Campus Network Design Workshop

Cisco Configuration Introduction

UNIVERSITY OF OREGON

NSRC
Network Startup Resource Center

Cisco router components: Memory types

- RAM:
  - Stores packet buffers, ARP cache, routing table, software code and data structures necessary for router operation
  - Running configuration and decompressed IOS code is stored in RAM
- ROM:
  - Contains basic software for hardware testing and initialization.

Cisco router components: Memory types

- Flash:
  - Stores IOS and backup configuration files.
  - Not volatile.
- NVRAM (non-volatile RAM):
  - Stores router configuration.
- External Storage:
  - Compact Flash (CF) – for IOS and backup configuration files

Cisco router components: Software

- POST:
  - Power-On Self-Test.
  - Stored in ROM.
  - Checks basic router functions
- Bootstrap:
  - In ROM.
  - Initiates router and loads IOS

Cisco router components: Software

- ROM Monitor:
  - In ROM
  - Used for tests and troubleshooting.
  - Basic interface for troubleshooting low-level issues.
- IOS (Internetwork Operating System):
  - Provides all of the higher-level router functionalities

Configuration Register

- ***config-register***
  - Controls various low-level settings
  - Tell router to load or ignore configuration
  - Terminal behavior
- Current value can been seen with IOS command *show version*
  - Most common settings are:
    - 0x2102 – Normal
    - 0x2142 – Ignore configuration

Where is the configuration?

- Router always has two configurations
  - ***running-config***
    - In RAM. Shows which parameters are currently in use.
    - Modified with `configure terminal` command
    - `show running-config`
  - ***startup-config***
    - In NVRAM. Loaded by router next time it boots
    - This is where the running-config is saved
    - `show startup-config`

Configuration backups

- You can store configuration in other places
  - In router's internal or external Flash memory
  - On a server, via TFTP or SCP
- Can be copied with copy command:
  - `copy running-config startup-config`
  - `write memory` (old version of the above command)
  - `copy running-config tftp`
  - `copy startup-config tftp`
  - `copy startup-config flash:saved-config`
  - `copy flash:saved-config startup-config`

Access Modes

- User EXEC
  - Limited access. Show router state, etc.
    - `Router>`
- Privileged EXEC (enabled mode)
  - Detailed examination, alter configuration and files, run tests, debugging, etc.
    - `Router#`
- ROM Monitor
  - Password recovery and IOS installation

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

Changing the configuration

```
router>
router>enable
[type password]
router#
router# configure terminal
router(config)#
[type commands]
router(config)# end
router# write memory
```

How to tell where you are

`Router>` - USER EXEC
`Router#` - PRIVILEGED EXEC
`Router(config)` - Global configuration
`Router(config-if)` - Interface configuration
`Router(config-subif)` - Sub-interface configuration
`Router(config-route-map)` - Route-map configuration
`Router(config-router)` - Routing protocol configuration
`Router(config-line)` - Line configuration
`rommon 1>` - ROM Monitor

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#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 et<TAB>
router(config)# interface ethernet 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 e 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
Ethernet0  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

```
show running-config
show run interface f0/0
show ip int brief
debug ip ospf hello / events / adj
show log
show version
```

- Be very careful with “debug” commands!
  - Some will cause the router to become unresponsive

Undoing Configuration

- To undo IOS configuration:
  - Simply negate the configuration command

```
Router# sh run int eth 0
interface ethernet 0
 description Link to Core-Router
 ip address 192.168.1.10 255.255.255.224
Router# conf t
Router(config)# int eth 0
Router(config-if)# no ip address
Router(config-if)# ^Z
Router# sh run int eth 0
interface ethernet 0
 description Link to Core-Router
Router#
```

Questions?

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