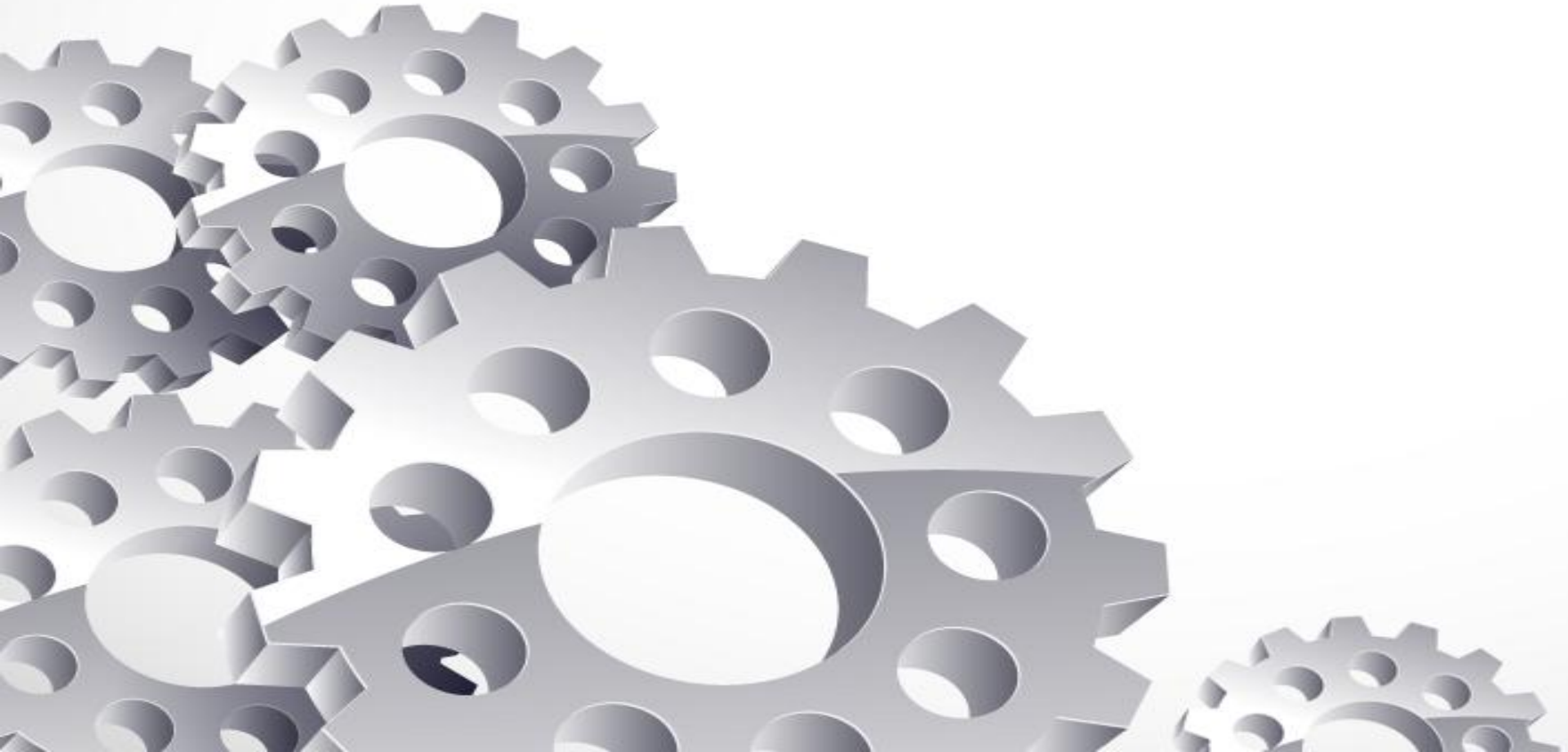
IOS image and Licensing



Reporters:

Haidee Yadao

Aljieo Tolibas

Edwin Tudas

Marjun Trazares

Objectives

- Understand the necessity of managing IOS system image files to increase network reliability in a small-to-medium-sized business network.
- Explain the Cisco IOS image naming conventions.
- Calculate memory requirements needed when upgrading an IOS system image
- Explain the licensing process for the Cisco IOS software in a small-to-medium-sized business network.
- Configure a router to install a Cisco IOS image license.

Introduction

Describes the following Cisco IOS concepts and features:

- The Cisco porfolio supports a broad range of technologies and features.
- Customers choose an IOS based on a set of protocols and features supported by a particular image.
- The Cisco IOS 12.5 and 15 packaging and naming conventions.
- Beginning with IOS 15, Cisco also implemented a new packaging format and licensing process for IOS.
- Process of obtaining, installing, and managing Cisco IOS 15 software licenses.

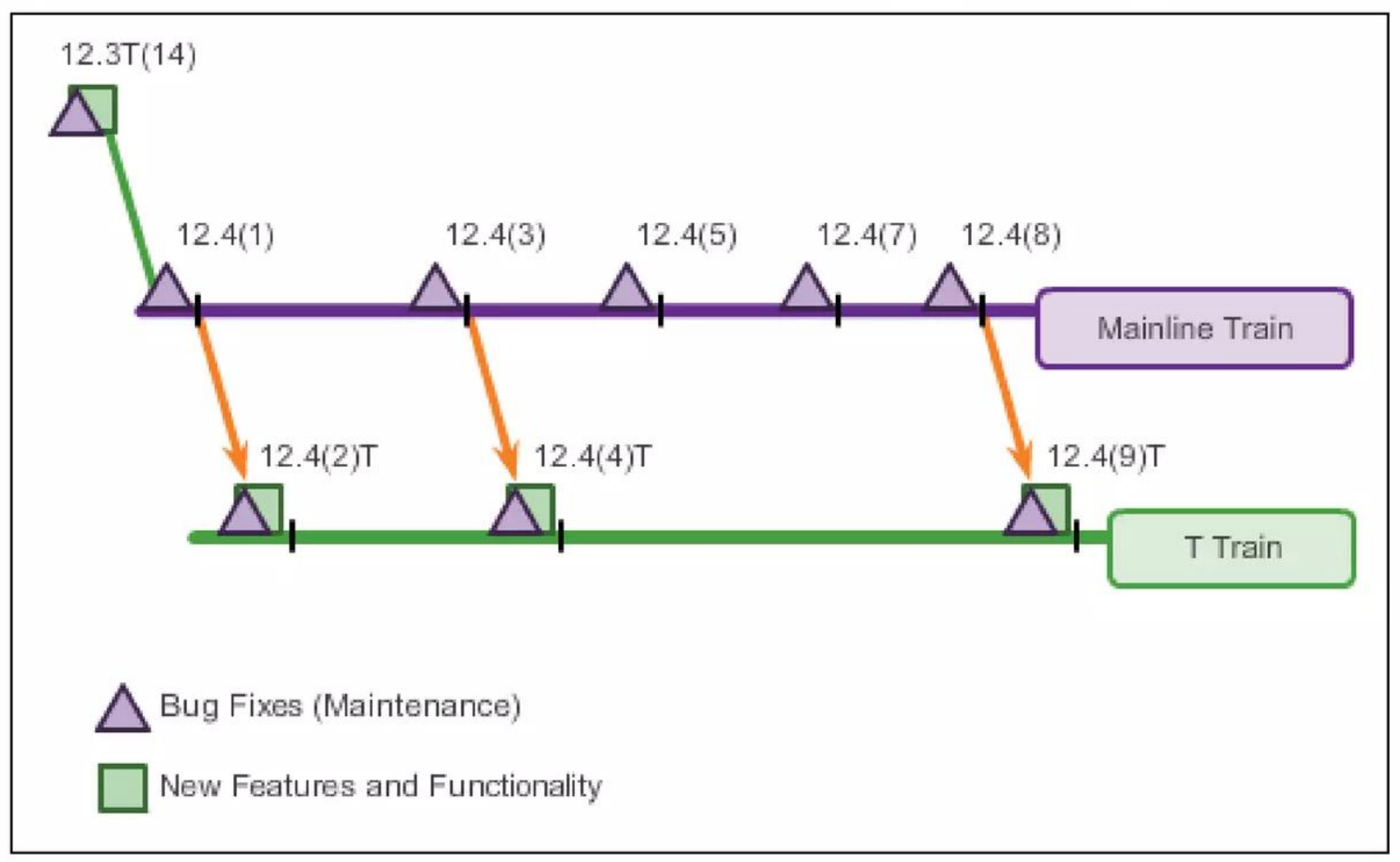
Cisco IOS Software Release Families and Trains

- A software release family is comprised of multiple IOS software release versions that:
  - Share a code base
  - Apply to related hardware
  - Overlap in support coverage
- Examples of IOS releases, within a software release family, include 12.3, 12.4, 15.0, and 15.1.
- A Cisco IOS train is a version of the software released to implement bug fixes and add new features.

Cisco IOS 12.4 Mainline and T Trains

- The Cisco IOS software 12.4 train is considered the mainline train.
  - It receives mostly software (bug) fixes
  - Releases are designated as Maintenance Deployment (MD) releases
  - Is always associated with a technology train (T train)

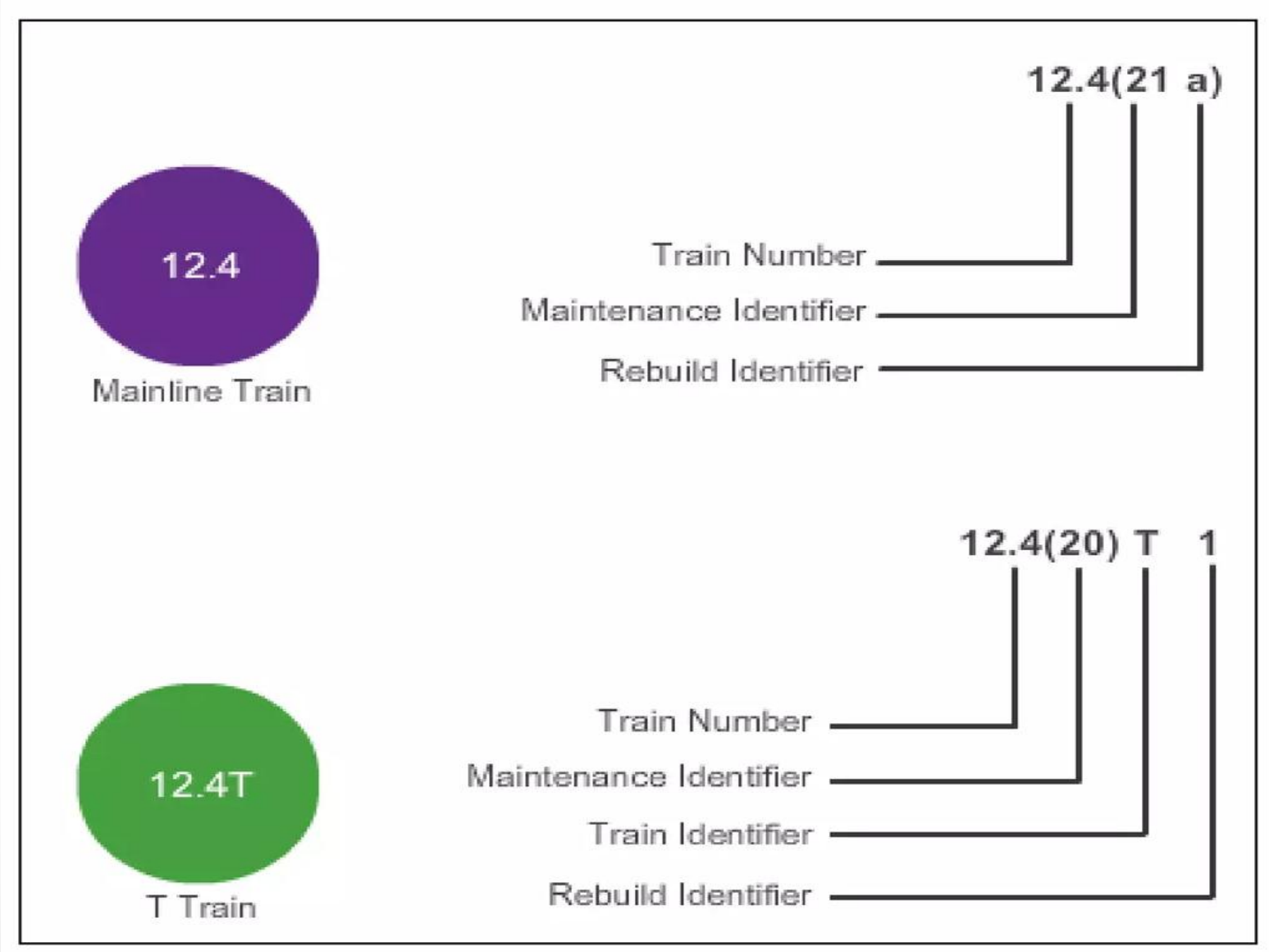
Cisco IOS 12.4 Mainline and T Trains



Cisco IOS 12.4 Mainline and T Numbering

The IOS release numbering convention is used to identify the release of the IOS software, including any bug fixes and new software features.

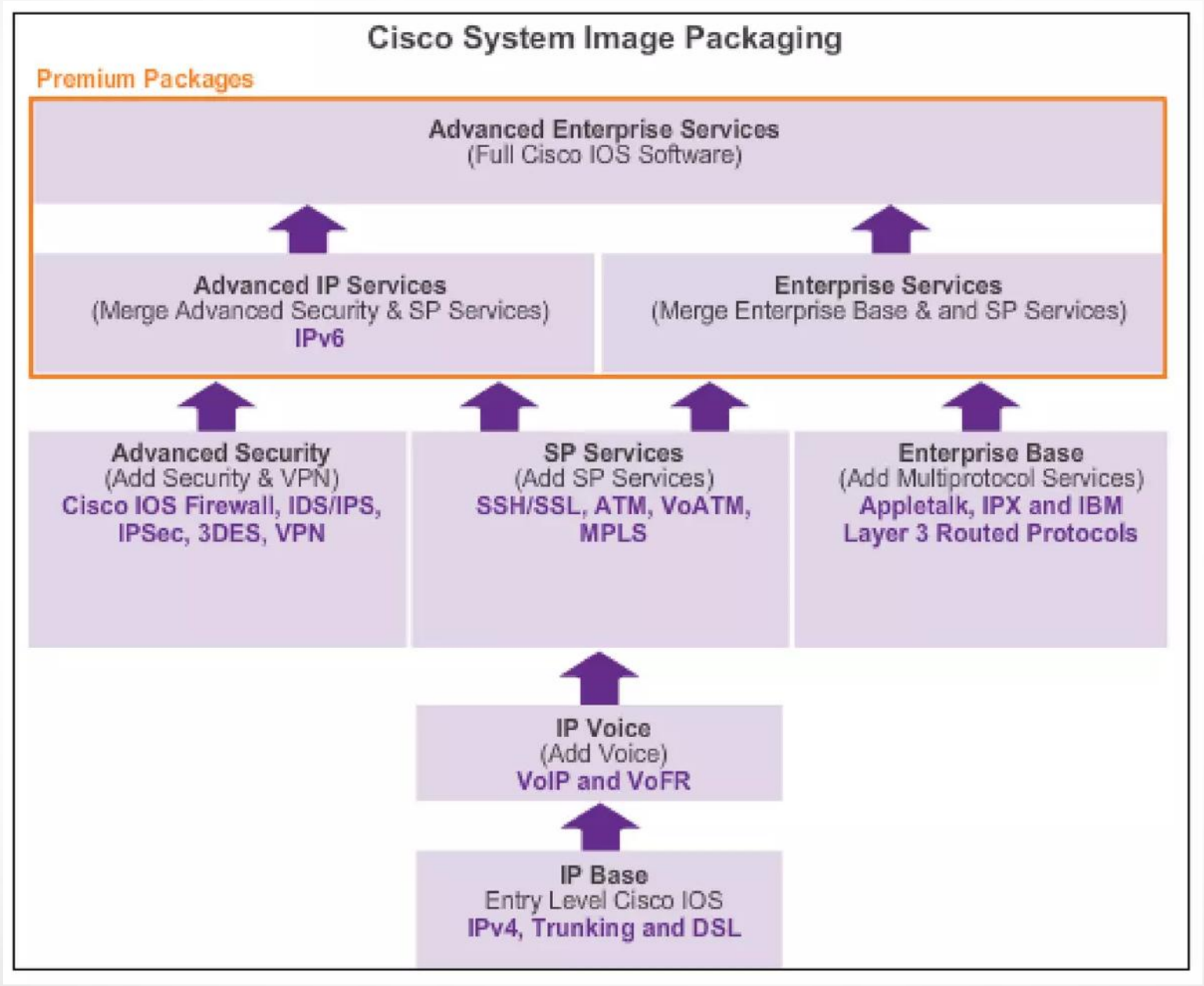
Cisco IOS 12.4 Mainline and T Numbering



Cisco IOS 12.4 System Image Packaging

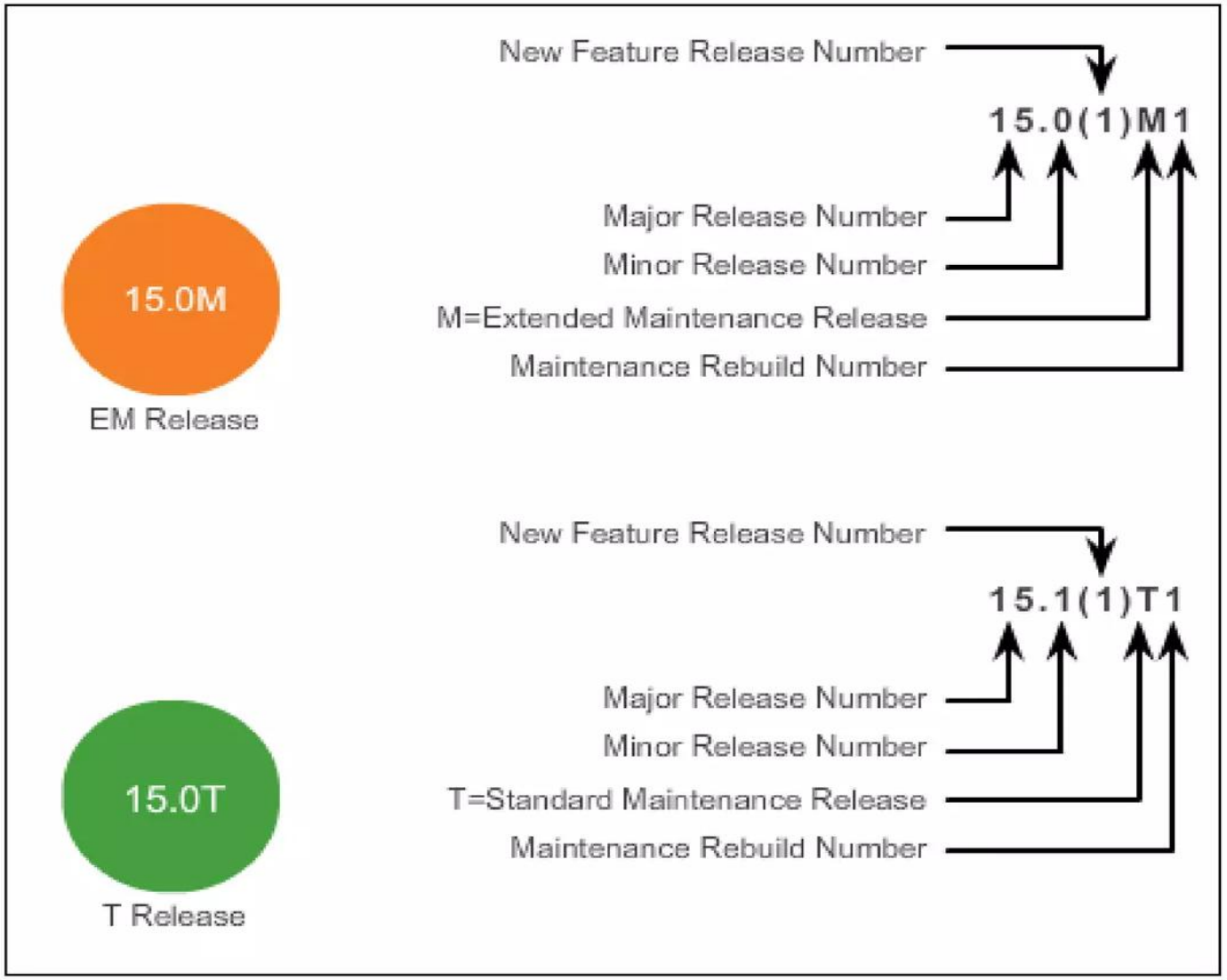
Pre Cisco IOS Software Release 15.0, the Cisco IOS Software Packaging consisted of eight packages for Cisco routes.

Cisco IOS 12.4 System Image Packaging

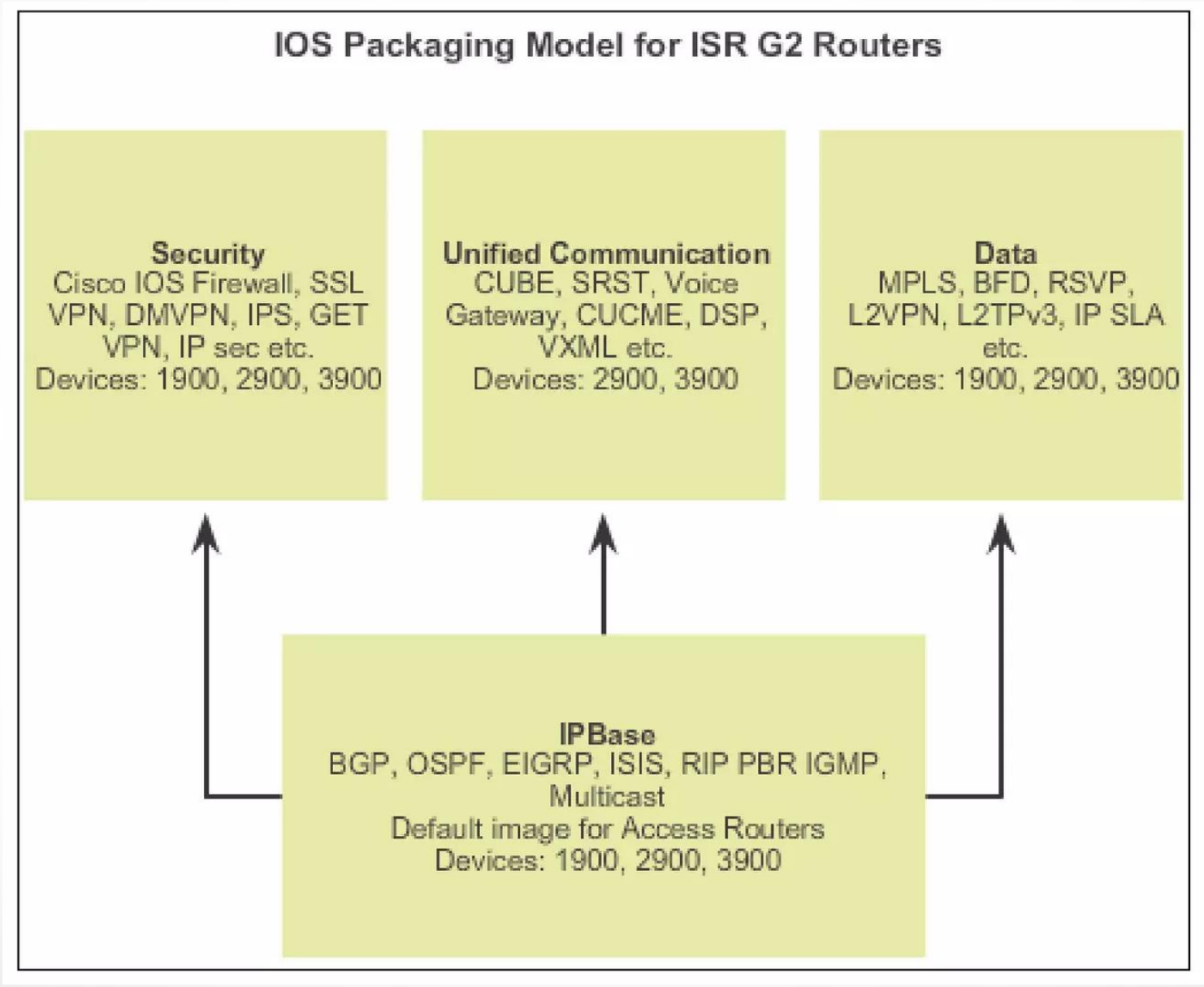


Cisco IOS 15.0 Train Numbering

- **Extended Maintenance (EM) Release** – The EM release is ideal for long-term maintenance, which enables customers to qualify, deploy, and remain on the release for an extended period.
- **Standard Maintenance (T) Release** – The T release is used for short-deployment releases, which is ideal for the latest new features and hardware support before the next EM release becomes available.



IOS System Image Packaging



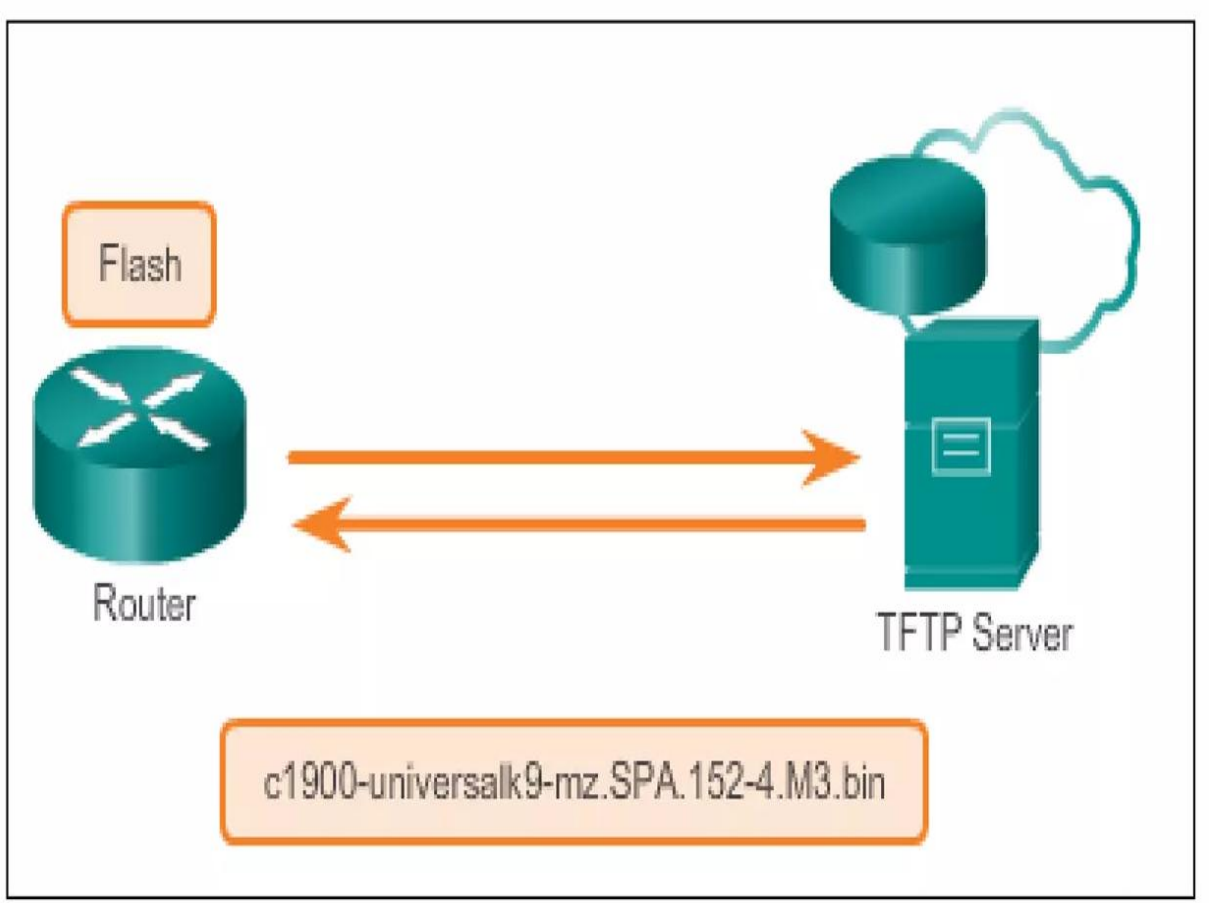
IOS image Filenames

Displaying the Cisco IOS image.

```
R1# show flash0:
-# - --length-- -----date/time------ path



8   68831808   Apr 2 2013 21:29:58 +00:00 c1900-universalk9-
mz.SPA.152-4.M3.bin

182394880 bytes available (74092544 bytes used)
```

TFTP Servers as a Backup Location

- Cisco IOS software images and configuration files can be stored on a central TFTP server.
- It is good practice to keep a backup copy of the Cisco IOS software image.
- Using a network TFTP server allows image and configuration uploads and downloads over the network.



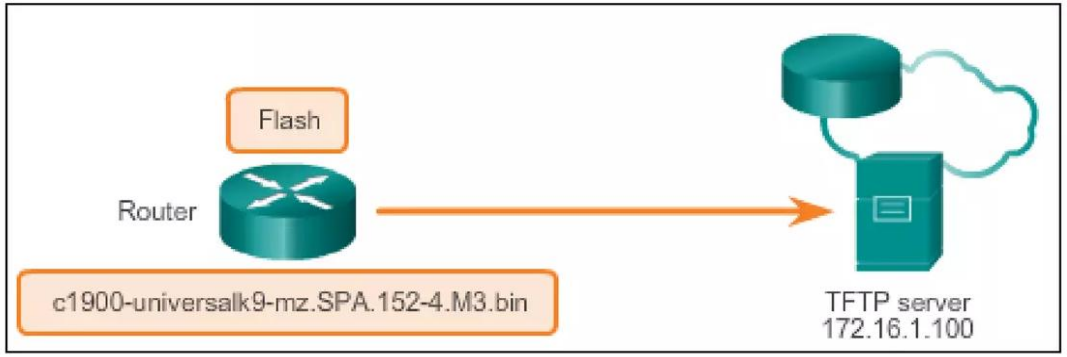
Creating Cisco IOS image Backup

To create a backup of the Cisco IOS image to a TFTP server, perform the following three steps:

Step 1. Ensure that there is access to the network TFTP server. Ping the TFTP server to test connectivity.

Step 2. Verify that the TFTP server has sufficient disk space to accommodate the Cisco IOS Software image. Use the **`show flash0:`** command on the router to determine the size of the Cisco IOS image file.

Step 3. Copy the image to the TFTP server using the **`copy`** *`source-url destination-url`* command.



Copying a System IOS image

Follow these steps to upgrade the software on the Cisco router:

Step 1. Select a Cisco IOS image file that meets the requirements in terms of platform, features, and software. Download the file from http://www.cisco.com and transfer it to the TFTP server.

Step 2. Verify connectivity to the TFTP server. Ping the TFTP server from the router.

Step 3. Ensure that there is sufficient flash space on the router that is being upgraded. The amount of free flash can be verified using the **`show flash0:`** command.

Step 4. Copy the IOS image file from the TFTP server to the router using the **`copy tftp: flash0`** command. After issuing this command with specified source and destination URLs, the user is prompted for the remote host's IP address, source filename, and destination filename. The transfer of the file then begins.

Boot System

- The **boot system** commands specify the name and location of the Cisco IOS Software image to load. Several **boot system** commands can be entered in sequence.
- Specify the flash device as the source of the Cisco IOS image:

```
Router(config)# boot system flash0://c1900-universalk9-mz.SPA.152-4.M3.bin
```

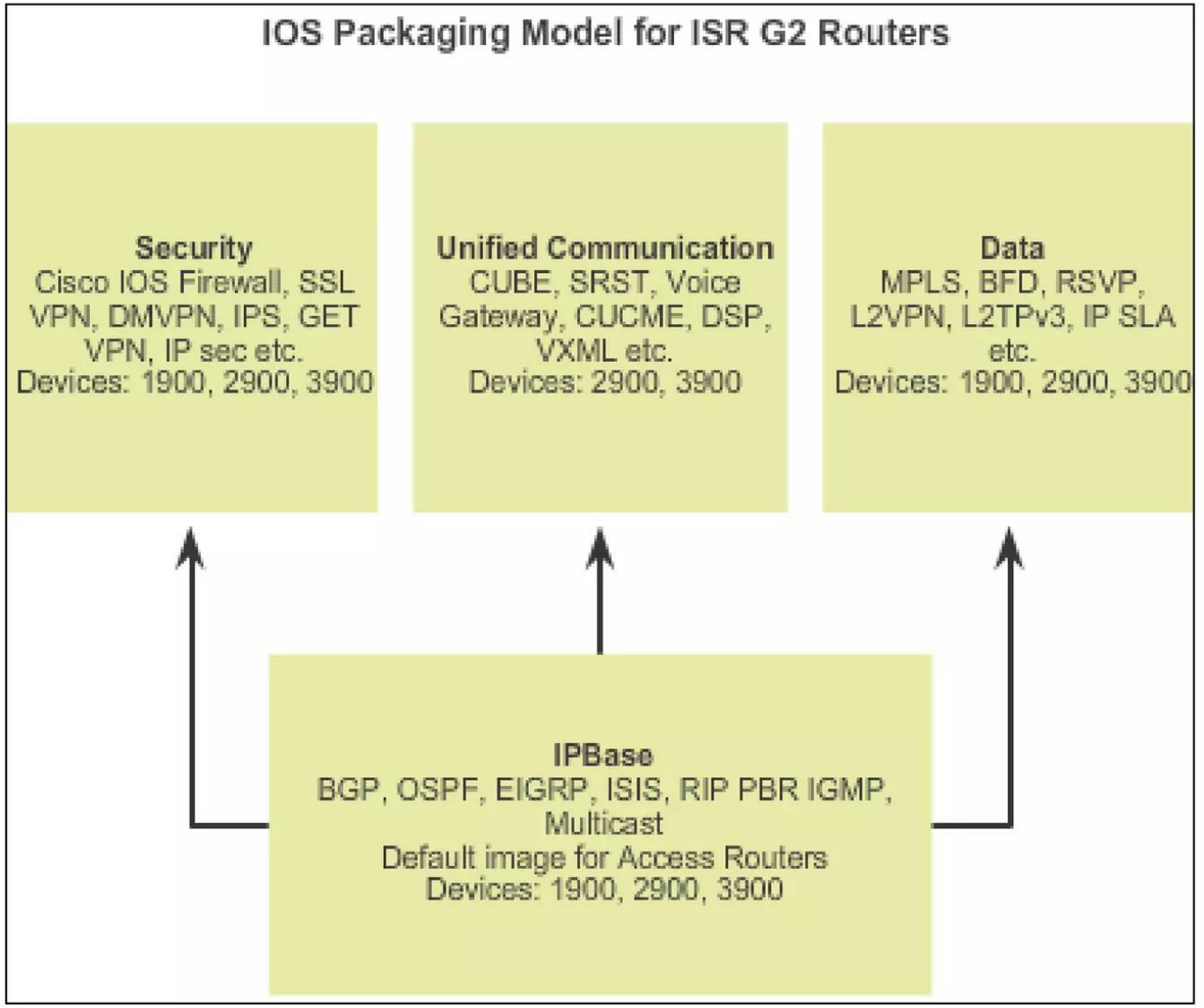
- Specify the TFTP server as a source of the Cisco IOS image, with ROMmon as the backup:

```
Router(config)# boot system tftp://c1900-universalk9-mz.SPA.152-4.M3.bin
Router(config)# boot system rom
```

Licensing Overview

- The Cisco IOS software Release 15.0 incorporates cross-platform feature sets to simplify the image selection process.
- Each device ships with the same universal image.
- Technology packages are enabled in the universal image via Cisco Software Activation licensing keys.
- Technology package licenses are supported on Cisco ISR G2 platforms (Cisco 1900, 2900, and 3900 Series routers).
- Use the **show license** feature command to view the technology package licenses and feature licenses supported on the router.

Licensing Overview



Licensing Process

- A new router is shipped preinstalled with the software image and the corresponding permanent licenses for the customer-specified packages and features.

- Also comes with the evaluation license, known as a temporary license, for most packages and features supported on the specified router for customer review.

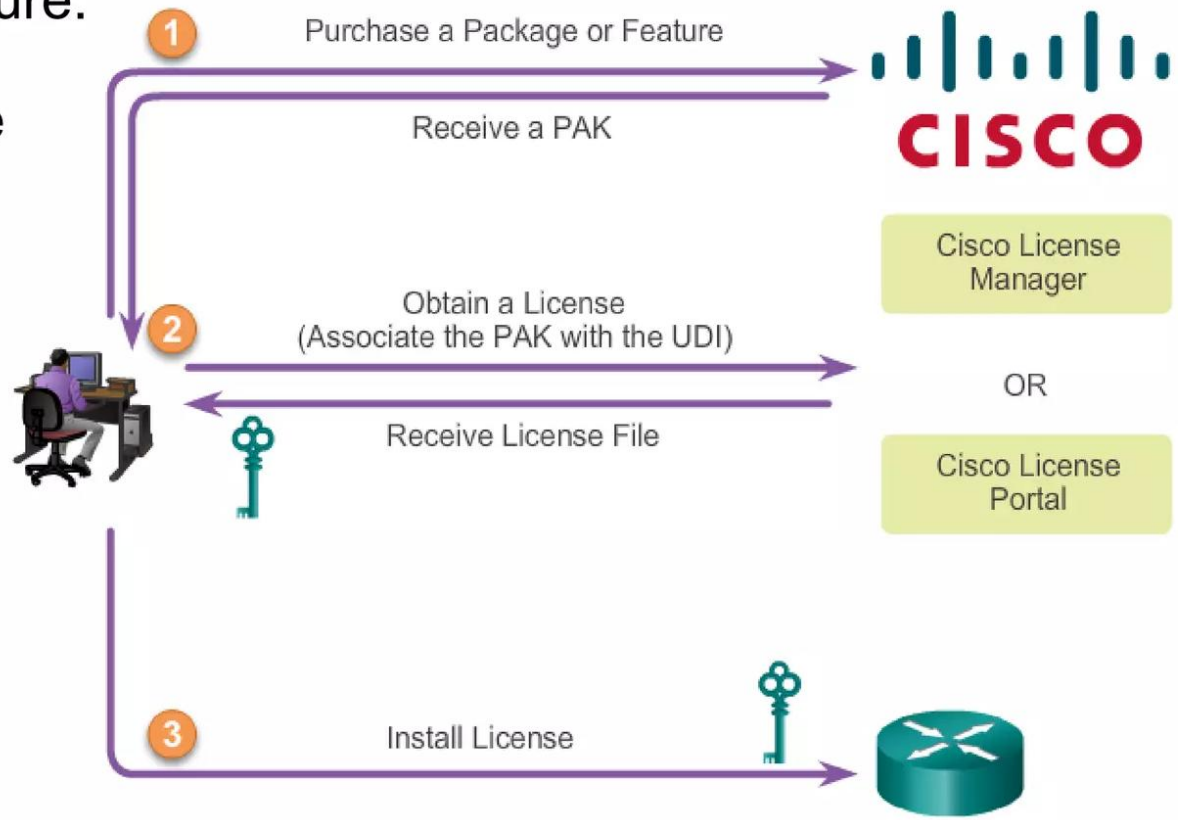
Licensing Process (cont.)

There are three steps to permanently activate a new software package or feature on a router.

Step 1. Purchase a package or feature.

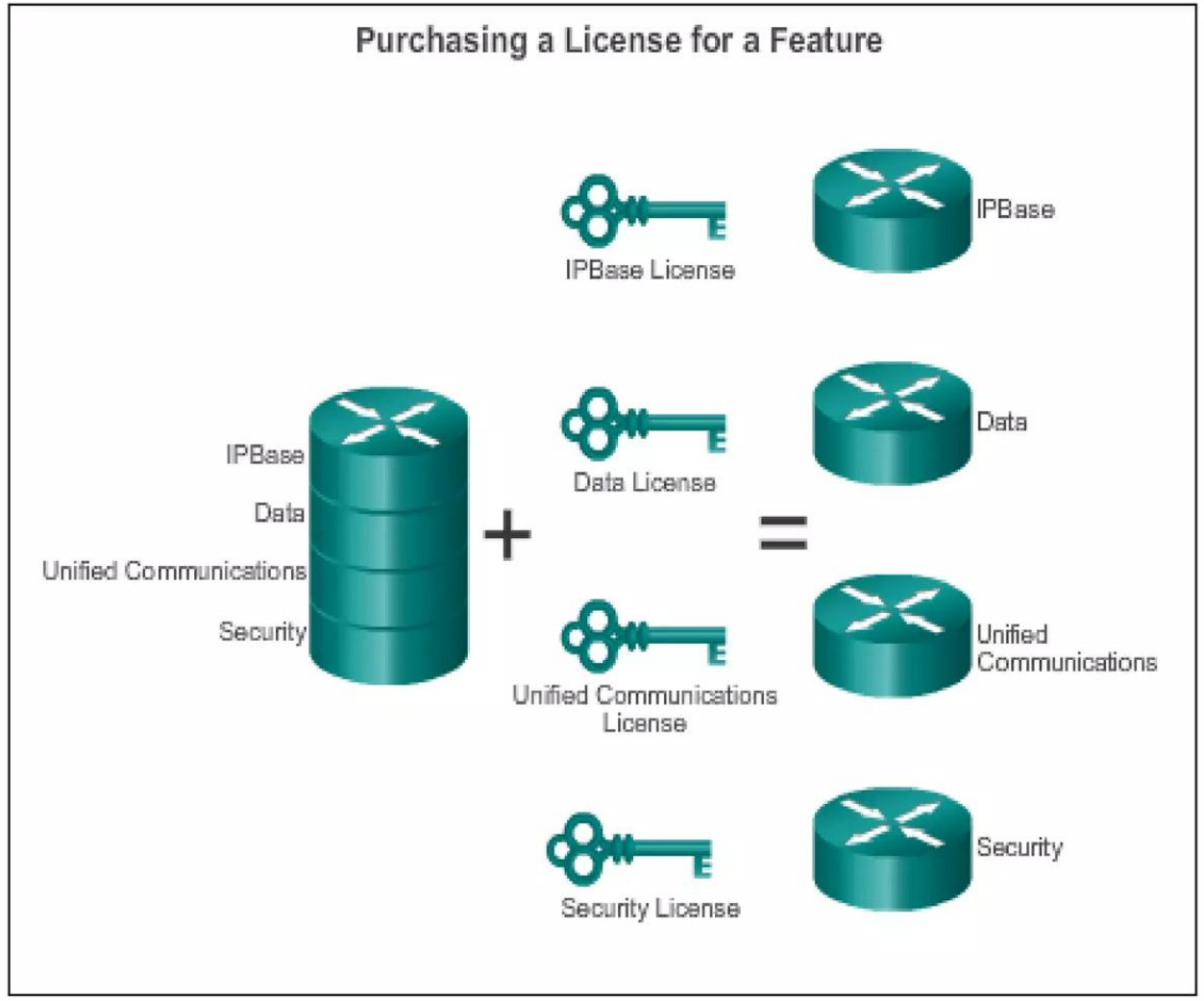
Step 2. Obtain a license

Step 3. Install license



Step 1: Purchase the software Package

- The first step is to purchase the software package or feature needed.
- Software Claim Certificates are used for licenses that require software activation. They provide Product Activation Key (PAK) and important information regarding the Cisco End User License Agreement (EULA).



Step 2: Obtain a License

The second step is to obtain a license or license file using one of the following options:

- Cisco License Manager (CLM) is a free software application available at http://www.cisco.com/go/clm.

  The Cisco License Manager can discover network devices, view their license information, and acquire and deploy licenses from Cisco.

- Cisco License Registration Portal is the web-based portal for obtaining and registering individual software licenses, available at http://www.cisco.com/go/license.

- Both options require a PAK number and a unique device identifier (UDI).

```
R1# show license udi
Device#  PID           SN            UDI
-------------------------------------------------------------------
*0       CISCO1941/K9  FTX1636848Z   CISCO1941/K9:FTX1636848Z
```

Step 3: Install the License

After obtaining the license file (an XML text file with a .lic extension), you must install a permanent license:

Step 1: Use the **license install** *stored-location-url* privileged EXEC mode command to install a license file.

Step 2: Reload the router using the **reload** privileged EXEC mode command. A reload is not required if an evaluation license is active.

- After a permanent license is installed on a router, it is good for that particular feature set for the life of the router, even across IOS versions.
- Cisco manufacturing preinstalls the appropriate permanent license on the ordered device for the purchased feature set; therefore, it's not necessary to enable that license on new hardware.

Note: Unified Communications is not supported on 1941 routers.

License Verification

Permanent License Verification – **`show version`** command

```
R1# show version
<output omitted>
License Info:
License UDI:
-------------------------------------------------
Device#    PID                    SN
-------------------------------------------------
*0        CISCO1941/K9        FTX1636848Z
Technology Package License Information for Module:'c1900'
-----------------------------------------------------------------
Technology    Technology-package          Technology-package
               Current       Type          Next reboot
-----------------------------------------------------------------
ipbase        ipbasek9      Permanent     ipbasek9
security      seck9         Permanent     seck9
uc            None          None          None
data          None          None          None
```

License Verification

License Verification – **`show license`** command

```
R1# show license
Index 1 Feature: ipbasek9
        Period left: Life time
        License Type: Permanent
        License State: Active, In Use
        License Count: Non-Counted
        License Priority: Medium
Index 2 Feature: securityk9
        Period left: Life time
        License Type: Permanent
        License State: Active, In Use
        License Count: Non-Counted
        License Priority: Medium
Index 3 Feature: datak9
        Period left: Not Activated
        Period Used: 0  minute  0  second
        License Type: EvalRightToUse
        License State: Not in Use, EULA not accepted
        License Count: Non-Counted
        License Priority: None

<output omitted>
```

Activate an Evaluation Right-to-Use License

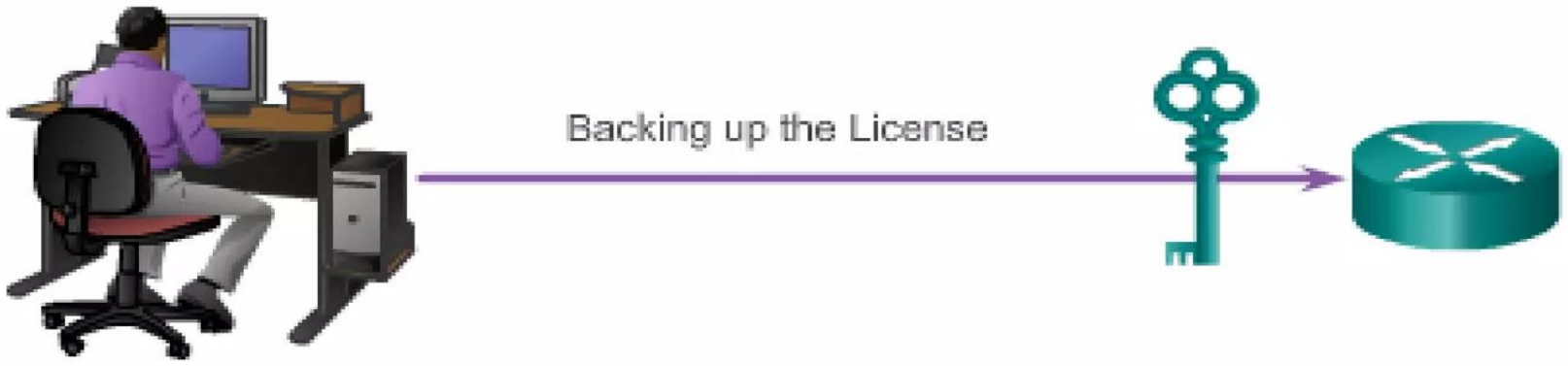
- An Evaluation License is good for a 60 day evaluation period. After the 60 days, this license automatically transitions into an Right-to-Use (RTU) license.

Evaluation License Installation

```
R1(config)# license accept end user agreement
R1(config)# license boot module c1900 technology-package
datak9
% use 'write' command to make license boot config take effect
on next boot
R1(config)#
*Apr 25 23:15:01.874: %IOS_LICENSE_IMAGE_APPLICATION-6-
LICENSE_LEVEL: Module name = c1900 Next reboot level = datak9
and License = datak9
*Apr 25 23:15:02.502: %LICENSE-6-EULA_ACCEPTED: EULA for
feature datak9 1.0 has been accepted.
UDI=CISCO1941/K9:FTX1636848Z; StoreIndex=1:Built-In License
Storage
```

- Use the **show license** command to verify that the license has been installed.

Backing Up the License




```
R1# license save flash0:all_licenses.lic
license lines saved ..... to flash0:all_licenses.lic

R1# show flash0:
-# - --length-- -----date/time------ path
<Output omitted>
8   68831808 Apr 2 2013 21:29:58 +00:00
    c1900-universalk9-mz.SPA.152-4.M3.bin
9       1153 Apr 26 2013 02:24:30 +00:00 all_licenses.lic

182390784 bytes available (74096640 bytes used)

R1#
```

Uninstalling the License

Step 1. Disable the Technology Package

```
R1(config)# license boot module c1900 technology-package
            seck9 disable
R1(config)# exit
R1# reload
```

Step 2. Clear the License

```
R1# license clear seck9
R1# configure terminal
R1(config)# no license boot module c1900 technology-package
            seck9 disable
R1(config)# exit
R1# reload
```

Thank you!