Routing Protocols and Concepts

Network Technology 1 – Routing protocol and concepts

Lennart Franked
email:lennart.franked@miun.se
Tel:060-148683

Information Technology and Media / Information- and Communication Systems (ITM/ICS)
Mid Sweden University

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Course elements

Tools and materials

- 11 Chapters.
- 11 assessment tests.
- Practice final exam.
- Lectures.
- Workshops.

Examination

- Practical assignment (groups of three).
- Homework assignment (individually).
- Final exam (individually).

Course content

Routing Protocols and Concepts

- Introduction to Routing and Packet Forwarding
- Static Routing
- Introduction to Dynamic Routing Protocols
- Distance Vector Routing Protocols
- RIP version 1
- VLSM and CIDR
- RIP version 2
- The Routing Table: A Closer Look
- EIGRP
- Link-State Routing Protocols
- OSPF

What is a router?

Figure : router symbol

Figure : Physical router (Cisco 2800 series)

Lets start simple.

- A computer
  - Central Processing Unit (CPU)
  - Different types of memory
    - Primary memory (RAM)
    - Secondary memory (Flash, ROM, HDD)
  - An Operating system for example - Windows, *NIX, Internetwork Operating System (IOS).
  - Network Interface Card (NIC).
- There are numerous devices that can act as routers
  - A specialized computer created for just this purpose.(Cisco use this description)
  - An ordinary server or even a desktop computer or laptop.
  - A mobile phone.
- That is, to know what a router is, we can not look at the hardware itself.

Router characteristics

Mandatory criteria

- works at the network layer.
- Connected to at least two networks.
- Able to forward packets between these two networks.
- Determines which interface to forward a packet to based on destination layer 3 address with the help of a routing table.

Other characteristics

- Connects between different layer 1 and layer 2 protocols and standards. WAN standards such as PPP, HDLC, Frame Relay or LAN standards such as Ethernet, Wireless Fidelity or Token Ring.
- Supports various routing protocols such as RIP, OSPF, EIGRP, BGP.
- Select the best path out of multiple potential routes.
- Prevent routing loops in the network.

Back to the hardware

What types of memory can we find on a Cisco router?

- Primary memory (RAM)
  - Random-access memory (RAM)
    - Operating system.
    - Running configuration.
    - IP routing table.
    - ARP cache.
    - Packet buffer.
- Secondary memory (ROM, NVRAM, FLASH)
  - ROM
    - Bootstrap program.
    - Diagnostic software.
    - Scaled-down version of IOS.
  - Flash
    - Permanent storage
    - Operating system
    - VLAN data.
  - NVRAM
    - Startup configuration files

Anatomy

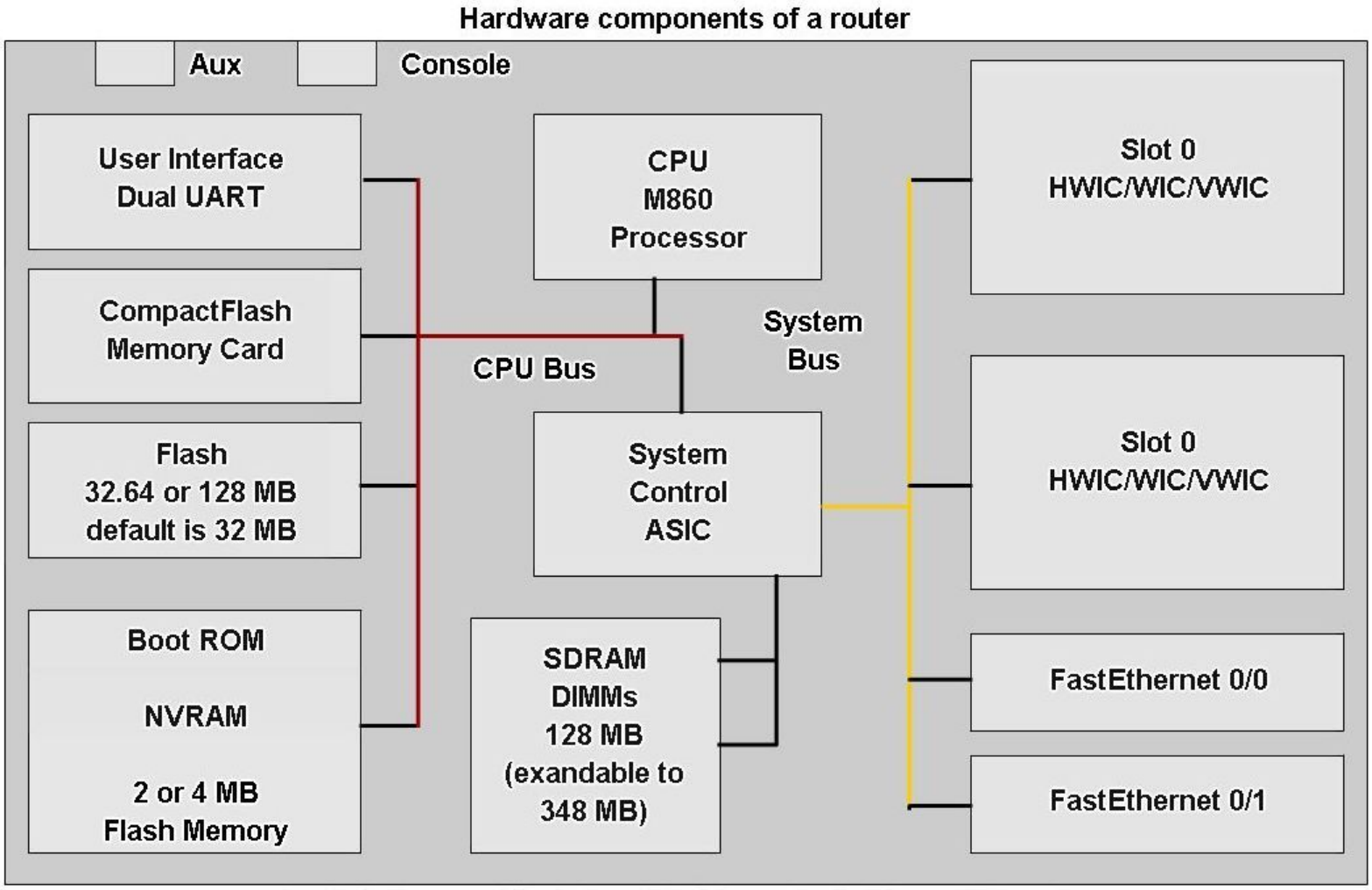

Figure : Anatomy of a Cisco router

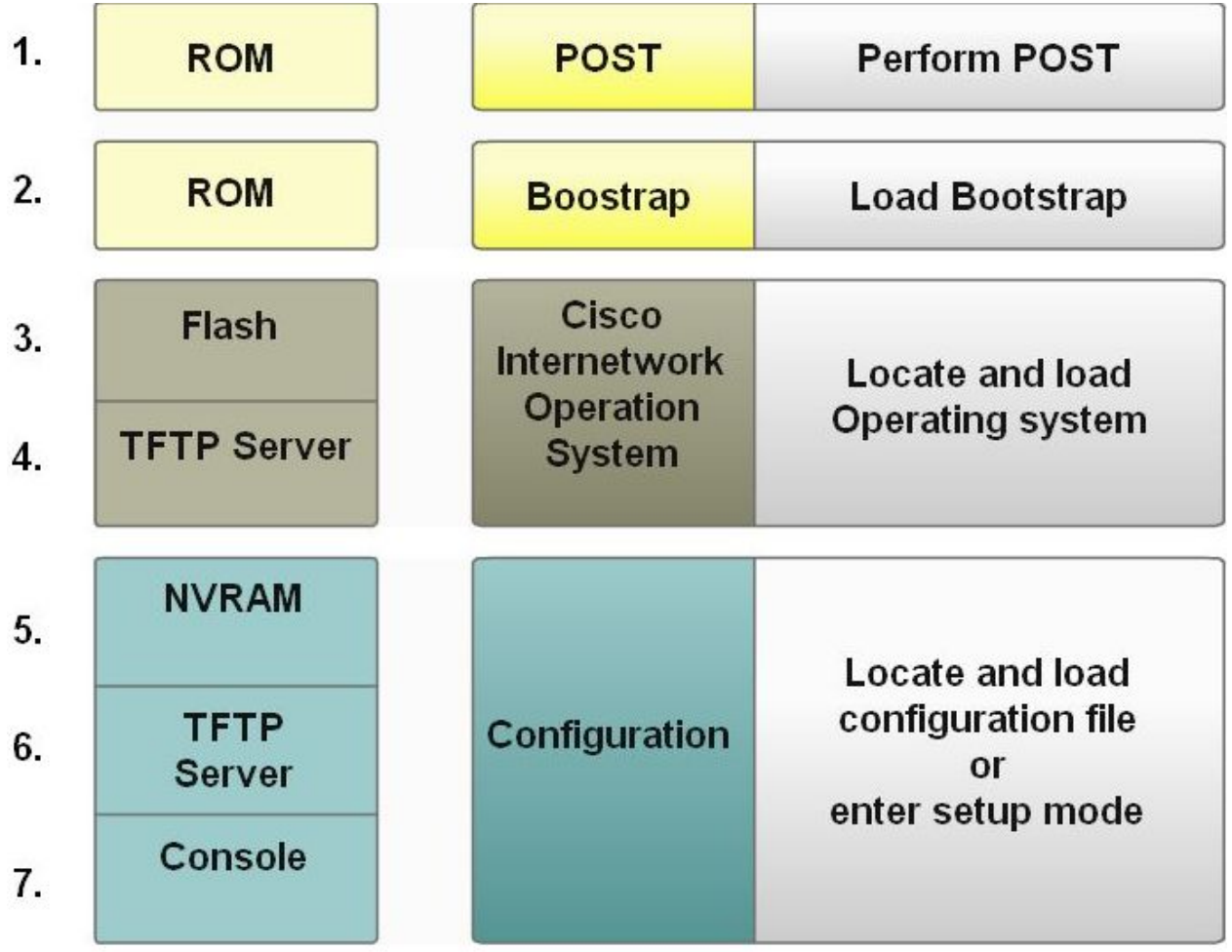

Figure : Boot process