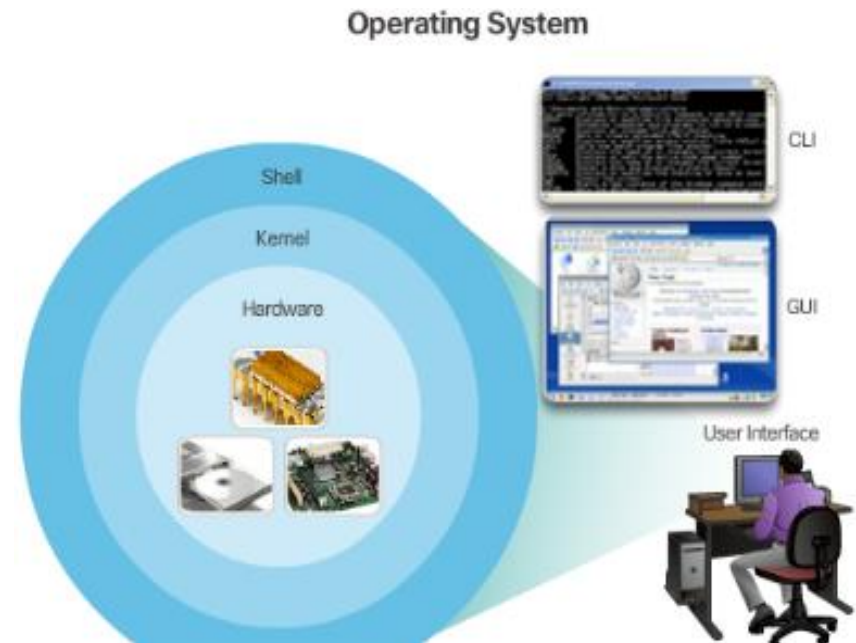
1.1 Cisco IOS

- Operating Systems
 - PC OS allows users to interact with the computer
 - User-computer interaction in PC OSs are often done via mouse, keyboard and monitor
 - Cisco IOS is also an Operating System
 - Cisco IOS allows users to interact with Cisco devices.



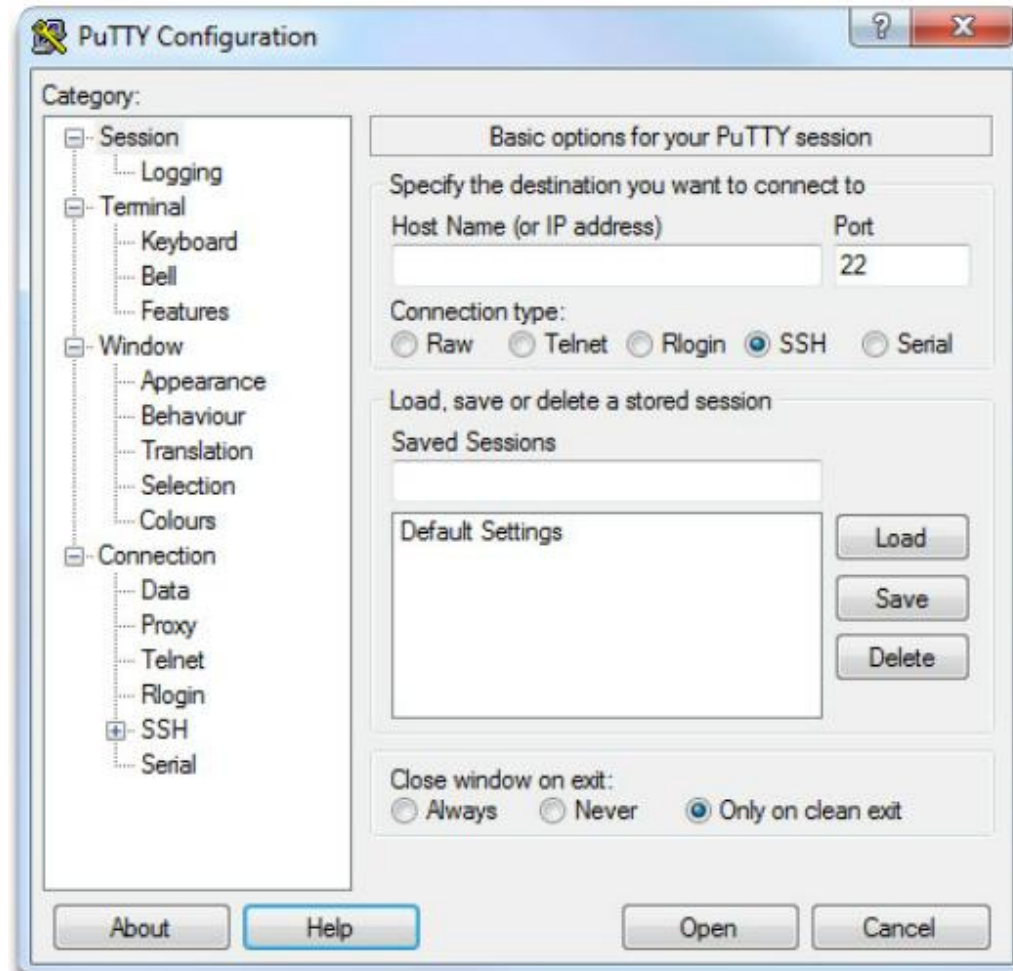
1.1 Cisco IOS

- Cisco IOS enables a technician to:
 - Use a keyboard to run CLI-based network programs.
 - Use a keyboard to enter text and text-based commands.
 - View output on a monitor.
- All Cisco networking devices come with a default IOS.
- It is possible to upgrade the IOS version or feature set.



1.2 Cisco IOS Access

- Access Methods
 - Console
 - Auxiliar
 - Virtual Terminal (Telnet / SSH)
- Terminal Emulation Programs
 - PuTTY
 - Tera Term
 - SecureCRT



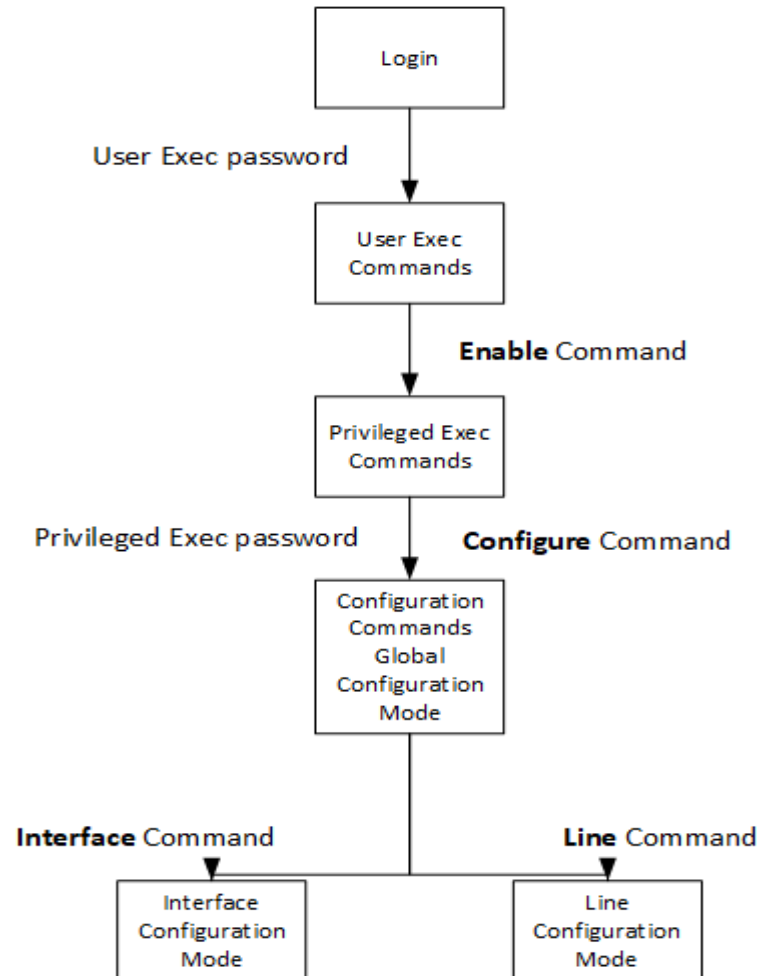
1.3 Navigate the IOS

- Cisco IOS Modes of Operation
 - Initial configuration must be done via console connection
 - Configuration is then done via various CLI command modes.
- Primary Command Modes
 - User EXEC Mode
 - Privileged EXEC Mode
- Configuration Command Modes
 - The **Configure Terminal** command enters the Global Configuration Mode.
 - Sub-configuration modes are accessible from the Privileged EXEC Mode.
 - Examples are: **swtich(config-line)#** and **switch(config-if)#**

1.3 Navigate the IOS (Cont.)

- Navigate Between IOS Modes
 - Navigation between modes is also done via commands.
 - The **enable** command enters the Privileged EXEC Mode.
 - The **exit** commands exits to the parent command mode.

1.3 Navigate the IOS



1.4 The Command Structure

- Basic IOS Command Structure
 - The general syntax for a command is the command followed by any appropriate keywords and arguments.
 - Keyword - a specific parameter defined in the operating system
 - Argument - not predefined; a value or variable defined by the user
- IOS Command Syntax
 - Provides the pattern or format that must be used when entering a command.
 - The Cisco IOS Command Reference is the ultimate source of information for a particular IOS command.

1.4 The Command Structure (Cont.)

- IOS Help Feature
 - The IOS has two forms of help available: Context-Sensitive Help and Command Syntax Check.
- Hotkeys and Shortcuts
 - Commands and keywords can be shortened to the minimum number of characters that identify a unique selection.
 - Line editing keyboard shortcuts such as Ctrl-A are also supported.

2. Basic Device Configuration

2.1 Hostnames

- Device Names
 - Hostnames allow devices to be identified by network administrators over a network or the Internet.
 - Very important and should also be displayed in the topology.
- Configure Hostnames
 - IOS hostnames should:
 - Start with a letter
 - Contain no spaces
 - End with letter or digit
 - Use only letters, digits or dashes
 - Be less than 64 characters in length

```
Switch# configure terminal
Switch(config)# hostname SW-Floor-1
Sw-Floor-1(config)#
```

2.2 Limit Access to Device Configurations

- Secure Device Access
 - Secure privileged EXEC and user EXEC access with a password.
 - Secure virtual terminal lines with a password.
- Configure Passwords
 - Use strong passwords.
 - Avoid re-using passwords
- Encrypt Passwords
 - Cisco IOS displays passwords in plain text by default.
 - Passwords should be encrypted.
- Banner Messages
 - Important part of the legal process in the event that someone is prosecuted for breaking into a device.
 - Wording that implies that a login is "welcome" or "invited" is not appropriate.
 - Often used for legal notification because it is displayed to all connected terminals.

```
Enter the command to encrypt the plain text passwords.
Switch(config)# service password-encryption
Exit global configuration mode and view the running configuration.
Switch(config)# exit

Switch# show running-config
!
<output omitted>
!
line con 0
 password 7 094F471A1A0A
 login
!
line vty 0 4
 password 7 03095A0F034F38435B49150A1819
 login
!
!
end

Switch#
You successfully encrypted the plain text passwords.
```


2.3 Save Configurations

- Save the Running Configuration File
 - File stored in NVRAM that contains all of the commands that will be used upon startup or reboot
 - NVRAM does not lose its contents when the device is powered off.
- Alter the Running Configuration
 - File stored in RAM that reflects the current configuration, modifying affects the operation of a Cisco device immediately.
 - RAM loses all of its content when the device is powered off or restarted.
- Capture Configuration to a Text File
 - Configuration files can also be saved and archived to a text document.
 - The configuration can then be edited with any text editor and placed back in the device.

```
Switch#show running-config
Building configuration...
Current configuration : 2904 bytes
!
! Last configuration change at 00:02:32
UTC Mon Mar 1 1993
!
version 15.0
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
<output omitted>
!
```

3. Address Schemes

3.1 Ports and Addresses

- IP Addresses
 - Each end device on a network must be configured with an IP address.
 - Enable devices to establish end-to-end communication on the Internet.
 - The structure of an IPv4 address is called dotted decimal notation and is represented by four decimal numbers between 0 and 255.
 - IPv6 is the most recent version of IP and the replacement for the more common IPv4.



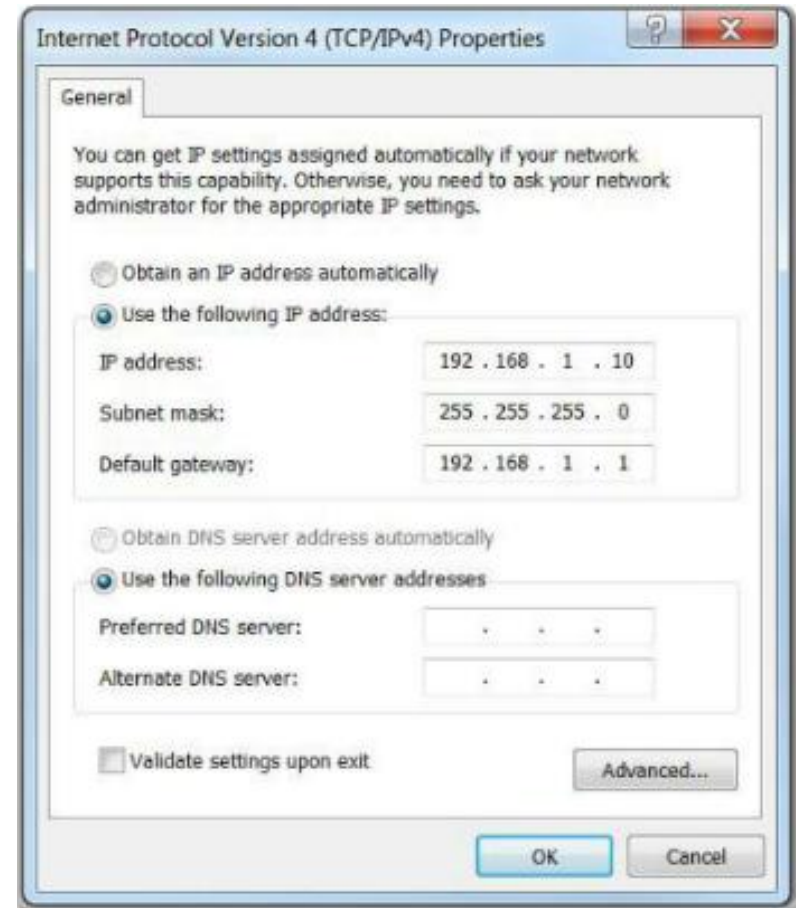
3.1 Ports and Addresses (Cont.)

- Interface and Ports
 - Network communications depend on interfaces and the cables that connect them.
 - Different types of network media have different features and benefits.
 - Ethernet is the most common local area network (LAN) technology.
 - SVI provides a means to remotely manage a switch over a network.



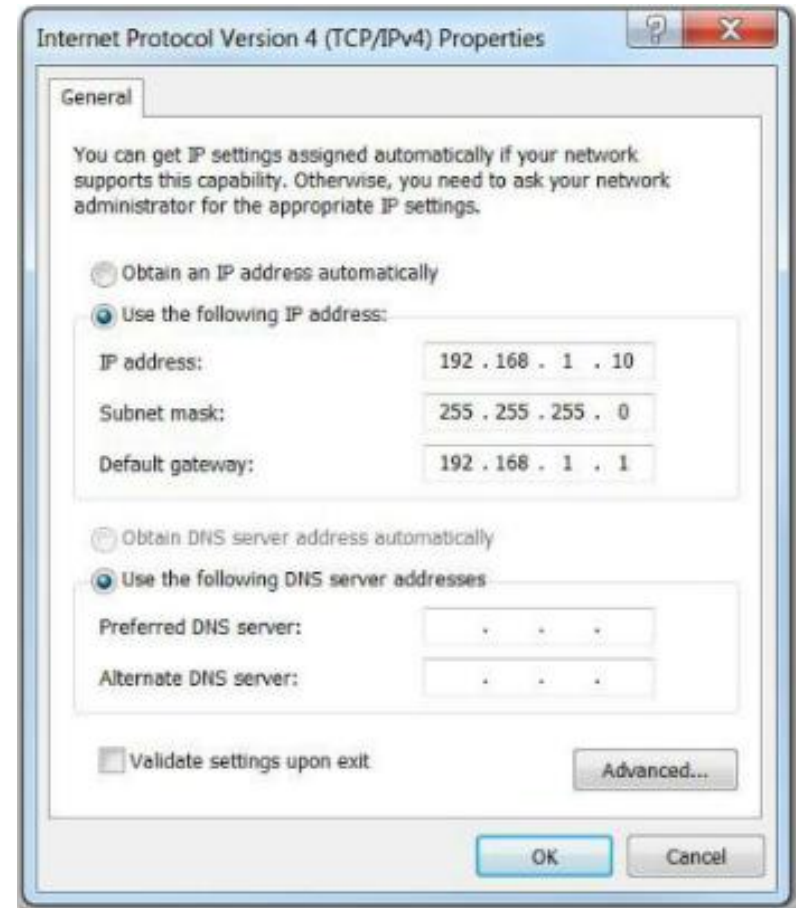
3.2 Configure IP Addressing

- Manual IP Address Configuration for End Devices
 - To manually configure an IPv4 address on a Windows host, open the Control Panel > Network Sharing Center > Change adapter settings and choose the adapter.
 - Next right-click and select Properties to display the Local Area Connection Properties shown in Figure 1.



3.2 Configure IP Addressing (Cont.)

- Automatic IP Address Configuration for End Devices
 - DHCP enables automatic IPv4 address configuration for every end device that has DHCP enabled. No extra configuration is needed.
- Switch Virtual Interface Configuration
 - To configure an SVI on a switch, use the interface vlan 1 global configuration command. Vlan 1 is not an actual physical interface but a virtual one.



3.3 Verifying Connectivity

- Interface Addressing Verification
 - Cisco IOS supports commands to allow IP configuration verification.
- End-To-End Connectivity Test
 - The ping command can be used to test connectivity to another device on the network or a website on the Internet.

S1#show ip interface brief

Interface	IP-Address	OK?	Method	Status	Protocol
FastEthernet0/1	unassigned	YES	manual	up	up
FastEthernet0/2	unassigned	YES	manual	up	up

<output omitted>

vlan1	192.168.10.2	YES	manual	up	up
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C:\>ping 192.168.10.2

Pinging 192.168.10.2 with 32 bytes of data:

Reply from 192.168.10.2: bytes=32 time=838ms TTL=35
 Reply from 192.168.10.2: bytes=32 time=820ms TTL=35
 Reply from 192.168.10.2: bytes=32 time=883ms TTL=36
 Reply from 192.168.10.2: bytes=32 time=828ms TTL=36

Ping statistics for 192.168.10.2:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
 Approximate round trip times in milli-seconds:
 Minimum = 820ms, Maximum = 883ms, Average = 842ms

C:\>ping 192.168.10.11

Pinging 192.168.10.11 with 32 bytes of data:

Reply from 192.168.10.11: bytes=32 time=838ms TTL=35
 Reply from 192.168.10.11: bytes=32 time=820ms TTL=35
 Reply from 192.168.10.11: bytes=32 time=883ms TTL=36
 Reply from 192.168.10.11: bytes=32 time=828ms TTL=36

Ping statistics for 192.168.10.11:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
 Approximate round trip times in milli-seconds:
 Minimum = 820ms, Maximum = 883ms, Average = 842ms

C:\>

Chapter Summary

Summary

- Explain the features and functions of Cisco IOS Software.
- Configure initial settings on a network device using the Cisco IOS software.
- Given an IP addressing scheme, configure IP address parameters on end devices to provide end-to-end connectivity in a small to medium-sized business network.

TERIMA KASIH

