

Campus Network Design Workshop

Cisco Configuration Introduction



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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



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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.
```



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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