Tribhuvan University
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Lab report on:
Computer Networking Lab 3: Routers & their setup

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1 Objectives

- to learn about enterprise level routers
- to simulate initial router setup in Cisco PacketTracer

2 Theory

One of the main components of the OSI model's Network layer is the router. It is a computer specifically designed for **routing** (forwarding data packets between different networks). Additionally, it determines the best path for routing packets.

Since a router is just a computer, it has the basic components such as CPU & different types of memory. It also has some specialized components as shown in the figure below:

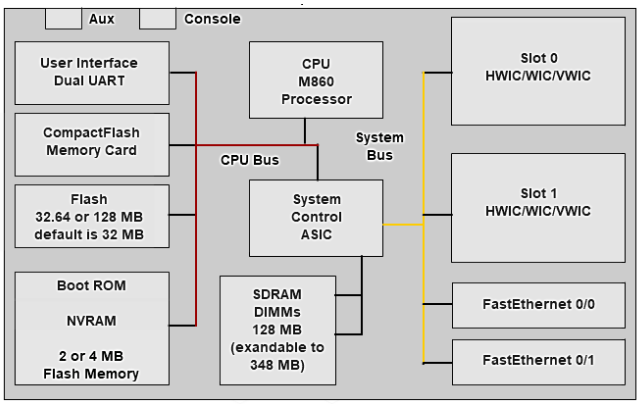

Figure 1: Hardware Components of a Router

2.1 ROM

It stores bootloader instructions which won't be erased even after formatting the router's data. These are loaded upon powering on the device, which then start up the operating system.

2.2 Flash

It is a small, non-volatile memory, generally used for storing the router's operating system. Cisco routers run IOS (Internetwork Operating System), which provides a text-based command line interface for interacting with & configuring the router.

2.3 NVRAM

Non-Volatile RAM is used for permanent storage of the router's startup configurations / settings in the `startup-config` file. One thing to note is that configuration changes are stored in volatile RAM in the `running-config` file. These must be manually copied into `startup-config` to save them.

2.4 Interfaces

A router consists of multiple interfaces / ports for connecting networks / devices through which data transfer occurs. Some basic ones are:

2.4.1 Console

It is a management port used for configuring the router and setting it up for the first time. Using this port, router is connected to a text-based terminal or nowadays, a computer running a terminal emulater program. Text commands can then be used to configure settings.

2.4.2 Virtual Terminal

It is used for configuring the router, similar to the console. The difference is that the terminal / computer doesn't need to be physically connected, instead accessing and logging in remotely. This allows multiple authorized people to easily access the router regardless of physical proximity.

2.4.3 FastEthernet interfaces

FastEthernet is an old transmission standard for data transmission inside a LAN. A FastEthernet (FE) port can receive signals as well as send some outwards. Multiple FE ports are used for different purposes like backups, explicit input & output ports etc.

2.4.4 Slot

Empty slots are provided to install more interfaces if needed. E.g: modules for wireless, WAN

2.5 Routing

Routers maintain a routing / address table having data about the network (devices, IP addresses, subnet masks, and interfaces). This is used to map what ip address packets should be sent to, determining best path etc. IP addresses and subnet masks are assigned to each network device as well as each enabled interface of the router.

3 Lab Work

Lab work was done in Cisco Packet Tracer by simulating a basic router(1841) and setting it up through text commands.

4 Conclusion

Thus, we learned how enterprise level routers work. We also simulated initial router setup in Cisco PacketTracer and configured its basic settings such as passwords, interfaces and ip addresses.