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: Sofware

- **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 bee 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.
    - `Router>`
- Privileged EXEC (enabled mode)
  - Detailed examination, manipulate configuration and files, run tests, debugging, etc.
    - `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

```
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#` - PRVILEDGED 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
```

Moving faster around the command line

- Move within command history
  - ↑ Previous command
  - ↓ Next command
- Line editing
  - ← and → to move within the line
  - **Ctr-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`