Cisco Configuration Introduction

Network Infrastructure Workshop

Last updated October 2019

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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

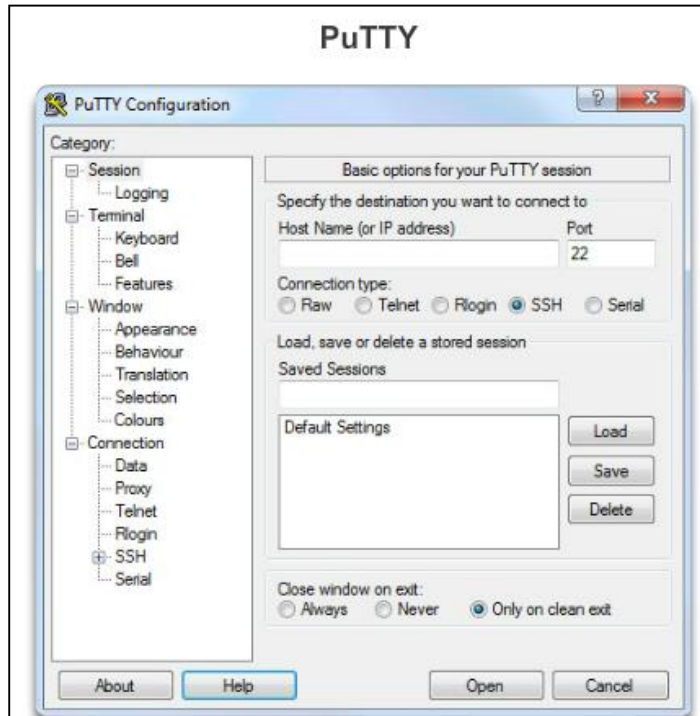Software available for connecting to a networking device:

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#
```
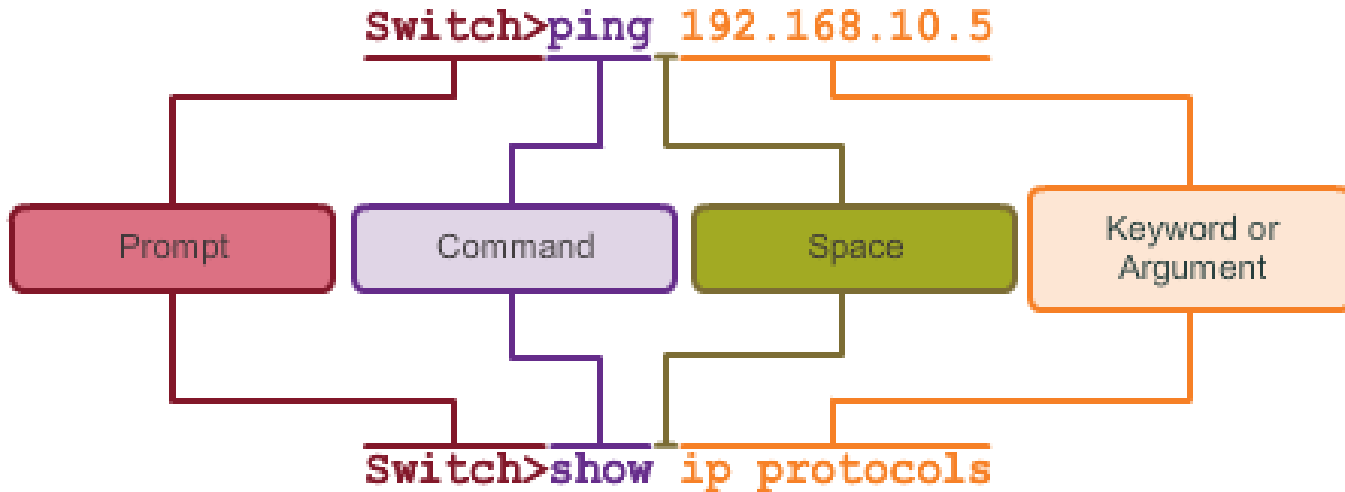
Exiting privileged mode:

```
Router# disable
Router>
```

Logging off:

```
Router> exit
```

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 addre*Jun 20 07:53:55.755:
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet3/0, changed state to downss 1.2.3.4
```

Solut
```
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?