



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

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

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



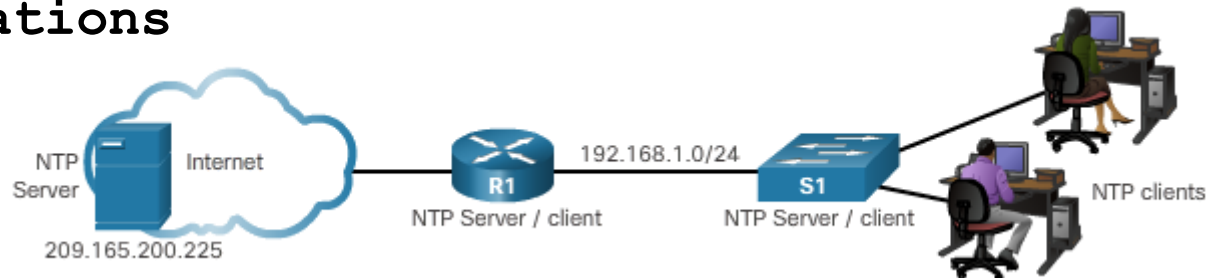
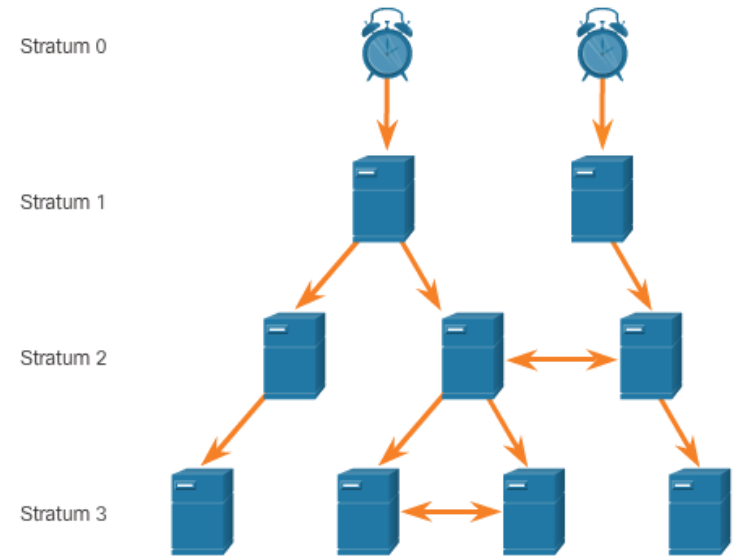
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Device Management

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`





Device Management

Syslog Operation

■ Introduction to Syslog

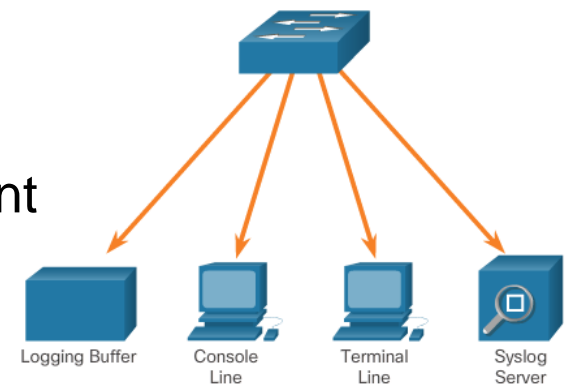
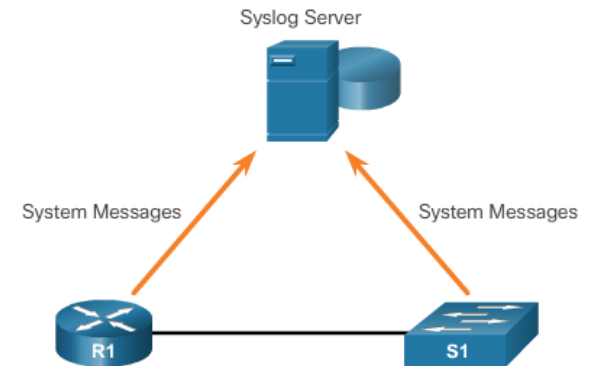
- Allows devices to send their messages to syslog server
- Supported by most networking devices
- Primary functions:
 - log information
 - select the type
 - specify the destinations

■ Syslog Message Format

- Severity level from 0 – 7
- Facility – service identifiers

■ Service Timestamp

- Enhances real-time debugging and management
- **service timestamps log datetime**





Device Management

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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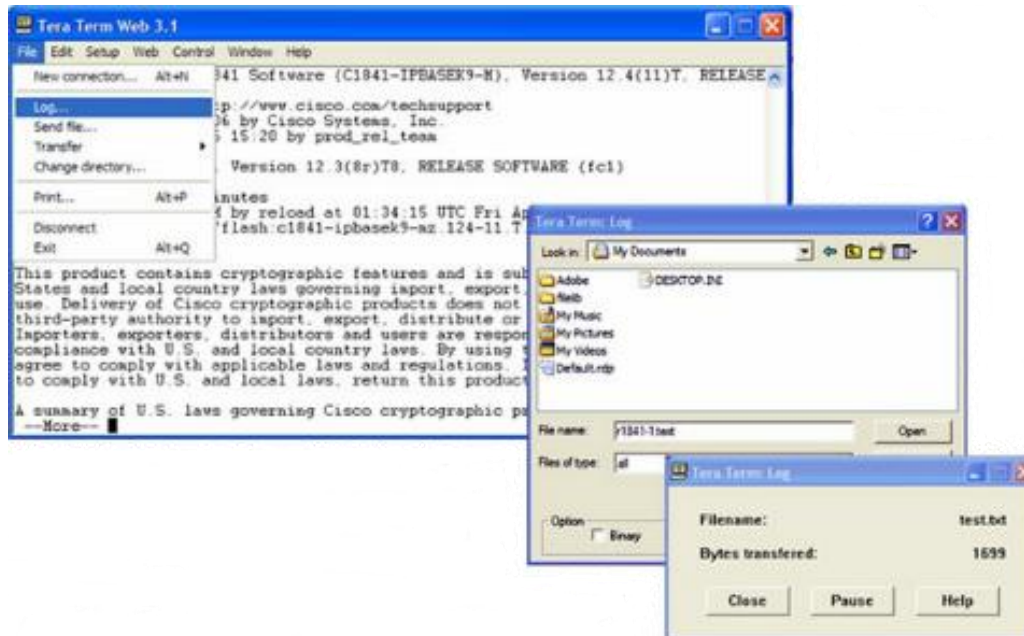


Device Maintenance

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



Device Maintenance

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



USB Ports



Device Maintenance

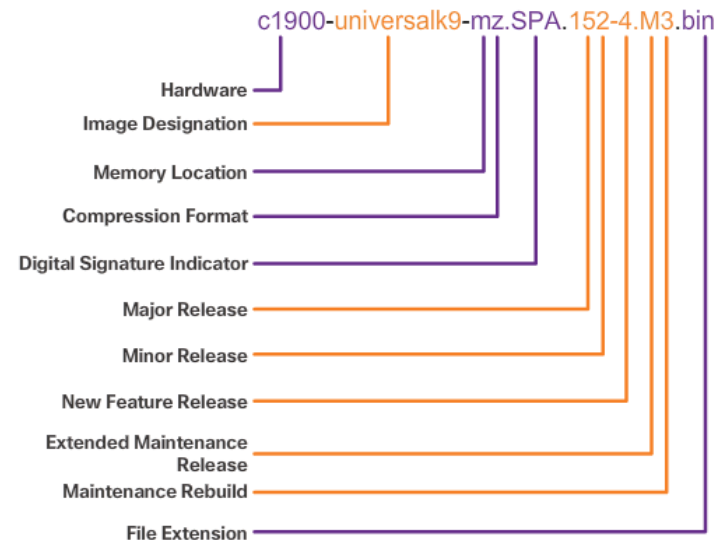
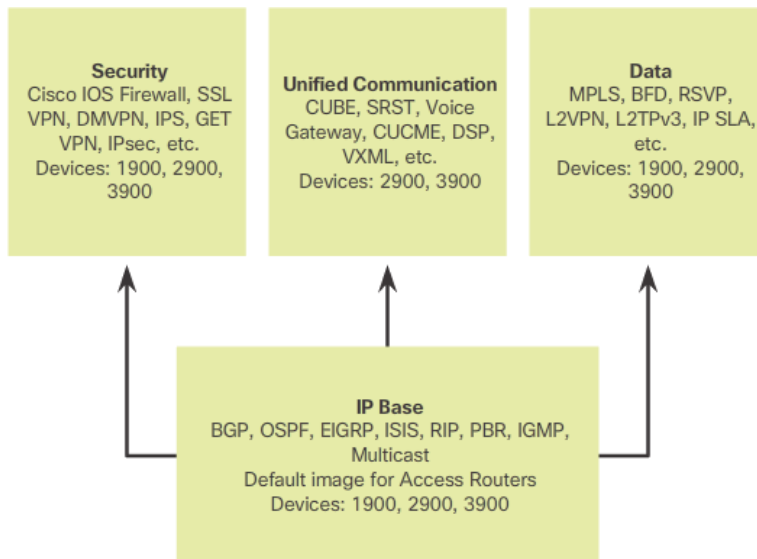
IOS System Files

■ 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**

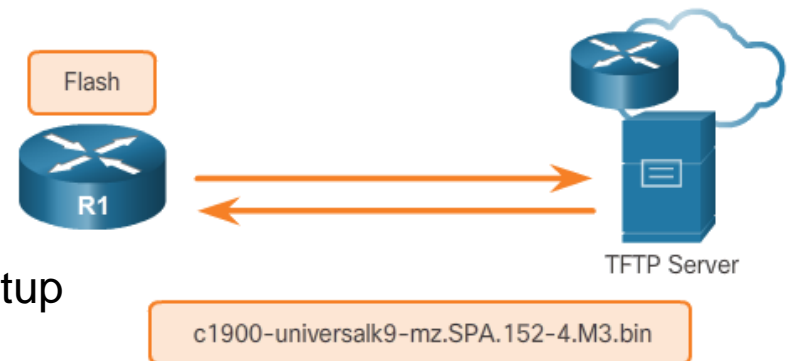




Device Maintenance

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`



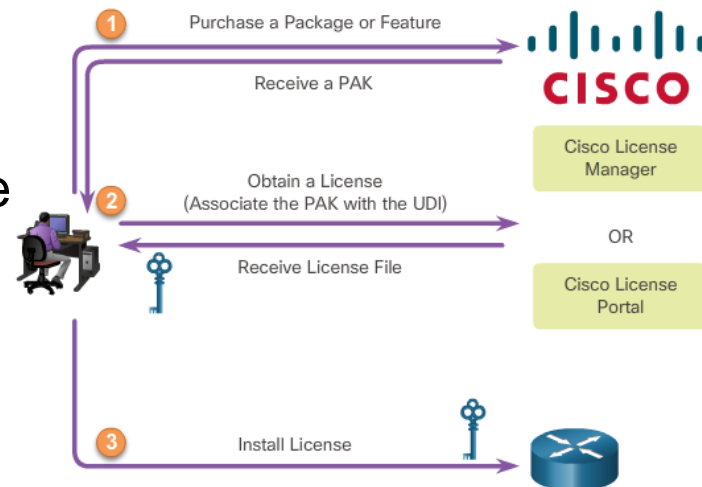


Device Maintenance

Software Licensing

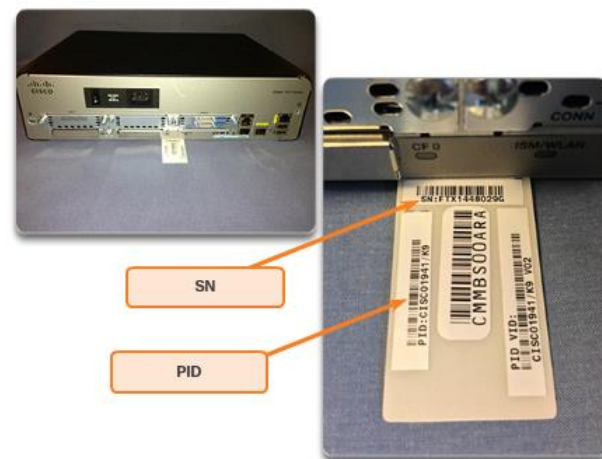
■ Licensing Process

- 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**

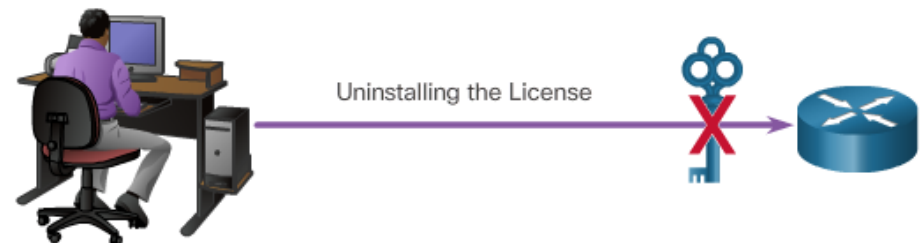




Device Maintenance

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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Chapter Summary

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.

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