

# Cisco Configuration Introduction

## Campus Network Design & Operations 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



# 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:
  - Accessed by:

```
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
```



# 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
```

- Solution: log to memory buffer instead

```
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
```

# Poor defaults (3)

- Typos interpreted as hostname to connect to

```
Router#wrtie  
Translating "wrtie"...domain server (255.255.255.255)  
  
% Bad IP address or host name
```

- Solution: "transport preferred none"

```
Router(config)#line con 0  
Router(config-line)#transport preferred none  
Router(config-line)#line vty 0 4*  
Router(config-line)#transport preferred none
```

```
Router#wrtie  
      ^  
% Invalid input detected at '^' marker.
```

\* line vty 0 15 on some devices



# Poor defaults (4)

- Router does not forward IPv6 traffic!
- Solution:
  - only on routers, not layer2-only devices

```
Router(config) #ipv6 unicast-routing
```



# Questions?



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