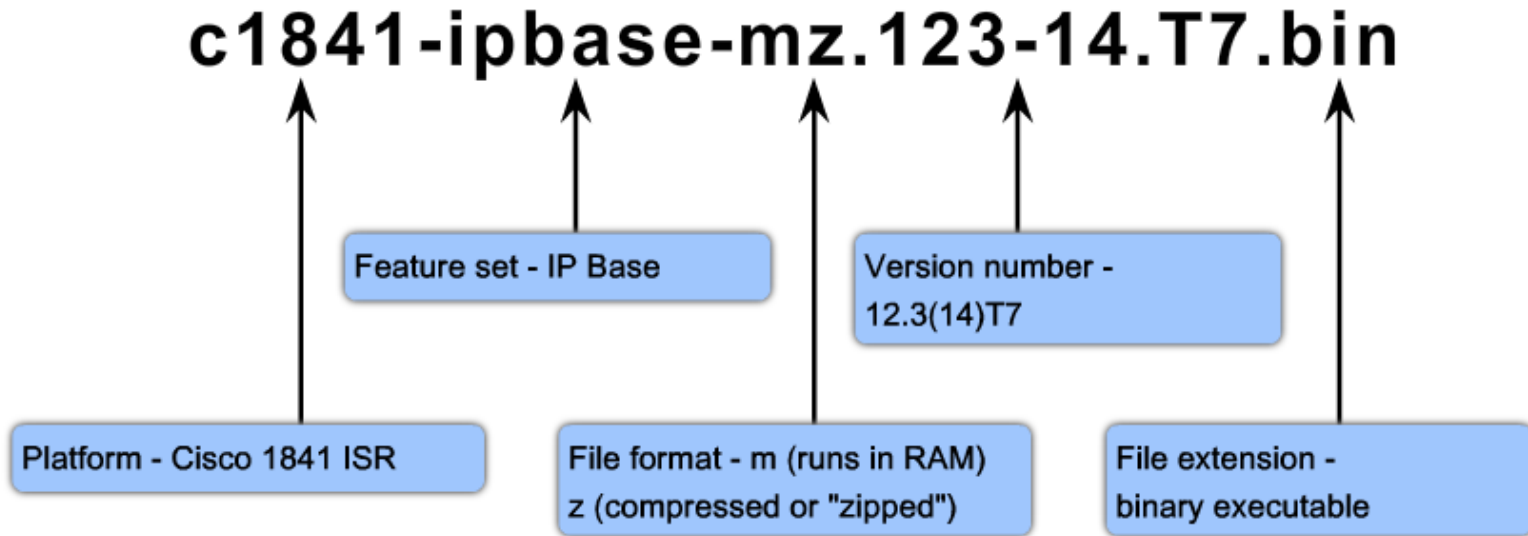# Introduction to IOS

What is IOS?

- Internetwork Operating System (IOS) is the Cisco Devices Operating System (Just like Microsoft Windows ® For PC)

What is IOS?

Cisco IOS File Naming Conventions

c1841-ipbase-mz.123-14.T7.bin

Feature set - IP Base

Version number - 12.3(14)T7

Platform - Cisco 1841 ISR

File format - m (runs in RAM) z (compressed or "zipped")

File extension - binary executable

Introduction to IOS 15 CLI Licensing Commands (Verification, Activation, Uninstall)

License Management Commands

- Display License Info

- Enable / Disable Technology Package Licenses

- Additional Resources:

    - Cisco IOS Software Activation Command Reference
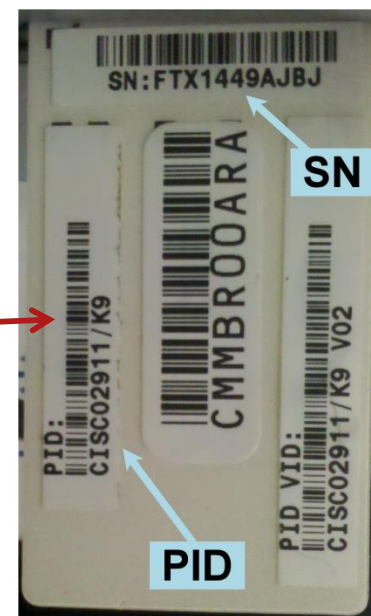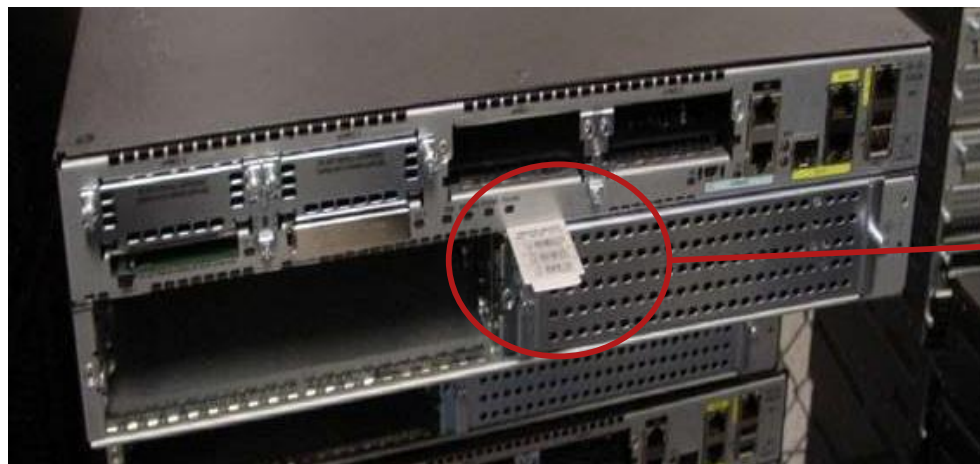
    - Software Activation Configuration Guide, Cisco IOS Release 15M&T

Command: **show license udi**

- Displays all the unique device identifier (UDI) values

```
Router#show license udi
Device#   PID              SN              UDI
--------------------------------------------------------------
*0        CISCO2911/K9     FTX1449AJBJ     CISCO2911/K9:FTX1449AJBJ
```

Command: show version

- Displays the hardware and Technology Package License information.

```
Router#show version | begin UDI
License UDI:


-------------------------------------------------
Device#    PID                      SN
-------------------------------------------------
*O         CISCO2911/K9             FTX1449AJBJ



Technology Package License Information for Module:'c2900'

-------------------------------------------------------------
Technology      Technology-package         Technology-package
                Current        Type        Next reboot
-------------------------------------------------------------
ipbase          ipbasek9       Permanent   ipbasek9
security        securityk9     Permanent   securityk9
uc              disable        None        disable
data            disable        None        None

Configuration register is 0x2102
```

Determine Technology license Type

Determine Technology license status at Next Boot

Determine Technology Package Status

Command: show license

- Displays detailed information about **all** feature licenses.

- Type of license
  - Evaluation or Permanent

- Actual usage time of the license
  - Time used and left in the evaluation

```
Router#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: uck9
        Period left: 624 weeks 6  days
        Period Used: 1  hour  20 minutes
        License Type: Evaluation
        License State: Active, Not in Use, EULA accepted
        License Count: Non-Counted
        License Priority: Low
Index 4 Feature: datak9
        Period left: 624 weeks 6  days
        Period Used: 18 minutes 59 seconds
        License Type: Evaluation
        License State: Active, Not in Use, EULA accepted
        License Count: Non-Counted
        License Priority: Low
Index 5 Feature: gatekeeper
        Period left: Not Activated
        Period Used: 0  minute  0  second
        License Type: Evaluation
        License State: Not in Use, EULA not accepted
        License Count: Non-Counted
        License Priority: None
Index 6 Feature: SSL_VPN
        Period left: Not Activated
        Period Used: 0  minute  0  second
        License Type: Evaluation
        License State: Not in Use, EULA not accepted
        License Count: 5000/0/0  (Active/In-use/Violation)
        License Priority: None
```

Command: show license feature

- Lists the **available licenses** on the device

- Lists the status of the license

```
Router#show license feature
Feature name          Enforcement   Evaluation   Subscription   Enabled
ipbasek9              no            no           no             yes
securityk9            yes           yes          no             yes
uck9                  yes           yes          no             no
datak9                yes           yes          no             no
gatekeeper            yes           yes          no             no
SSL_VPN               yes           yes          no             no
ios-ips-update        yes           yes          yes            no
SNASw                 yes           yes          no             no
hseck9                yes           no           no             no
cme-srst              yes           yes          no             no
WAAS_Express          yes           yes          no             no
UCVideo               yes           yes          no             no
```

Activate/Deactivate Technology Package Licenses

- Available Technology Package Licenses:
  - **Data**, **Unified Communications** and **Security**

Enable:

Router(config)# **license boot module** *C2900* **technology-package** *datak9*

                                    <Model>   *<Package>*

Disable:

Router(config)# **no** **license boot module** *C2900* **technology-package** *datak9 [disable]*

OR

Verifying A Technology Package License

Step 1: Issue **show version | begin UDI** (verify data license is disabled)

```
Router#show version | begin UDI
License UDI:

-------------------------------------------------
Device#   PID                     SN
-------------------------------------------------
*0        CISCO2911/K9            FTX1449AJBJ




Technology Package License Information for Module:'c2900'

----------------------------------------------------------------
Technology     Technology-package           Technology-package
               Current        Type          Next reboot
----------------------------------------------------------------
ipbase         ipbasek9       Permanent     ipbasek9
security       securityk9     Permanent     securityk9
uc             disable        None          disable
data           disable        None          disable
```

Activating A Technology Package License

Step 2: Activate the data technology package license

Router(config)# **license boot module** *c2900* **technology-package** *datak9*

```
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#license boot module c2900 technology-package datak9
% use 'write' command to make license boot config take effect on next boot

Router(config)#
*May 19 05:20:05.499: %IOS_LICENSE_IMAGE_APPLICATION-6-LICENSE_LEVEL: Module nam
e = c2900 Next reboot level = datak9 and License = datak9
Router(config)#
```

Verify A Technology Package License Status after Next Reboot

Step 3: Verify activated license:

Ro

```
Router(config)#
Router(config)#do show version | begin UDI
License UDI:

----------------------------------------------------
Device#   PID                     SN
----------------------------------------------------
*0        CISCO2911/K9            FTX1449AJBJ



Technology Package License Information for Module:'c2900'

------------------------------------------------------------------
Technology      Technology-package          Technology-package
                Current        Type         Next reboot
------------------------------------------------------------------
ipbase          ipbasek9       Permanent    ipbasek9
security        securityk9     Permanent    securityk9
uc              disable        None         disable
data            disable        None         datak9
```

Uninstalling A Technology Package License

Step 1: **no** **license boot module** *c2900* **technology-package** *datak9* **OR**

–   **license boot module** *c2900* **technology-package** *datak9* **disable**

```
Router(config)#no license boot module c2900 technology-package datak9
% use 'write' command to make license boot config take effect on next boot

Router(config)#do show version | begin UDI
License UDI:

-----------------------------------------------------
Device#   PID                    SN
-----------------------------------------------------
*0        CISCO2911/K9           FTX1449AJBJ




Technology Package License Information for Module:'c2900'

---------------------------------------------------------------------
Technology      Technology-package            Technology-package
                Current        Type           Next reboot
---------------------------------------------------------------------
ipbase          ipbasek9       Permanent      ipbasek9
security        securityk9     Permanent      securityk9
uc              disable        None           disable
data            disable        None           None
```

Step ... ase is disp...

Overview of IOS 15 Licensing and Process

A. Peter Anderson

Associate Professor

August 4, 2013

Introduction to Licensing

Available License Types on ISR G2

- Permanent Licenses

- Evaluation Licenses

- Feature Licenses:
  - Software Activation Feature Licenses
  - Right to Use Feature Licenses

- Subscription Licenses

- Counted Licenses

What is a Permanent License?

- A Permanent License **never expires.**

- Once 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**. <u>For example</u>, once a UC, Security or Data license is installed on a router, the subsequent features for that license will be active even if the router is upgraded to a new IOS release.

- A permanent license is the most common license type used when a feature set is purchased for a device.
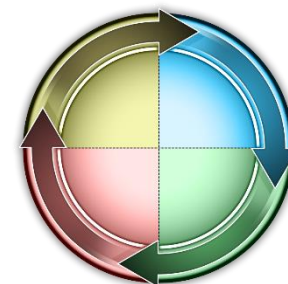
What is a Evaluation License?

- A Evaluation License is good for a **limited amount of time.**

- ISR G2 includes a full set of 60 day Evaluation License(s) for the Data, UC and Security feature sets.

- These can be activated and deactivated at any time to evaluate a feature set before making the decision to convert to a Permanent License.

- They also provide a mechanism that gives the user some flexibility before upgrading to a Permanent License.

- Only the time a Evaluation License is active counts against the 60 day allotted time.

- Once an Evaluation License expires, it cannot be extended.
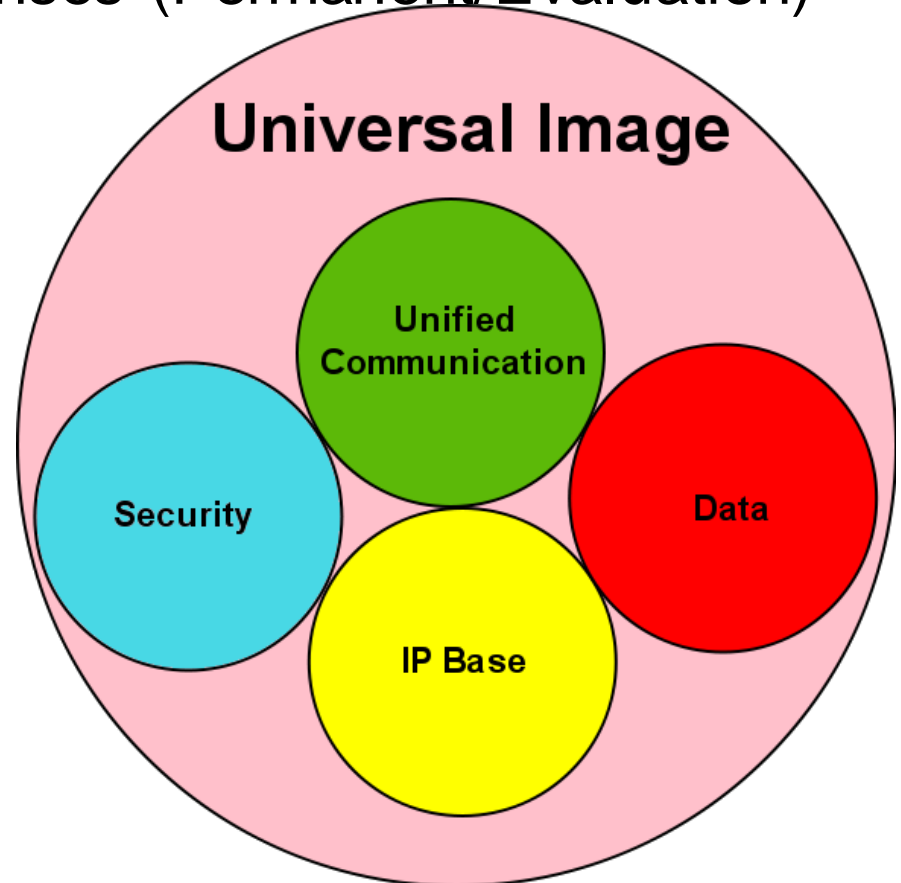
What are Feature Licenses?

- Software Activation Feature Licenses
  - Typically upgrades to one or more technology Package Licenses (**Data**, **UC** or **Security**)
  - Can be delivered with new router or upgraded at a later time.
  - Licenses are enforced through Cisco Software Licensing framework

- Right to Use Feature Licenses
  - Does not require software activation (honor system)
  - Can be ordered with new router or upgraded at a later time.

What are Subscription and Counted Licenses?

- May be Software Activation or Right-to-Use Feature Licenses

- Subscription Licenses
  - Time-based licenses
  - Software Activation Feature Licenses - Intrusion Prevention, Content Filtering

- Counted Licenses
  - Enable a defined number of users
  - Software Activation Feature Licenses – SSLVPN, CUE
 - Right-to-Use Feature Licenses – VXML, CME, SRST, CUBE

Technology Package Licenses

- Technology Package Licenses (Permanent/Evaluation)
    - IP Base (Permanent Only)
    - Security
    - Data
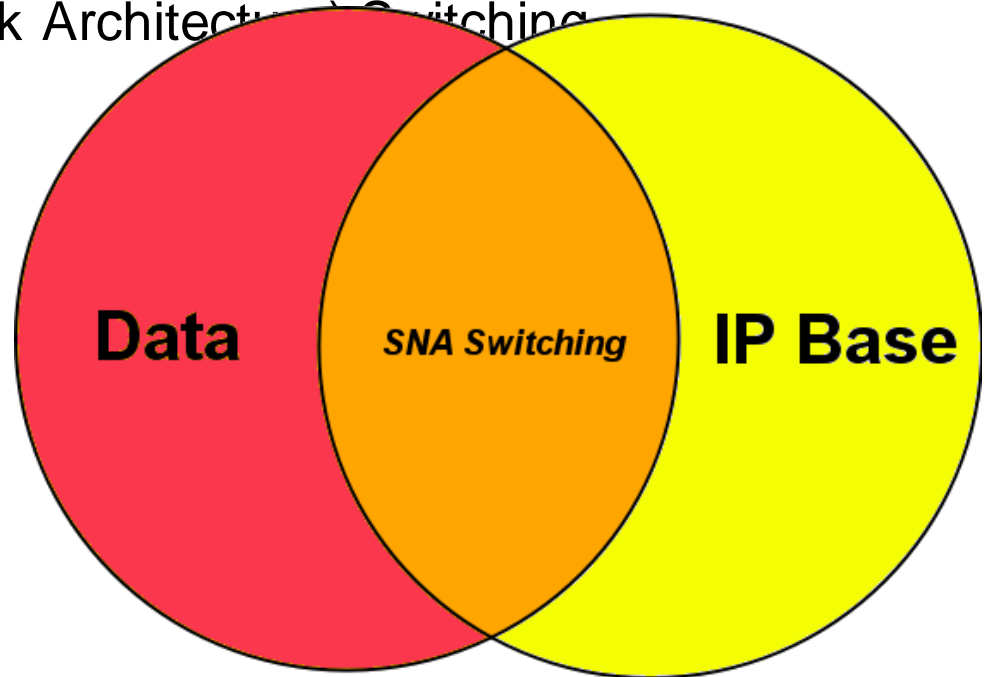   - Unified Communication

Technology Package License: Security

- Security Technology Package License activated:
  - Additional Software Activation Feature Licenses
    - Intrusion Prevention (Subscription)
    - Content Filtering (Subscription)
    - SSL VPN)Counted)

Security | **Content Filtering** **Intrusion Prevention** **SSL VPN** | **IP Base**
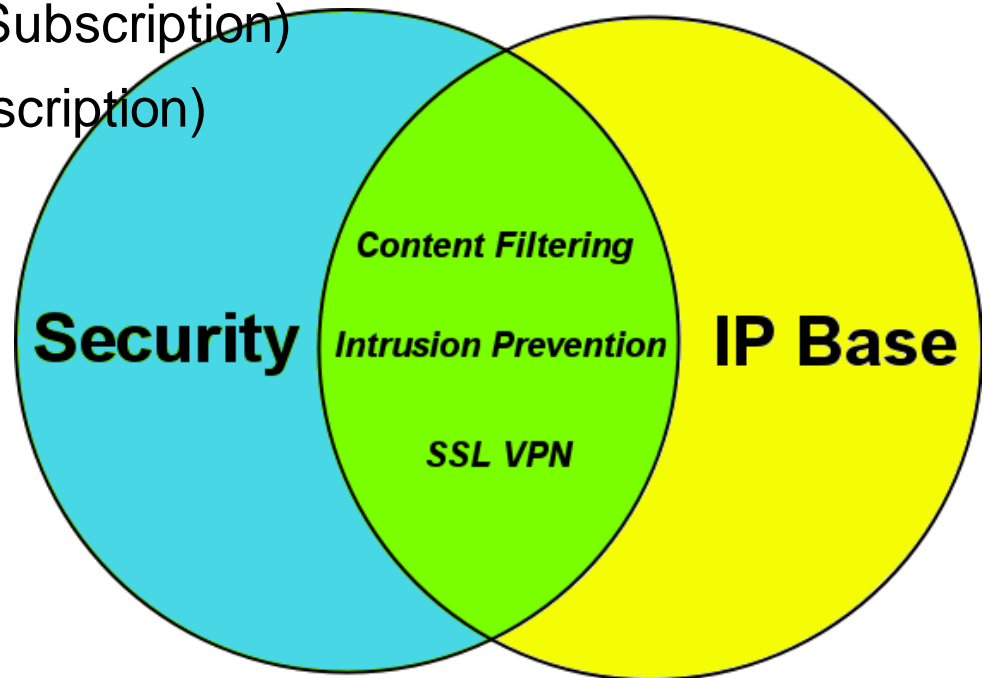
Technology Package License :Data

- Data Technology Package License activated:
    - Additional Software Activation Feature License
        - SNA (Systems Network Architecture) Switching

Technology Package License :UC
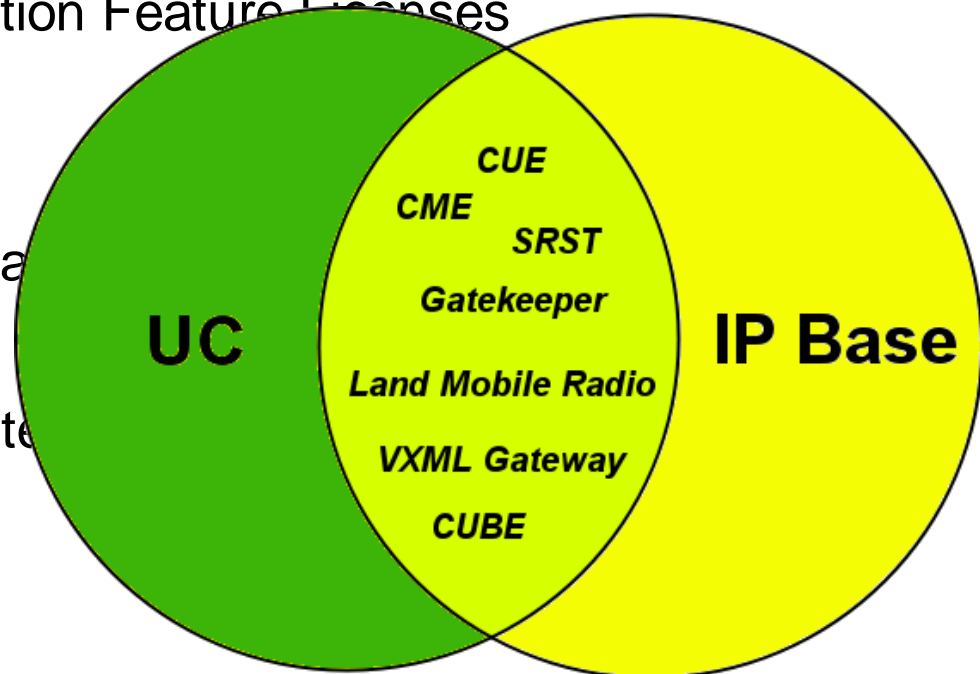
- Unified Communication Technology Package License activated:
    - Additional Software Activation Feature Licenses
        - Gatekeeper
        - CUE (Counted)
    - Additional Right to Use Fea
        - Land Mobile Radio
        - VXML Gateway (Counted
        - CME (Counted)
        - SRST (Counted)
        - CUBE (Counted)

UC

CUE
CME
SRST
Gatekeeper
Land Mobile Radio
VXML Gateway
CUBE

IP Base

Licensing Process

- Step 1: Purchase the Software Package or Feature to Install

  - A Product Authorization Key (PAK) will be provided upon payment

    - Acts as a Receipt
    - Used to obtain a license

- Step 2: Obtain A License file

  - Option 1 -Cisco License Manager, which is a free software application available at http://www.cisco.com/go/clm.

  - Option 2 -Cisco License Registration Portal: www.cisco.com/go/license

  - An e-mail containing the license information that you can use to install the license is received

Introduction to IOS 15 Trains, Numbering, and System Image Packaging

A. Peter Anderson

Associate Professor

August 4, 2013
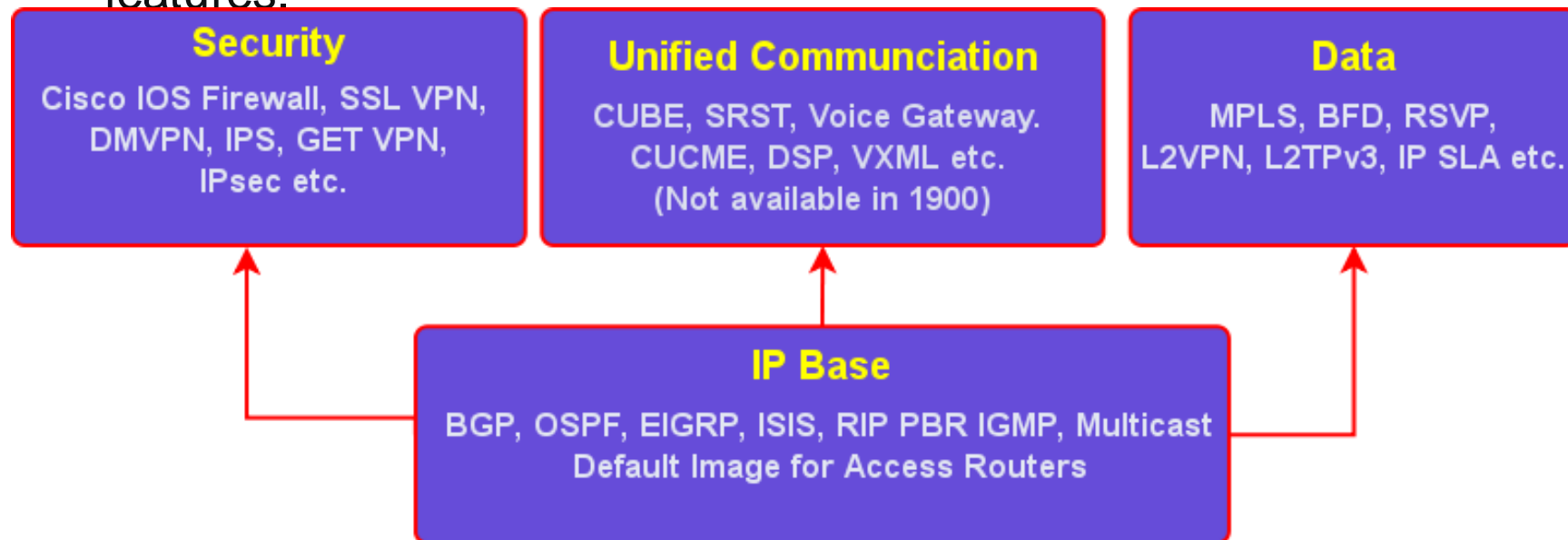
Universal IOS Image

 Cisco Public

What is a Universal Image?

- Universal IOS Image contains all Cisco IOS features.

- Single universal IOS Image is shipped with the ISR G2 devices.

- IOS functionality is determined by the specific licenses applied to the devices.

- Only two IOS images for each release:
  - universalk9: This universal image offers all the Cisco IOS features including strong crypto features such as VPN payload, Secure UC, etc.
  - universalk9_npe (no payload encryption): This universal image satisfies requirements of import restricted countries. It does not support any strong payload encryption, such as VPN payload, secure voice, etc.

- Examples:
  - c2900-universalk9-mz.SPA.151-4.M.bin
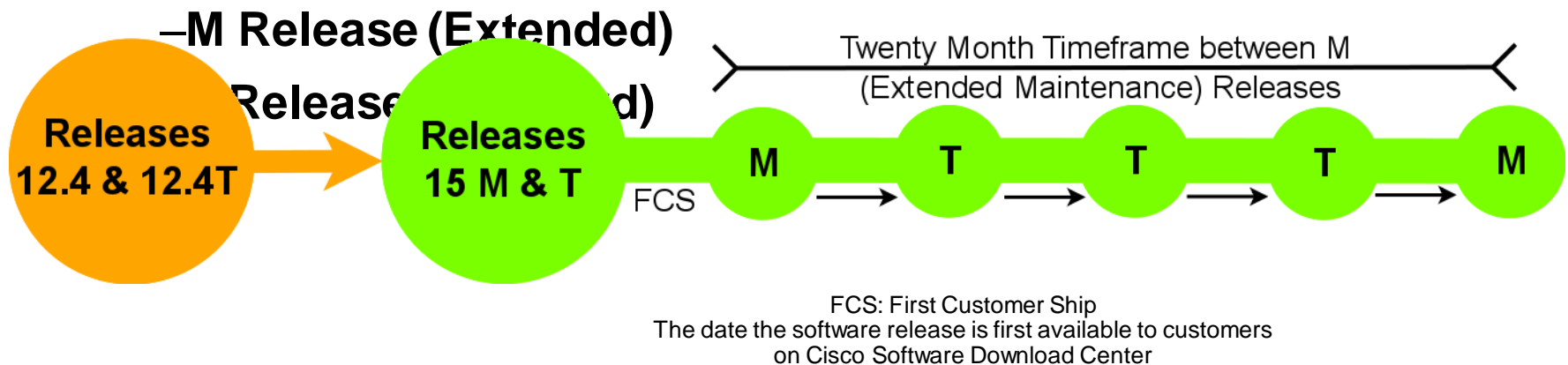 - c2900-universalk9_npe-mz.SPA.151.4-M.bin

Universal IOS Images

- Includes all the available features in a model.

- Four technology packages available: **IP Base**, **Security**, **UC** and **Data**
  - IP Base Technology Package is *enabled by default.*
  - Security, UC and Data Technology Package licenses activate more features.

Security

Cisco IOS Firewall, SSL VPN, DMVPN, IPS, GET VPN, IPsec etc.

Unified Communciation

CUBE, SRST, Voice Gateway. CUCME, DSP, VXML etc. (Not available in 1900)

Data

MPLS, BFD, RSVP, L2VPN, L2TPv3, IP SLA etc.

IP Base

BGP, OSPF, EIGRP, ISIS, RIP PBR IGMP, Multicast Default Image for Access Routers

IOS Release 15 Timeline

- Feature inheritance and platform support from 12.4T and 12.4 Mainline

- Two major maintenance releases for IOS :15
  - M Release (Extended)
  - Release (Standard)

Releases 12.4 & 12.4T

Releases 15 M & T

FCS

Twenty Month Timeframe between M
(Extended Maintenance) Releases

M   T   T   T   M

FCS: First Customer Ship
The date the software release is first available to customers
on Cisco Software Download Center

What are the Maintenance Releases?

15 M (**Extended** Maintenance Release):

- Ideal for long-term maintenance, enabling customers to qualify, deploy, and remain on the release for an extended period.
- Provides **44** months of support.
- Incorporates features delivered in previous releases plus incremental new feature enhancements and hardware support.

15 T (**Standard** Maintenance Release):

- Short deployment releases ideal for latest new features and hardware support before the next M release becomes available.
- Provides regular bug fix maintenance rebuilds for **12** months, plus 6 additional months of critical fix support for network affecting bugs.
- Incorporates features and hardware support delivered in previous releases.

The New IOS 15 Naming Convention

c2900-universalk9-mz.SPA.151-4.M1.bin

Major Release Number A.

Minor Release Number B.

New Feature Release Number C.

M/T = Ext./Std Maintenance D.

Maintenance Rebuild Number E.