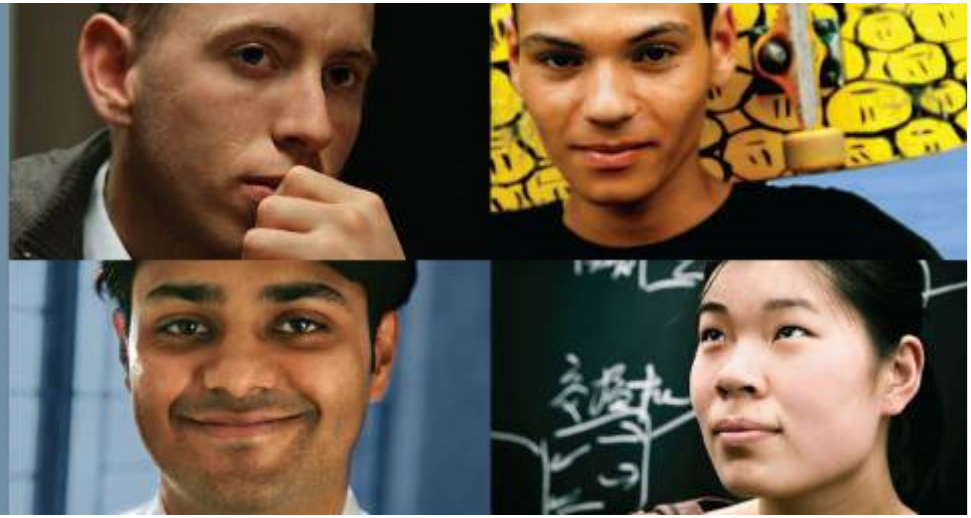
Chapter 10: Device Discovery, Management, and Maintenance



Routing and Switching Essentials v6.0

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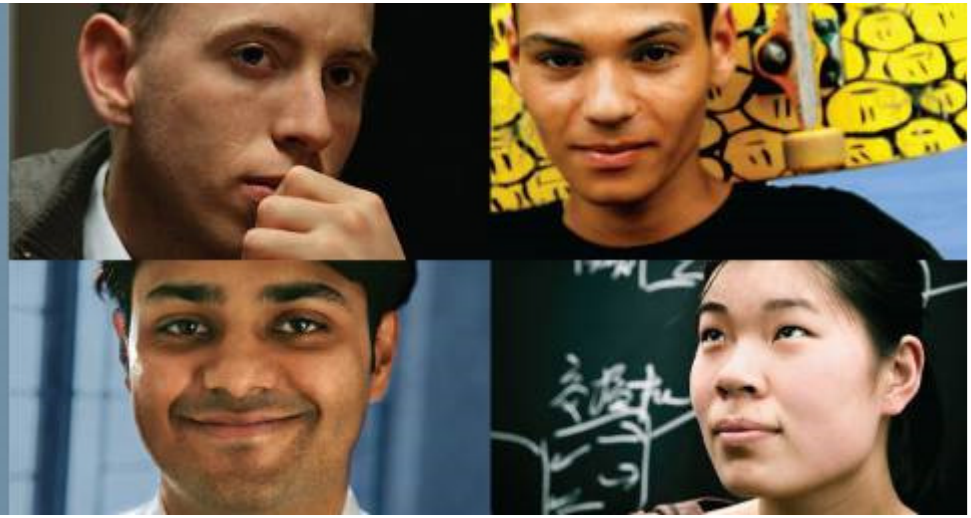
Chapter 10 - Sections & Objectives

- 10.1 Device Discovery
  - Use discovery protocols to map a network topology.
- 10.2 Device Management
  - Configure NTP and Syslog in a small to medium-sized business network
- 10.3 Device Maintenance
  - Maintain router and switch configuration and IOS files.

10.1 Device Discovery



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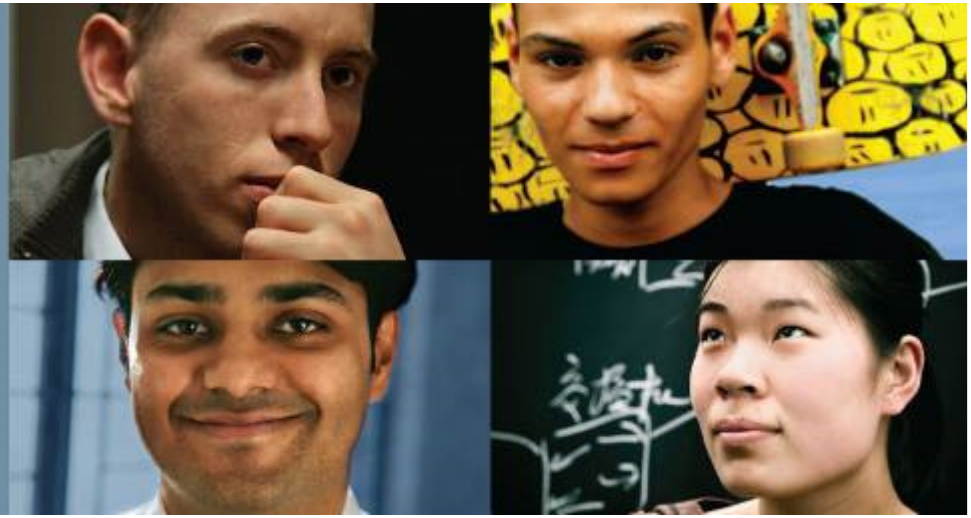
Device Discovery with CDP

- CDP Overview
  - Cisco Discovery Protocol
  - Neighbor discovery of physically connected Cisco devices
- Configure and Verify CDP
  - **`show cdp neighbors`**
  - **`show cdp interface`**
  - **`cdp run`**
  - **`cdp enable`**
- Discover Devices Using CDP
  - Device identifiers - The host name of the neighbor device
  - Port identifier - The name of the local and remote port
  - Capabilities list - Whether the device is a router or a switch
  - Platform - The hardware platform of the device

Device Discovery with LLDP

- LLDP Overview
  - A vendor neutral layer 2 neighbor discovery protocol, similar to CDP
- Configure and Verify LLDP
  - **`show lldp`**
  - **`lldp run`**
  - **`lldp transmit`**
  - **`lldp receive`**
- Discover Devices Using LLDP
  - **`show lldp neighbors`**

10.2 Device Management



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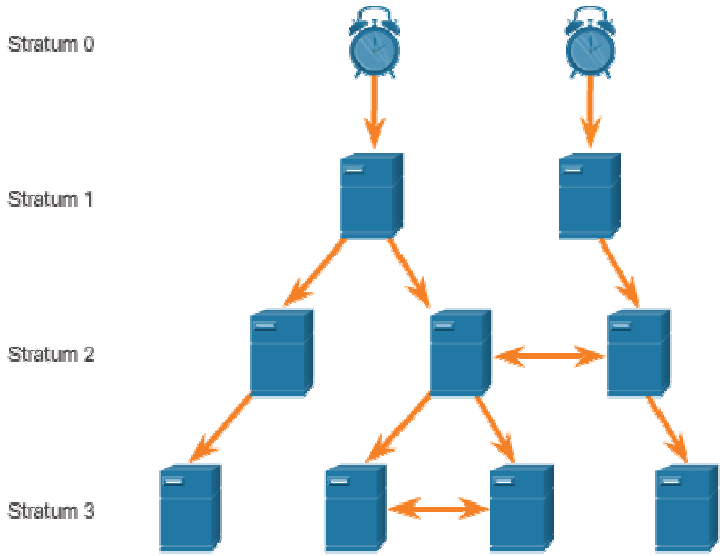
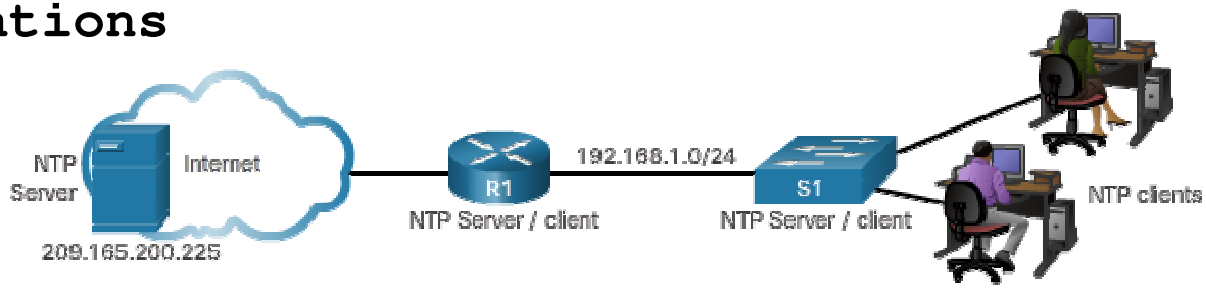
Implement NTP

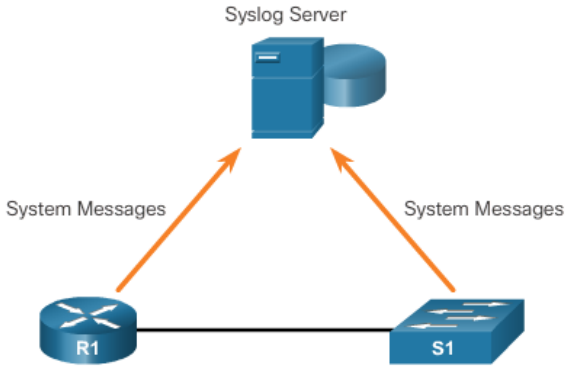
- Setting the System Clock
  - Manually configure the date and time
  - Configure Network Time Protocol (NTP)
- NTP Operation
  - Hierarchical system of time sources
  - Stratum 0 – Authoritative time source
  - Stratum number indicates how far the server is from the time source
- Configure and Verify NTP
  - **ntp server** *ip-address*
  - **show ntp associations**
  - **show ntp status**
  - **show clock**

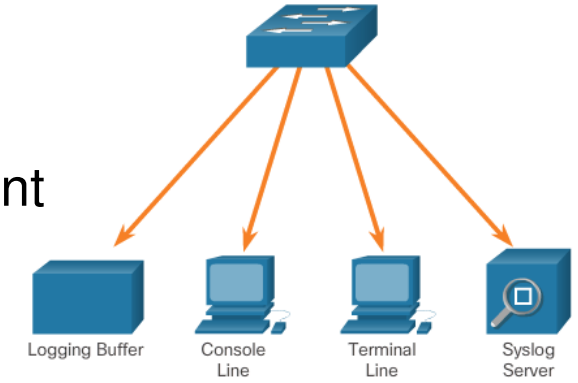




Syslog Operation

- Introduction to Syslog
  - Allows devices to send their messages to syslog server
  - Supported by most networking devices
  - Primary functions:
    - log information
    - select the type
    - specify the destinations
- Syslog Message Format
  - Severity level from 0 – 7
  - Facility – service identifiers
- Service Timestamp
  - Enhances real-time debugging and management
  - **`service timestamps log datetime`**

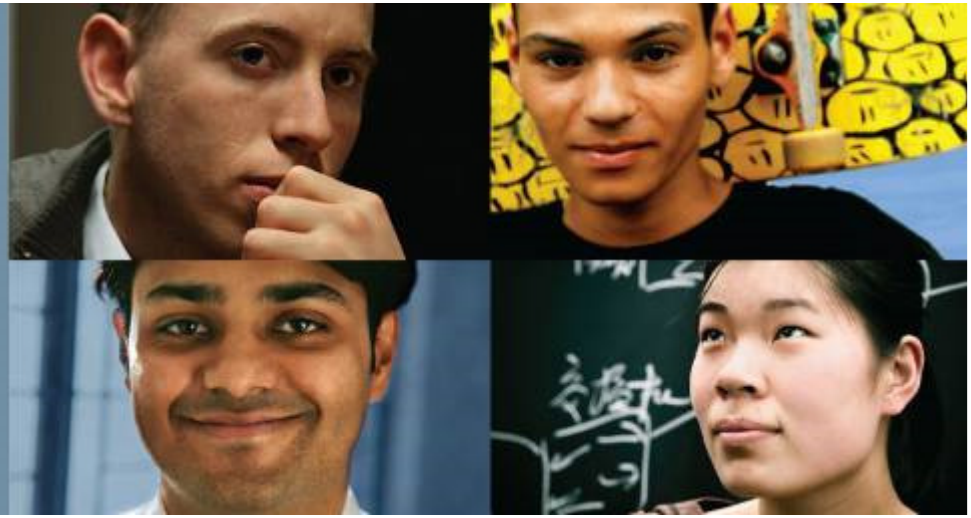




Syslog Configuration

- Syslog Server
  - Parses the output and places the messages into pre-defined columns
  - Timestamps are displayed if configured on networking devices that generated the log messages
  - Allows the network administrators to navigate the large amount of data compiled on a syslog server.
- Default Logging
  - Send log messages of all severity level to the console
  - **`show logging`**
- Router and Switch Commands for Syslog Clients
  - **`logging`** *`ip-address`*
  - **`logging`** `trap` *`level`*
  - **`logging source-interface`** *`source-interface interface-number`*
- Verifying Syslog
  - **`show logging`**
  - Use the pipe (|) to limit the amount of displayed log messages

10.3 Device Maintenance



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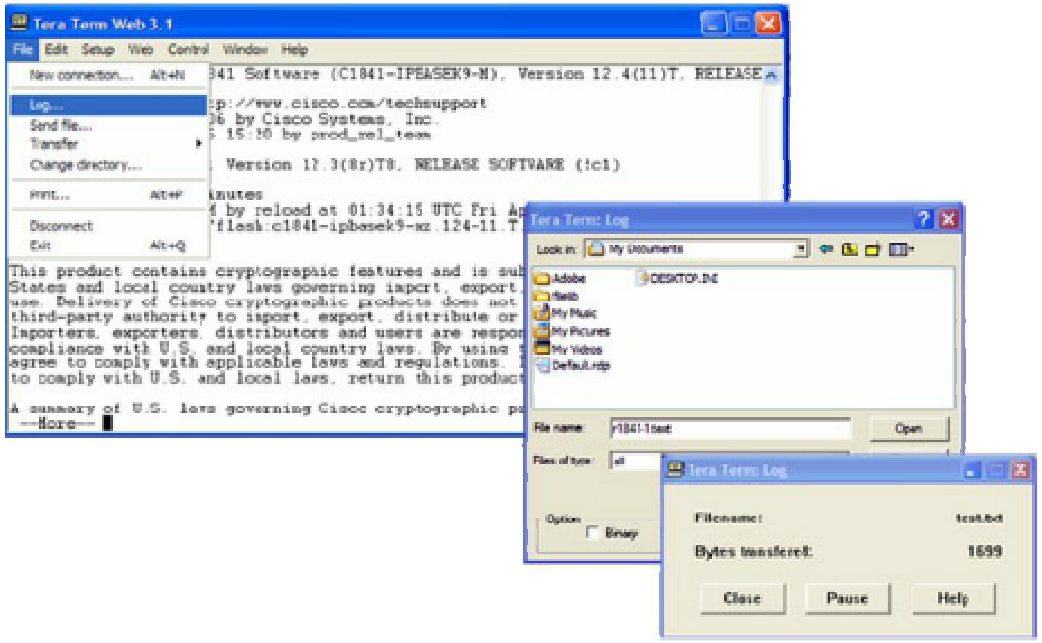
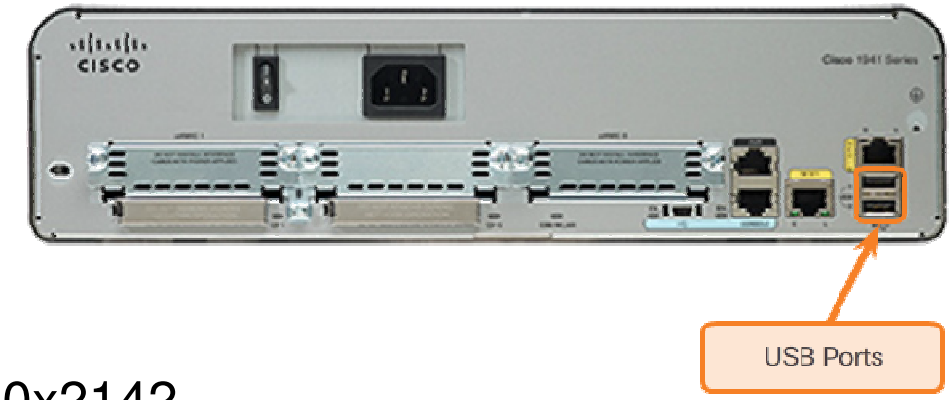
Router and Switch File Maintenance

- Router and Switch File Systems
  - **`show file systems` – lists all available file system**
  - **`dir` – lists the content of the file system**
  - **`pwd` – verify the present working directory**
  - **`cd` – changes the current directory**
- Backing up and Restoring using Text Files



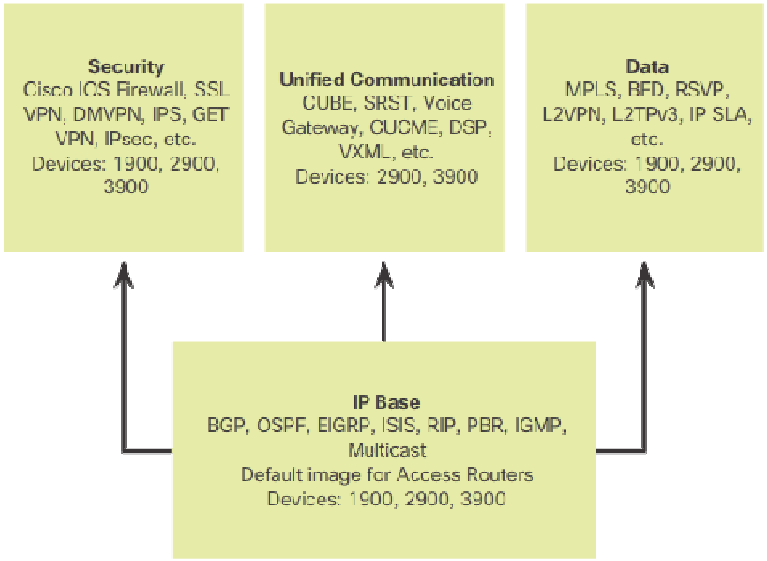
Router and Switch File Maintenance (Cont.)

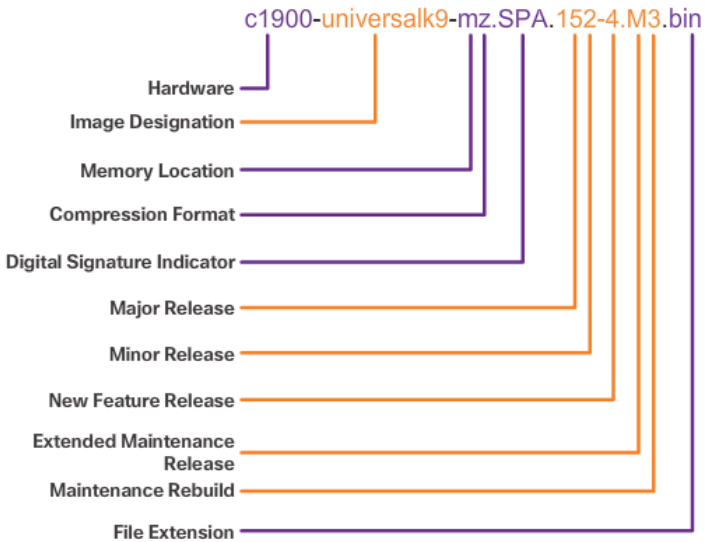
- Backing up and Restoring using TFTP
  - `copy running-config tftp`
  - `copy startup-config tftp`
- Using USB Ports for Backing Up and Restoring
  - `show file systems`
  - `dir usbflash0:`
  - `copy run usbflash0:/`
- Password Recovery
  - Enter ROMMON mode
  - Change configuration register to 0x2142
  - Make changes to the original startup config
  - Save the new configuration



IOS System Files

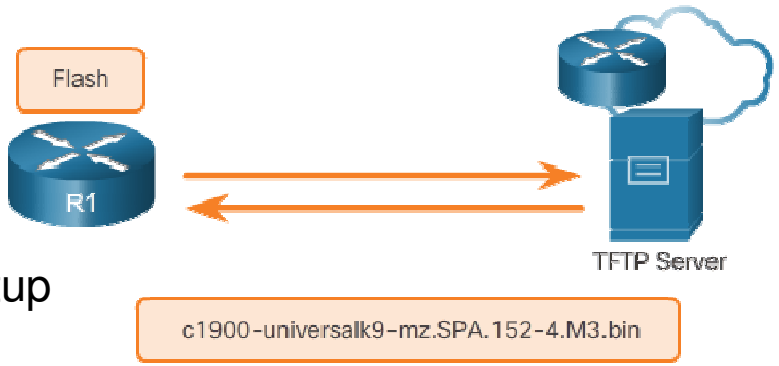
- IOS 15 System Image Packaging
  - universalk9 images
  - universalk9_npe images
  - Technology packages: IP Base, Data, UC, SEC
  - Data, UC, and SEC technology packages are activated through licensing
- IOS Image Filenames
  - Feature sets and version
  - **`show flash`**





IOS Image Management

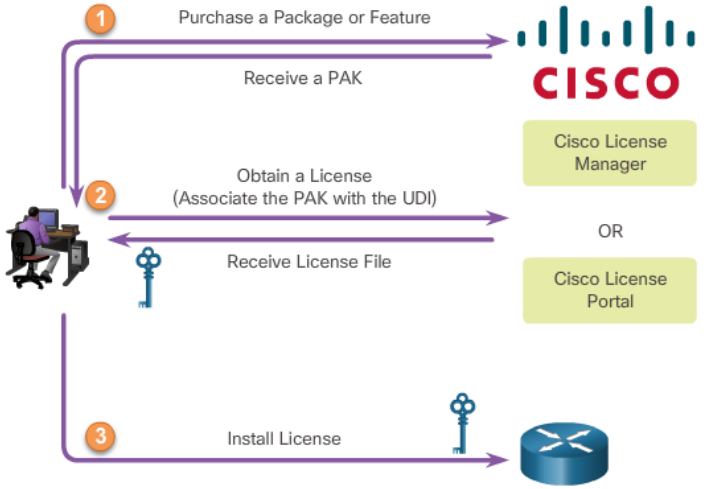
- TFTP Servers as a Backup Location
  - Backup location for IOS images and configuration files
- Steps to Backup IOS Image to TFTP Server
  - Verify access to TFTP server
  - Verify sufficient disk space
  - Copy the image to the TFTP server
    - **copy** *source-url* **tftp:**
- Steps to Copy an IOS Image to a Device
  - Download IOS image from Cisco.com and transfer it to TFTP server
  - Verify access to TFTP server from device
  - Verify sufficient disk space on device
  - Copy the image from the TFTP server
    - **copy tftp:** *destination-url*
- The **boot system** Command
  - Command to load the new image during bootup
  - **boot system** *file-url*

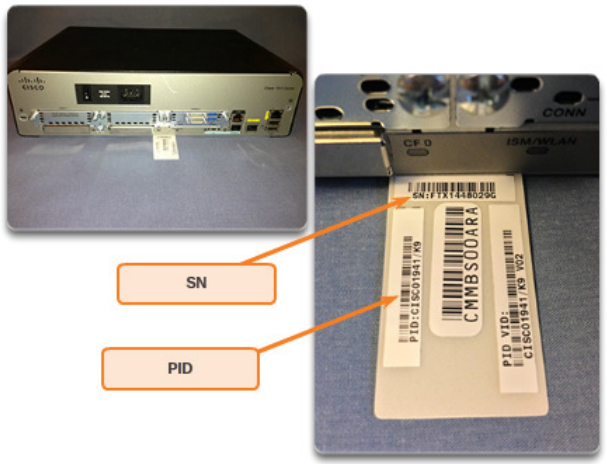


Software Licensing

- Licensing Process
  - Purchase the software package or feature to install
  - Obtain a license
    - Cisco License Manger
    - Cisco License Portal
    - Requires PAK number and UDI

      `show license udi`
  - Install the license
    - **`license install`** *`stored-location-url`*
    - **`reload`**

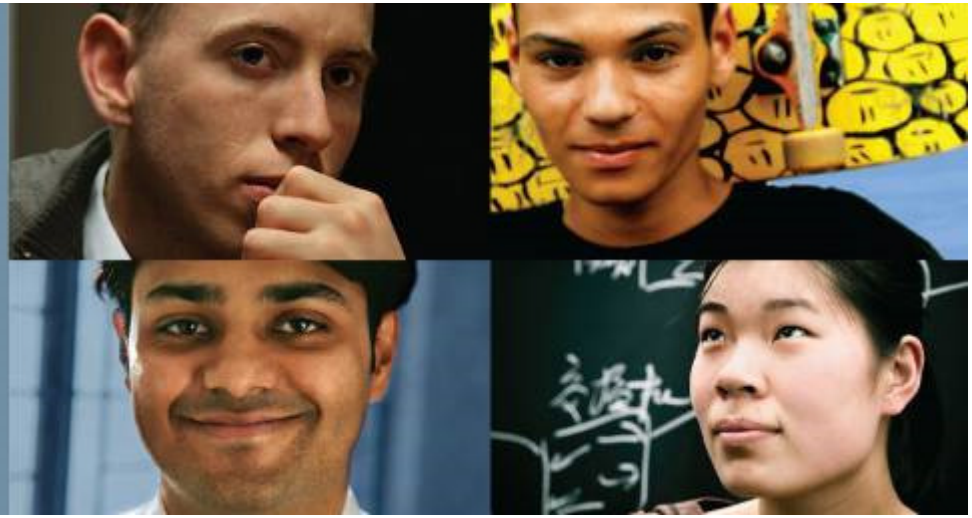




License Verification and Management

- License verification
  - **show version**
  - **show license**
- Activate an evaluation right-to-use license
  - **license accept end user agreement**
  - **license boot module** *module-name* **technology-package** *package-name*
- Back up the license
  - **license save** *file-sys://lic-location*
- Uninstall the license
  - Disable the license
    - **license boot module** *module-name* **technology-package** *package-name* **disable**
  - Clear the license
    - **license clear** *feature-name*
    - **no license boot module** *module-name* **technology-package** *package-name* **disable**

10.4 Chapter Summary



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Summary

- CDP is a Cisco proprietary protocol for network discovery on the data link layer. It can share information, such as device names and IOS versions, with other physically connected Cisco devices.
- LLDP is vendor-neutral protocol used on the data link layer for network discovery. The network devices advertise information, such as their identities and capabilities, to their neighbors.
- NTP synchronizes the time of day among a set of distributed time servers and clients. This allows networking devices to agree on the time a specific event occurred, such as the loss of connectivity between a router and a switch.
- Syslog messages can be trapped and sent to a syslog server where the network administrator can investigate when the link failed.
- Device maintenance includes the tasks of backing up, restoring, and upgrading IOS images and configuration files from an TFTP server or using USB storage devices.
- Upgrading an IOS image also includes tasks related to software licensing.
- Understanding IOS image name conventions can be useful in the determination of included IOS feature sets.