CISCO

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Cisco 8000 Series Routers Licensing Quick Reference

Licensing for Cisco IOS XR Routers

This article provides information on available licenses and deployment solutions on Cisco IOS XR Routers.

Cisco IOS XR licensing is structured to provide flexibility and scalability for network operators, with a focus on high-end routers.

Cisco 8000 Series Routers

The Cisco 8000 Series is a family of highly scalable, 400G-optimized routing platforms. These routers offer deep buffers and on-chip High Bandwidth Memory (HBM) ranging from 10.8 Tbps to 12.8 Tbps.

The Cisco 8000 Series router is designed to benefit from the real-time analytics and operational insights delivered through Cisco Crosswork Cloud. With this cloud-enhanced network automation, the Cisco 8000 Series routers can reduce your operating costs.

Cisco 8000 Series routers enhance the security posture of your network by helping you measure, audit, verify, and enforce the trustworthiness of your network infrastructure.

Licensing Solutions and Offerings

Cisco IOS XR offers licensing solutions for you to manage your licenses.

- **Smart Licensing (SL)**: A flexible and convenient cloud-based software licensing model that simplifies the management of software licenses across your organization. It automatically creates a pool of licenses or entitlements for use throughout the organization. With SL, you only pay for the features you currently need, with the option to upgrade as necessary, ensuring the security of your investment. For more information, see Smart Licensing.

- **Smart Licensing Using Policy (SLP)**: An enhanced version of Smart Licensing that enables immediate use of devices right out of the box. This licensing solution streamlines the process, making it easier to manage your licenses. For more information, see Smart Licensing Using Policy.

- **Specific License Reservation (SLR)**: A solution specifically designed for classified environments where electronic communication is restricted. In such environments, routers are unable to communicate directly with the Cisco Smart Software Manager (CSSM) or through SSM On-Prem. SLR enables the use of all entitlements on the router without the need for communication with Cisco.

Key Differences between Licensing Solutions

Table 1: Available Licensing Solutions

License Attributes	Smart Licensing Using Policy	Smart Licensing	Specific License Reservation
Activation of Licenses	Creates a trust relationship with CSSM	Registers with CSSM	Generates code from the device to reserve licenses in CSSM
Supported Deployments	• SSM On-Prem or CSLU deployment • Direct deployments • Offline deployment	• SSM On-Prem deployment • Direct deployment • Offline deployment	Offline deployment for air-gapped environments

License Attributes	Smart Licensing Using Policy	Smart Licensing	Specific License Reservation
License Reporting	Generates RUM reports from the device and synchronizes with CSSM	Generates Product Instance reports from CSSM or SSM On-Prem	Not applicable for SLR

What are the Flexible Consumption Models?

The Flexible Consumption Model (FCM) is a modern licensing framework that enables you to tailor your software expenditures to real-time requirements. It provides the agility to scale software services based on fluctuating business needs, often using a subscription or usage-based payment structure. This approach offers financial flexibility, as you only pay for the software you use, and can quickly adjust subscriptions as the business landscape changes. This model of licensing is available at a low initial investment, provides easy scalability, and allows you to increase consumption of licenses as you expand.

FCM is enabled by default on the Cisco 8000 Series routers.

Key Features of FCM

- **Pay-as-you-grow**: Enables you to lower initial costs and add more capacity over time.

- **Simplify operations**: FCM delivers the carrier-class IOS-XR software feature set with two software suites, Essentials and Advantage, that simplify license management.

- **Utilize capital efficiently**: License pooling enables an efficient way to share licenses across the network.

- **Protect investment**: Software portability provides investment protection by enabling porting of licenses to next-generation hardware.

  For more information, see Cisco IOS XR Software Flexible Consumption Model Data Sheet.

Smart Licensing, Smart Licensing Using Policy and Flexible Consumption Model

Flexible Consumption Model (FCM) is a consumption model that lets you pay for software based on actual use, offering flexibility and cost efficiency.

The Smart Licensing and Smart Licensing Using Policy solutions facilitate FCM by providing a centralized way to manage licenses with ease. Combined, they deliver a user-friendly and adaptable licensing system.

FCM requires Smart Licensing registration and license usage reporting. A network under FCM is considered compliant if the FCM-enabled devices in the network are registered to Smart Licensing and are reporting the usage.

Similarly, FCM requires devices enabled with Smart Licensing Using Policy to have trust enablement and generate the first license usage report within 90 days.

Flexible Consumption model licenses are checked for usage on a daily basis. The daily license usage is reported to the Smart Licensing Manager at Cisco.com.

In short, the FCM adjusts software costs to actual usage, while Smart Licensing streamlines license management. Together, they provide a flexible and simplified licensing approach.

Parts of the FCM Model

The three parts of the FCM Model are:

1. The hardware

2. The perpetual software component, also known as Right To Use (RTU). RTU licenses are software licenses for indefinite period.

3. The recurring software component, also known as Software Innovation Access (SIA). SIA licenses are software licenses with the RTU licenses for the length of the subscription term. SIA licenses provide faster access to latest features. SIA provides pooling of licenses, continuous software upgrades.
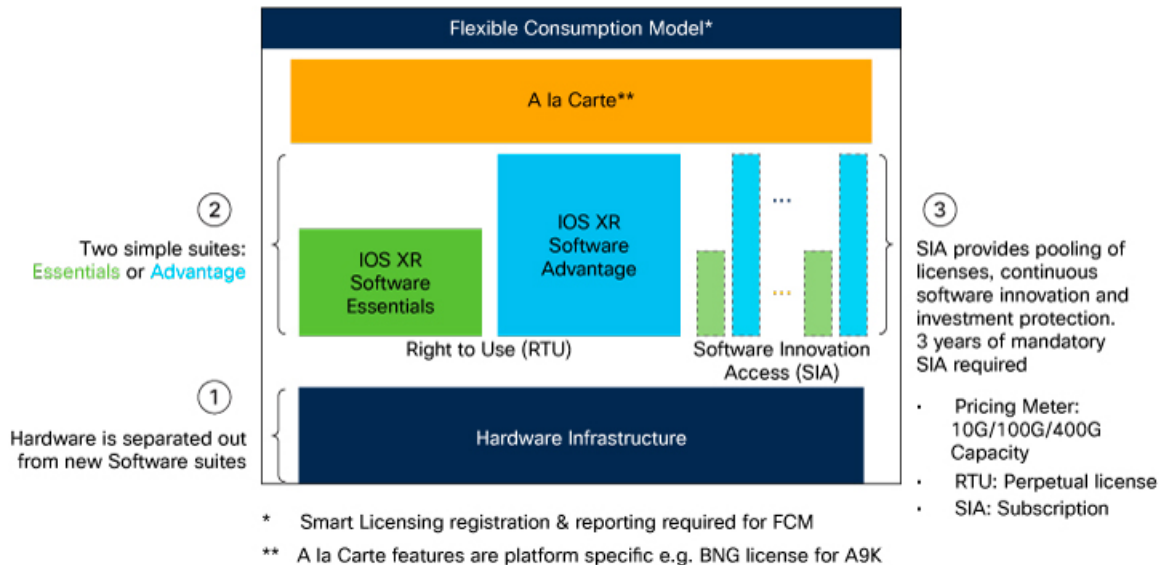
Some product families may have additional, optional, a-la-carte software perpetual licenses for specialized platform-specific features.

FCM License Suites

FCM Model offers these license suites which provide features for your devices.

- Essentials Suite: Includes the IOS XR comprehensive suite of routing and management services.

- Advantage Suite: Includes all features of Essentials Software licenses with extra advanced routing and management services. Advantage is an extension of Essential Software licenses.

RTU Licenses

RTU licenses offer capability and flexibility to purchase software capacity as needed.

These are the types of RTU licenses.

- **Essential Licenses**: Are the base licenses that are required by every active port for its operation. An example of Essential License is ESS-CA-400G-RTU-2.

- **Advantage (earlier known as Advanced licenses) without Essential licenses**: Are the licenses that are required on top of Essential Licenses for ports that use advanced features like L3VPN. An example of an advantage license is ADV-CA-400G-RTU-2.

- **Advantage with Essential Combination Licenses**: Are the licenses that are packaged together as a combined entitlement. Example of an advantage license with essentials is ESS-ADN-CA-100G-RTU.

- **Tracking Licenses**: Are the licenses that are required for the hardware for its operation. An example of a tracking license is 8201-TRK.

FCM Models on Cisco 8000 Series

The table shows the hardware, FCM model and the available license suites.

Table 2: Cisco 8000 Series FCM Model and License Suites

When your router is...	The supported FCM is...	And available licenses are...
Cisco 8100 Series Cisco 8200 Series Cisco 8400 Series Cisco 8800 Series	FCM Model	Essential Licenses that are necessary for every active port for operation. Example: ESS-CA-400G-RTU-2
		Advantages without Essential Licenses (earlier known as Advanced licenses) are Advantage licenses without the Essential licenses. Example: ADV-CA-400G-RTU-2
		Advantages with Essential Licenses are a combination of both Essential and Advantage licenses with a single PID. Example: ADN-CA-100G-SIA-3

Flexible Consumption Model Licenses

The Flexible Consumption model licensing for your hardware or software is enabled by default.

The table provides the supported hardware for different Flexible Consumption model licenses for Cisco 8000 Series routers:

Table 3: FCM Model Licenses

License Name	Hardware Supported	Consumption Pattern
Essential and Advantage Licenses: • ESS-CA-400G-RTU-2 • ESS-CA-100G-RTU-2 • ADV-CA-400G-RTU-2 • ADV-CA-100G-RTU-2	Fixed systems: Cisco 8201 Router Modular systems: Cisco 8812 Router	The number of essential or advantage licenses that are consumed depends on the number of active ports and is reported on per chassis basis.

License Name	Hardware Supported	Consumption Pattern
Hardware Tracking Licenses: These are for the chassis. • 8201-TRK • 8812-TRK • 8808-TRK • 8818-TRK • 8202-TRK • 8800-LC-48H-TRK • 8800-LC-36FH-TRK • 8800-LC-48H-O • 88-LC0-36FH-MO • 88-LC0-36FH-O	Tracking licenses are named based on the hardware supported. For example, 8201-TRK licenses support Cisco 8201 Router.	The number of licenses that are consumed depends on the number of line cards in use.

Table 4: Nested Licenses

License PID	License Entitlement	License Description
ADN-CA-100G-SIA-3	Core and Agg Advantage SIA 3 yr term/ 100G	Advantage 100G Software Innovation Access License
ADN-CA-100G-SIA-5	Core and Agg Advantage SIA 5 yr term/ 100G	
ADN-CA-400G-SIA-3	Core/Aggr Advance SIA 3 yr term / 100G	Advantage 400G Software Innovation Access License
ADN-CA-400G-SIA-5	Core and Agg Advantage SIA 5 yr term / 400G	
ESS-ADN-CA-100G-RTU	Core and Agg Essential and Advantage Right-to-Use / 100G	Essential and Advantage 100G Right-to-Use License
ESS-ADN-CA-400G-RTU	Core and Agg Essential and Advantage Right-to-Use / 400G	Essential and Advantage 400G Right-to-Use License
ESS-ADN-CA-100GS5	Core and Agg Essentials -Advantage SIA per 100G 60-120 months	Core and Aggregation Essentials -Advantage 100G Software Innovation Access License
ESS-ADN-CA-100GS3	Core and Agg Essentials -Advantage SIA per 400G 36-59 months	

License PID	License Entitlement	License Description
ESS-ADN-CA-400GS5	Core and Agg Essentials -Advantage SIA per 400G 60-120 months	Core and Aggregation Essentials -Advantage 400G Software Innovation Access License
ESS-ADN-CA-400GS3	Core and Agg Essentials -Advantage SIA per 400G 36-59 months	
ADN-CA-100G-RTU-2	Core and Agg Advantage Right-to-Use 100G	Advantage 100G Right-to-Use License
ADN-CA-400G-RTU-2	Core and Agg Advantage Right-to-Use 400G	

License Consumption

These are the guidelines when consuming licenses on the Cisco 8000 Series routers.

Table 5: License Consumption on Cisco 8000 Series Routes

If your device is running a release...	Then the license consumption on the router is...
prior to Release 7.3.1	one 400G license per one 400G interface.
starting with Release 7.3.2 and later	four 100G licenses per one 400G interface.

If necessary, contact your Cisco Account Representative to convert SIA 400G license into four SIA 100G licenses.

Software Innovation Access

Software Innovation Access (SIA) subscription are FCM licenses that provide access to your network's latest software upgrades and features. SIA licenses enable the consumption of Right-to-Use (RTU) licenses for your devices to access software innovation and avail support for your devices throughout the term of subscription.

Benefits of SIA Licenses

- **Access to software innovation**: provides access to continuous software upgrades which contain latest features, security enhancements, and bug fixes for all your devices at a network level.

- **Pooling of licenses**: enables Right-to-Use (RTU) licenses to be shared across your FCM network from a common license pool through the virtual account.

- **Protects your investment**: enables the portability of perpetual RTU licenses purchased for your current device to a next-generation router when you expand or upgrade your network.

Types of SIA Licenses

The types of SIA licenses are

- Essential SIA license

- Advantage SIA license

SIA License Term

The initial term of a SIA subscription is for a term of three years. You can renew the subscription by contacting your Cisco account representative. An equal number of SIA licenses and corresponding RTU licenses are required to enjoy the benefits, and ensure that your network is in compliance.

If your device is in a state of SIA Out-of-Compliance (OOC) the benefits cease.

Managing SIA Entitlements

SIA entitlement management manages software upgrades for FCM. Software upgrades are possible when the device is in an In-Compliant State.

The table shows the SIA Compliance factors and its states.

Table 6: SIA Compliance and SIA States

Compliance	SIA In-Compliance State	SIA Out-of-Compliance State
License Usage Consumption	The device consumes fewer licenses than purchased.	The number of SIA licenses consumed exceeds the number of SIA licenses purchased. OOC can also occur when the RTU licenses consumed is higher than the number of SIA licenses purchased.
Reporting	The device reports regularly.	The term of the SIA license expires and you haven't renewed the subscription.
Grace Period	NA	The SIA License *Grace* period of 90 days expires.
License Authorization Status	NA	License Authorization Status is: • Not Authorized: The license authorization code doesn't contain sufficient counts for the request. This can occur when you attempt to use more licenses than the licenses available in your Virtual Account. • Authorization Expired: The device hasn't been able to connect to CSSM for an extended period, due to which the authorization status couldn't be verified.

When the device enters an OOC state, a grace period of 90 days (cumulative of all the previous occurrences) begins. During this period, SIA license benefits can still be availed. The system attempts to renew the authorization period by connecting with the CSSM during the grace period, or even after the grace period has expired. If an attempt isn't successful, it remains in an OOC state. If the attempt is successful, a new authorization period begins and the device is In-Compliance.

When are Software Upgrades Blocked?

A software upgrade for a device is blocked in these situations.

- Software upgrades are blocked for all devices in the product family in the virtual account when the devices are Out-of-Compliance.
- Software upgrades are blocked when the device does not report within 90 days.

Usage Guidelines for Device Compliance

These are the guidelines for device compliance.

Table 7: Device Compliance

If...	Then...
the SIA license Grace period has expired	register your device with CSSM.
the SIA license has expired or the number of SIA licenses consumed is more than the number of SIA licenses that are purchased	contact your Cisco Account Representative to purchase or renew the required license.
the authorization code has insufficient counts for the request	generate the code with sufficient counts.
the authorization has expired	connect the device with CSSM.

Verify the Compliance Status

Verify the device compliance status, using the **show license platform summary** command.

Examples

Status: In-Compliance

```
Router# show license platform summary
Fri Aug  7 20:28:46.222 UTC
Collection: LAST: Fri Aug 07 2020 20:28:42 UTC
            NEXT: Fri Aug 07 2020 20:29:42 UTC
Reporting:  LAST: Fri Aug 07 2020 20:28:42 UTC
            NEXT: Fri Aug 07 2020 20:29:42 UTC
SIA Status: In Compliance
                                                                Count
Feature/Area    Entitlement                                Last Next
============ ===================================================== ==== ====
FCM          Core & Aggr Essentials SW Right-to-Use per 400G for   1    0
FCM          Core & Aggr Essentials SIA per 400G for Cisco 8000    1    0
```

Status: Out-of-Compliance (Grace Period Remaining)

```
Router# show license platform summary
Fri Aug  7 21:00:47.525 UTC
Collection: LAST: Fri Aug 07 2020 21:00:42 UTC
            NEXT: Fri Aug 07 2020 21:01:42 UTC
Reporting:  LAST: Fri Aug 07 2020 21:00:42 UTC
            NEXT: Fri Aug 07 2020 21:01:42 UTC
**********************************IMPORTANT*************************************
SIA Status: Out of Compliance(Remaining Grace Period: 90 days, 0 hours)
            SIA license(s) status is Not Authorized.
            SW Upgrade will still be allowed as SIA Grace Period is remaining
*****************************************************************************
                                                                Count
Feature/Area    Entitlement                                Last Next
```

```
============ ================================================== ==== ====
FCM          Core & Aggr Essentials SW Right-to-Use per 400G for    2    0
FCM          Core & Aggr Essentials SIA per 400G for Cisco 8000     2    0
```

Status: Out-of-Compliance (Grace Period expired and upgrades are blocked)

```
Router# show license platform summary
Fri Aug  7 21:19:58.580 UTC
Collection: LAST: Fri Aug 07 2020 21:19:17 UTC
            NEXT: Fri Aug 07 2020 21:20:17 UTC
Reporting:  LAST: Fri Aug 07 2020 21:19:17 UTC
            NEXT: Fri Aug 07 2020 21:20:17 UTC
*********************************IMPORTANT**************************************
SIA Status: Out of Compliance(Grace Period Expired)
            SW Upgrades are blocked as SIA license(s) are in "Not Authorized" state
*****************************************************************************
                                                            Count
Feature/Area    Entitlement                                 Last Next
============ ================================================== ==== ====
FCM          Core & Aggr Essentials SW Right-to-Use per 400G for    2    0
FCM          Core & Aggr Essentials SIA per 400G for Cisco 8000     2    0
```

Achieving and Maintaining Network Licenses Compliance

To ensure network compliance, it is important to use a quantity less than or equal to the total amount of perpetual (RTU) licenses and subscription (SIA) licenses, and report license usage regularly.

The benefits of maintaining network compliance include license pooling, portability of RTU, and access to software upgrades. If the network is out of compliance (OOC), these benefits are restricted.

Network compliance is measured at the virtual account level and enforced based on the product family. For example, consider a virtual account that contains ASR 9000 devices and NCS 540 devices. In this example, the NCS 540 devices are compliant, but one of the ASR 9000 devices uses more SIAs than that are available in the Smart account. Once all granted grace periods are exhausted, the enforcement conditions such as no license pooling, no RTU portability, and software upgrade restriction for all ASR 9000 devices within that virtual account are instituted. In this example, the NCS 540 devices in the same virtual account aren't impacted by the OOC condition, nor are the other ASR 9000 devices that reside in different virtual accounts.

A product family in a virtual account is considered in compliance when four factors are valid:

1. The devices are registered with the smart licensing server (On-Prem or CSSM).

2. The number of current SIA licenses in use is less than or equal to the number of available SIA licenses in your virtual account.

3. The number of current RTU licenses in use is less than or equal to the number of available RTU licenses in your virtual account.

4. The devices are reporting license usage within 90 days.

Thus, network compliance for a product family in a given virtual account is present when all devices are using no more RTUs & SIAs that have been purchased, and those devices are reporting usage at least every 90 days.

Revision History

Table 8: Feature History Table

Feature Name	Release Information	Feature Description
Smart Licensing Using Policy	Release 24.1.1	Cisco Smart Licensing Using Policy (SLP) is an enhancement to the existing Cisco Smart Licensing model. It streamlines the licensing process for Cisco IOS XR products by introducing a more flexible and automated approach. With SLP, you no longer need to register your device during installation, and there is no evaluation license state or period. This simplifies the licensing process and reduces complexity. To use SLP, your devices must establish trust and send the initial license usage report within 90 days.
Support for Smart Licensing on the line cards, 8800-LC-48H-O, 88-LC0-36FH-MO and 88-LC0-36FH-O	Release 7.3.16	Support for Smart Licensing is now extended to the hardware: • 8800-LC-48H-O • 88-LC0-36FH-MO • 88-LC0-36FH-O
Licensing Solutions and Offerings	Release 7.3.1	Specific License Reservation is a solution designed for classified environments that don't allow electronic communication in or out of the environment.
Smart Licensing	Release 7.0.11	Smart Licensing is a cloud-based, flexible software licensing model that enables you to activate and manage Cisco software licenses across their organization. Smart Licensing solution allows you to easily track the status of your license and software usage trends.