

# Cisco Configuration Introduction

## Network Infrastructure Workshop



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# Introduction to Cisco devices

Presentation describes components of Cisco routers and switches running Cisco IOS

- IOS is Cisco's Internet Operating System, the software used to control the router or switch

Cisco produces other equipment running other operating systems:

- IOS-XR (high end routers)
- IOS-XE (replacing IOS)
- NX-OS (datacentre & enterprise switches)

Equipment from other vendors uses similar concepts

# Where is the configuration?

## Router always has two configurations

- **running-config**
  - Stored in RAM
  - Shows which parameters are currently in use.
  - Modified with configure terminal command
  - “show running-config”
- **startup-config**
  - Stored in NVRAM
  - Loaded by router next time it boots
  - This is where the running-config is saved
  - “show startup-config”

# Management input sources

## Console:

- Direct access via serial port

## Auxiliary Port:

- Access via Modem or other serial devices
- (Also used for accessing other serial devices)

## Virtual Terminals (VTY):

- Telnet/SSH

Accessing a Cisco IOS Device

# Terminal Emulation Programs

Software available for connecting to a networking device:

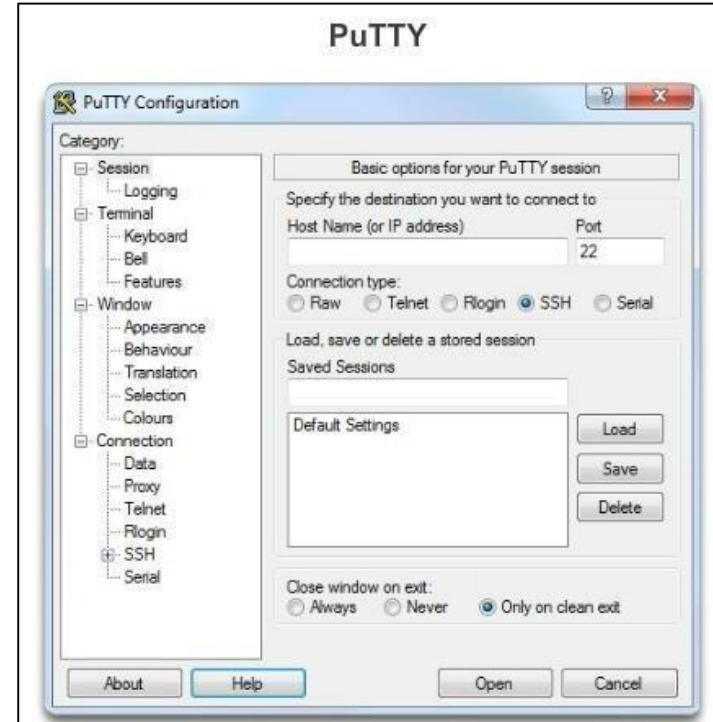
PuTTY

Tera Term

SecureCRT

HyperTerminal

OS X Terminal



# Changing the configuration

Commands are implemented immediately

- Be careful when typing!

When working on serial console or via Telnet or SSH, commands can be:

- Copied from a text file and pasted into the terminal
  - Be very careful with cut and paste!
- Copied by SCP or TFTP from a file prepared previously on a SCP or TFTP server

# Access Modes

## Standard user access:

- Lets users see some of the device status
- Prompt:

```
Router>
```

## Privileged user access:

- Full administrative view of the device
- Accessed by:

```
Router> enable  
Router#
```

## Configuration mode:

- ```
Router# configure terminal  
Router(config)#
```



# Access Modes

Exiting configuration mode:

```
Router(config)# end      (or Ctrl-Z)  
Router#
```

Exiting privileged mode:

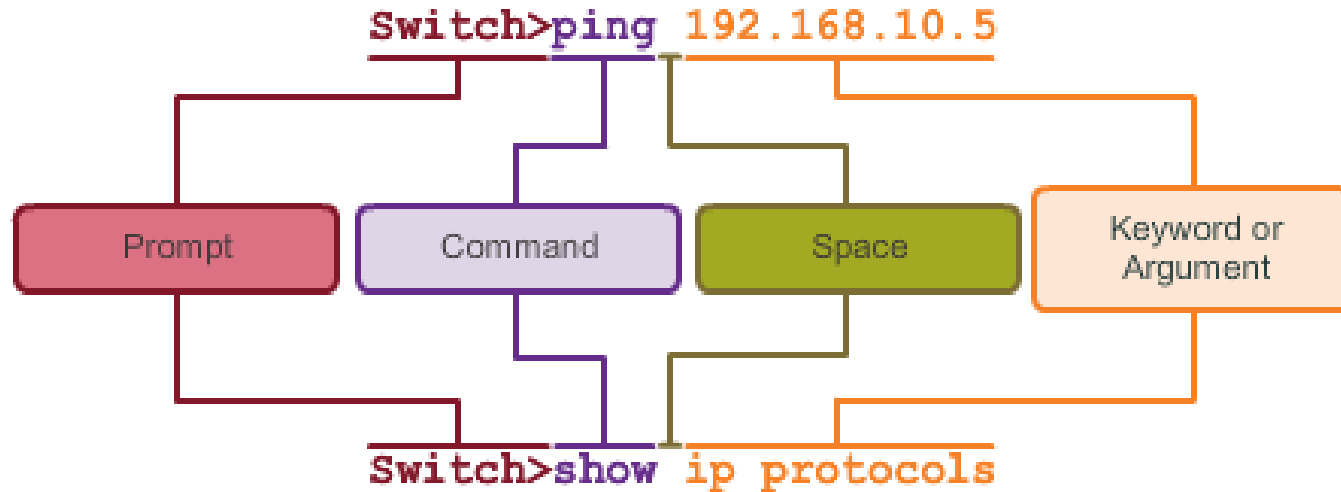
```
Router# disable  
Router>
```

Logging off:

```
Router> exit
```

The Command Structure

# IOS Command Structure



# Saving Configuration

Very important to save the configuration to the device NVRAM after it has been updated

- The device does NOT do it automatically
- Done in privileged mode:

```
Router# write memory
```

- Can be shortened to just:

```
Router# wr
```

Full long hand form of Cisco command to save configuration:

```
Router# copy running-config startup-config
```

# Saving Configuration

There are many available options for saving the configuration:

- Locally on the device
- On an external server using TFTP or SCP

```
Router# copy running-config ?  
 flash:          Copy to flash: file system  
 ftp:           Copy to ftp: file system  
 scp:          Copy to scp: file system  
 slot0:        Copy to slot0: file system  
 slot1:        Copy to slot1: file system  
 startup-config Copy to startup configuration  
 tftp:         Copy to tftp: file system  
 ...
```

# Context Help

Use “?” to obtain a list of commands available in your current configuration mode:

```
Router(config)#?  
Configure commands:  
  aaa                Authentication, Authorization and Accounting  
  aal2-profile       Configure AAL2 profile  
  access-list        Add an access list entry  
  alarm-interface    Configure a specific Alarm Interface Card  
  alias              Create command alias  
  appfw              Configure the Application Firewall policy  
  application        Define application  
  archive            Archive the configuration  
  arp                Set a static ARP entry
```

# Online Help

Use “?” also to see all possible parameters to an incomplete command:

```
Router(config)#username ?  
  WORD    User name  
Router(config)#username cndlab ?  
  password    Specify the password for the user  
Router(config)#username cndlab password secret-pass  
  
Router#show ?  
  aaa                Show AAA values  
  aal2               Show commands for AAL2  
  access-expression  List access expression  
  access-lists       List access lists  
  accounting          Accounting data for active sessions
```

# Command Completion

Use the Tab key to complete a command:

```
router(config)# int<TAB>
router(config)# interface fa<TAB>
router(config)# interface fastEthernet 0
router(config-if)# ip add<TAB>
router(config-if)# ip address n.n.n.n m.m.m.m
```

# Command Shorthand

## IOS understands shorthand

- Complete command does not need to be typed as long as the initial characters are unique

```
router(config)# int fa 0
router(config-if)# ip add 192.168.1.1 255.255.255.0
router(config-if)# no sh
router(config-if)# ^Z
router# sh ip int br
Interface      IP-Address      OK?  Method  Status  Protocol
FastEthernet0  192.168.1.1     YES  NVRAM   up      up
```

- Can you work out the full form of the above commands?



# Moving faster around the command line

Move within command history



Previous command Next command

Line editing



move to the left within a line move to the right within a line



Ctrl-a move to beginning of line

Ctrl-e move to end of line

Ctrl-k delete until end of line

# Verifying and Troubleshooting

## Checking configuration:

- Need to be in privileged mode to do this:
- Current running configuration

```
Router# show running-config
```

- Saved configuration

```
Router# show startup-config
```

- Or

```
Router# show configuration
```

## Checking specific interface running configuration

```
Router# show run interface Gig0/0
```

# Verifying and Troubleshooting

## Checking interface status:

- Can be in standard or privileged mode to do this:

```
Router# show interface Gig0/0
```

- Checks interface Gigabit 0/0

## Checking status of all interfaces:

- Can be in standard or privileged mode to do this:

```
Router# show interface description
Interface      Status      Protocol Description
Fa0/0          up          up         Backbone LAN
Fa0/1          up          up         Server LAN
Fa1/0          up          up         Wireless LAN
Fa1/1          up          up         ISP Link
Lo0            up          up         Loopback
```

# Verifying and Troubleshooting

Getting a brief list of IPv4 status of all interfaces

```
Router# show ip interface brief
```

Getting a brief list of IPv6 status of all interfaces

```
Router# show ipv6 interface brief
```

Find out about directly attached Cisco devices

- “Cisco Discovery Protocol” – CDP
- Can be in standard or privileged mode to do this:

```
Router# show cdp neighbor
```

# Verifying and Troubleshooting

## Checking logs:

- Need to be privileged mode to do this:

```
Router# show logging
```

## Show software and hardware details of the device:

```
Router# show version
```

- Or

```
Router# show hardware
```

# Verifying and Troubleshooting

## Checking device status while inside configuration mode:

```
Router(config)# do show interface Gig0/0
```

- The “do” command lets the operator run all privileged mode commands from within the configuration mode of the router
- Much quicker/easier than exiting configure mode, running the status command, and then returning to configure mode

# Undoing Configuration

To undo IOS configuration:

- Simply negate the configuration command

```
Router# sh run int fa 0/0
interface FastEthernet 0/0
description Link to Core-Router
ip address 192.168.1.10 255.255.255.224
```

```
Router# conf t
Router(config)# int fa 0/0
Router(config-if)# no ip address
Router(config-if)# end
```

```
Router# sh run int fa 0/0
interface FastEthernet 0/0
description Link to Core-Router
Router#
```

# Poor defaults

For historical reasons, there are some legacy default settings which you will want to change on every device



# Poor defaults (1)

Log messages are sent to console port

- They mix in with whatever you are typing!

```
Router(config-if)#ip address 1.2.3.4  
*Jun 20 07:53:55.755:  
%LINEPROTO-5-UPDOWN: Line protocol on Interface  
GigabitEthernet3/0, changed state to down
```

## Solution

```
Router(config)#no logging console  
Router(config)#logging buffer 8192 debug
```

Use "show log" to see buffer contents

# Poor defaults (2)

## DNS lookups sent to broadcast address

- Can cause long delays e.g. for reverse lookups

```
Router#ping nsrc.org
Translating "nsrc.org"...domain server (255.255.255.255)
% Unrecognized host or address, or protocol not running.
```

## Solution: disable DNS resolution completely

```
Router(config)#no ip domain-lookup
```

## Alternatively: configure real DNS servers

- But this can also lead to delays when network is down

```
Router(config)#ip name-server 8.8.8.8
Router(config)#ip name-server 8.8.4.4
```



Questions?