



Chapter 10: Device Discovery, Management, and Maintenance



Routing and Switching Essentials v6.0

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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 (global)`
- `cdp enable (interface)`

■ 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 (global)`
- `lldp transmit (interface)`
- `lldp receive (interface)`

■ Discover Devices Using LLDP

- `show lldp neighbors`





10.2 Device Management



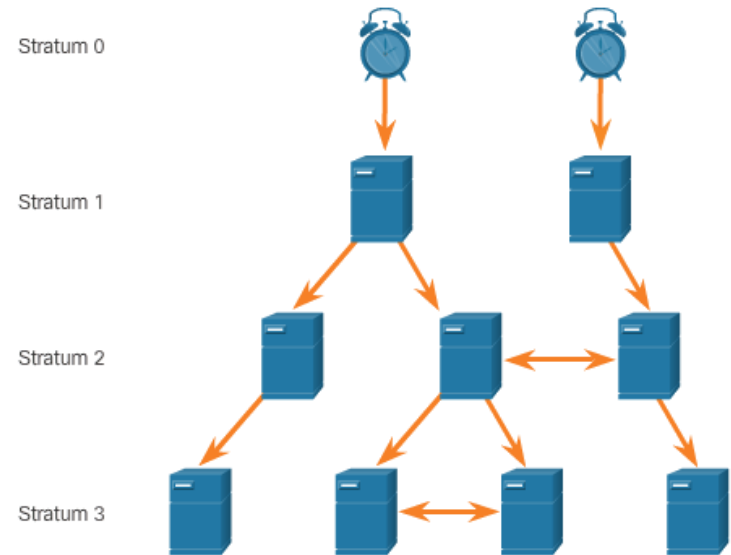
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Device Management

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`



```
R1# show ntp associations
address      ref clock    st  when  poll reach  delay
*~209.165.200.225 .GPS.    1   61    64   377  0.481
* sys.peer, # selected, + candidate, - outlyer, x falseticker,

R1# show ntp status
Clock is synchronized, stratum 2, reference is 209.165.200.225
```

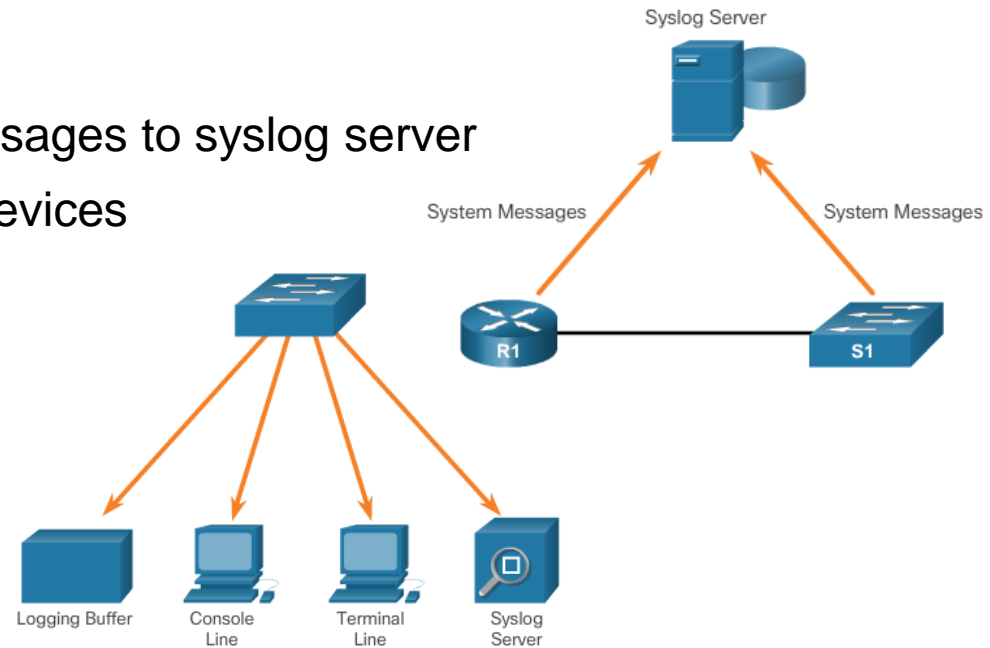


Device Management

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

■ Service Timestamp

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

Severity Name	Severity Level
Emergency	Level 0
Alert	Level 1
Critical	Level 2
Error	Level 3
Warning	Level 4
Notification	Level 5
Informational	Level 6
Debugging	Level 7



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*

■ Verifying Syslog

- **show logging**



10.3 Device Maintenance



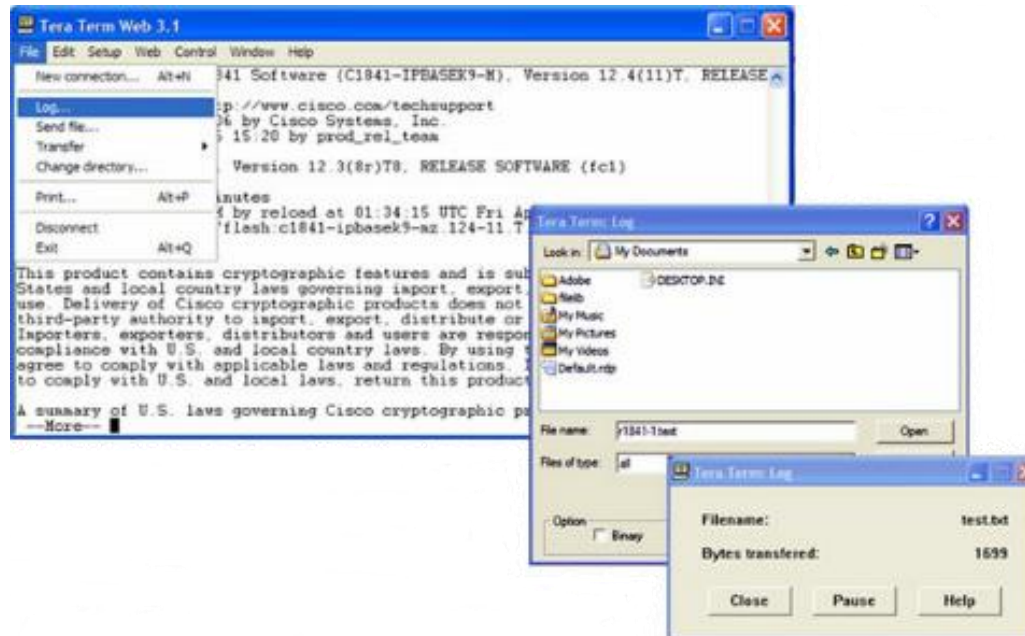
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Device Maintenance

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

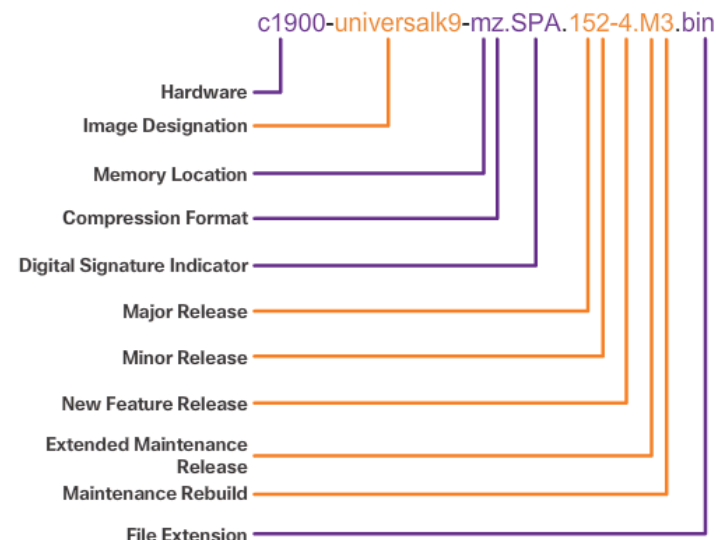
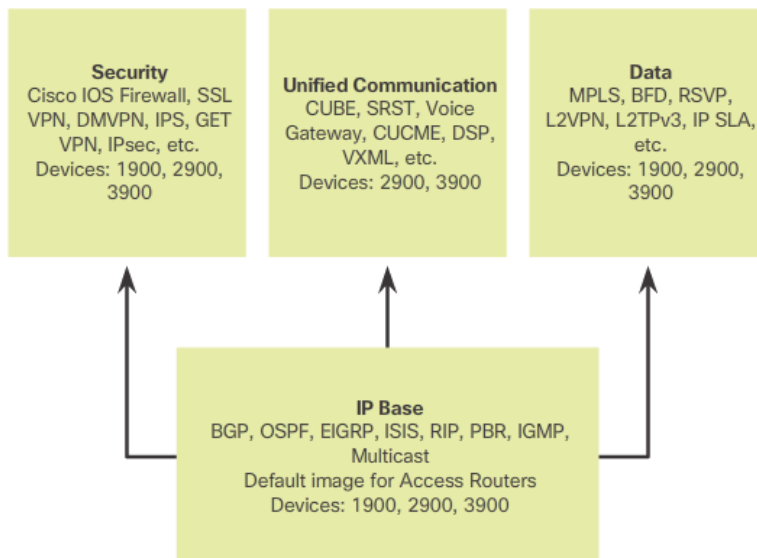
IOS System Files

■ IOS 15 System Image Packaging

- universalk9 images
- universalk9_npe images (No Payload Encryption)
- 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**

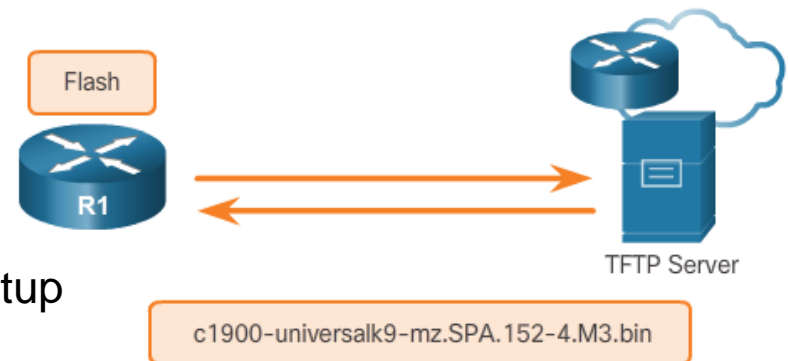




Device Maintenance

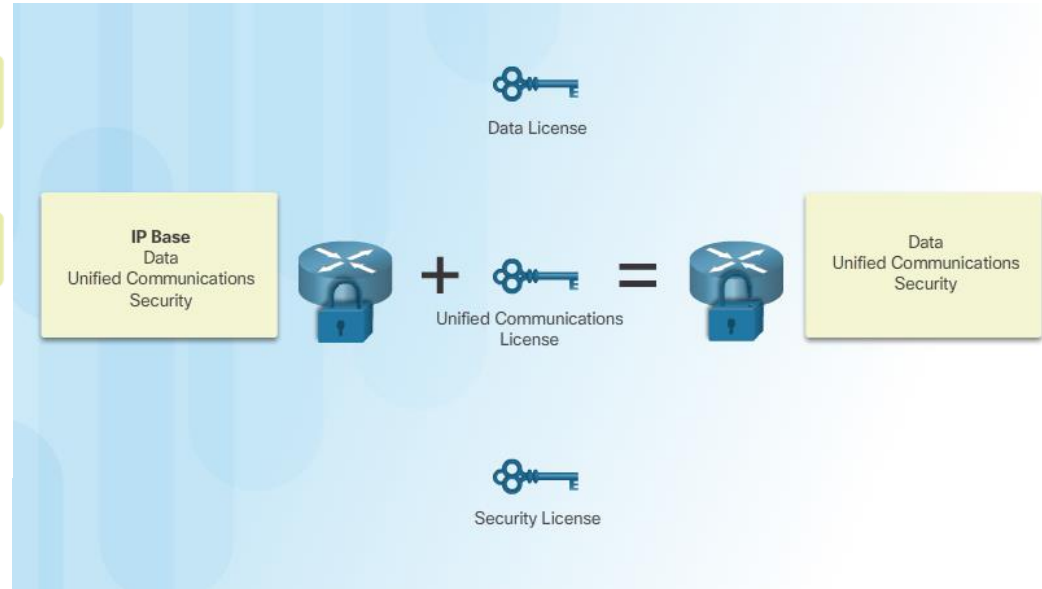
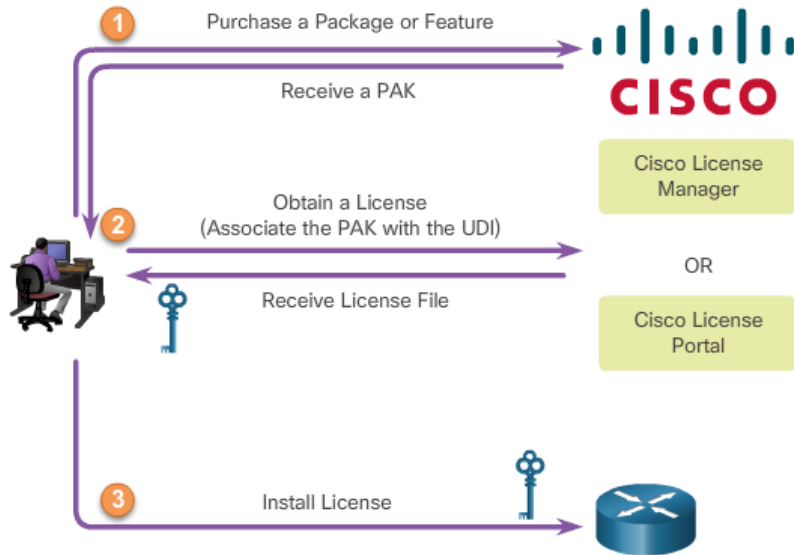
IOS Image Management

- 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



- *show license udi*
- *show license feature*
- *show version*
- *license boot module ...*

