Campus Networking Workshop

Introduction to Cisco Router Configuration
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.

- **Flash**: Stores IOS and backup configuration files. Not volatile.

- **NVRAM (non-volatile RAM)**: Saves router configuration.
Cisco router components: Software

- **POST**: Power-on Self-Test. Stored in ROM. Checks basic router functions
- **Bootstrap**: In ROM. Initiates router and loads IOS
- **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 be seen with `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 in next reboot
    • This is where the `running-config` is saved
    • `show startup-config`
**Configuration backups**

- You can store configuration in other places
  - In router’s Flash memory
  - In a server, via TFTP
- Can be copied around with `copy` command
  - `copy running-config startup-config`
  - `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.
    • \texttt{Router>}

• Privileged EXEC (enabled mode)
  • Detailed examination, manipulate configuration and files, run tests, debugging, etc.
    • \texttt{Router#}

• ROM Monitor
  • Password recovery and IOS installation
Management input sources

• Console: Direct access via serial port
• Auxiliar Port: Access via Modem
• Virtual Terminals (VTY): Telnet/SSH
Changing the configuration

- Commands are activated 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
Changing the configuration

```plaintext
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
- aal2-profile
- access-list
- alarm-interface
- alias
- appfw
- application
- archive
- arp

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

```plaintext
router(config)#interface ethernet 0
router(config-if)#ip address n.n.n.n m.m.m.m
```
Moving faster around the command line

- Move within command history
  - ↑ Previous command
  - ↓ Next command

- Line editing
  - ← and → to move within the 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`