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# Cisco ASR 9000 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 ASR 9000 Series Routers

The Cisco ASR 9000 Series routers are next-generation edge access routers that are optimized for service provider applications. These routers are designed to fulfill various roles in:

- Layer 2 and Layer 3 Ethernet aggregation
- Subscriber-aware broadband aggregation

The Cisco ASR 9000 Series routers meet carrier-class requirements for redundancy, availability, packaging, power, and other requirements traditional to the service provider. The Cisco ASR 9000 Series encompasses a range of router models designed to serve various network sizes and requirements.

The ASR 9000 Series routers include:

- ASR 9001: A 2RU compact high-capacity provider edge router that delivers 120 Gbps of nonblocking fabric capacity.
- ASR 9001-S: A 1.5RU router similar to the ASR 9001 but with a lower profile that offers 60 Gbps.
- ASR 9006: A 6RU modular router designed for high-end carrier Ethernet, video, mobile backhaul, and high-bandwidth applications.
- ASR 9010: A 10RU router that offers a chassis with increased capacity and slots for more line cards and service modules.
- ASR 9901: A 2RU compact high-performance router that provides up to 456 Gbps of nonblocking fabric capacity.
- ASR 9904: A 6RU router that offers high performance and scalability in a small footprint, with a 6.4 Tbps capacity.
- ASR 9906: A 10RU robust, high-capacity router that provides up to 12 Tbps of system bandwidth.
- ASR 9910: A 13RU router that supports up to 20 Tbps of system bandwidth.
- ASR 9912: A 30RU router designed for high-capacity carrier and service provider networks that offer up to 64 Tbps of system bandwidth.
- ASR 9922: A 44RU router that provides up to 96 Tbps of system bandwidth, suitable for the large and demanding network environments.

## 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.
- **Consumption Model (CM):** A model that aligns line card pricing with your needs. You can deploy a line card with minimum ports and add additional ports in 10G increments over time as traffic grows. For more information see, [Software Entitlement](#).
- **Traditional Licensing:** A model that involves purchasing of a perpetual license for a specific feature set. The license is activated with a license key that is tied to the hardware device. You can activate all available software packages on your network devices and enable all the bundled features. For more information, see [Software Entitlement](#).

## 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	<ul style="list-style-type: none"> <li>• SSM On-Prem or CSLU deployment</li> <li>• Direct deployments</li> <li>• Offline deployment</li> </ul>	<ul style="list-style-type: none"> <li>• SSM On-Prem deployment</li> <li>• Direct deployment</li> <li>• Offline deployment</li> </ul>	Offline deployment for air-gapped environments
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.

To enable Flexible Consumption model licensing on ASR 9000 Series routers, use the **license smart flexible-consumption enable** command. See [Enable FCM, on page 4](#).

## 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.

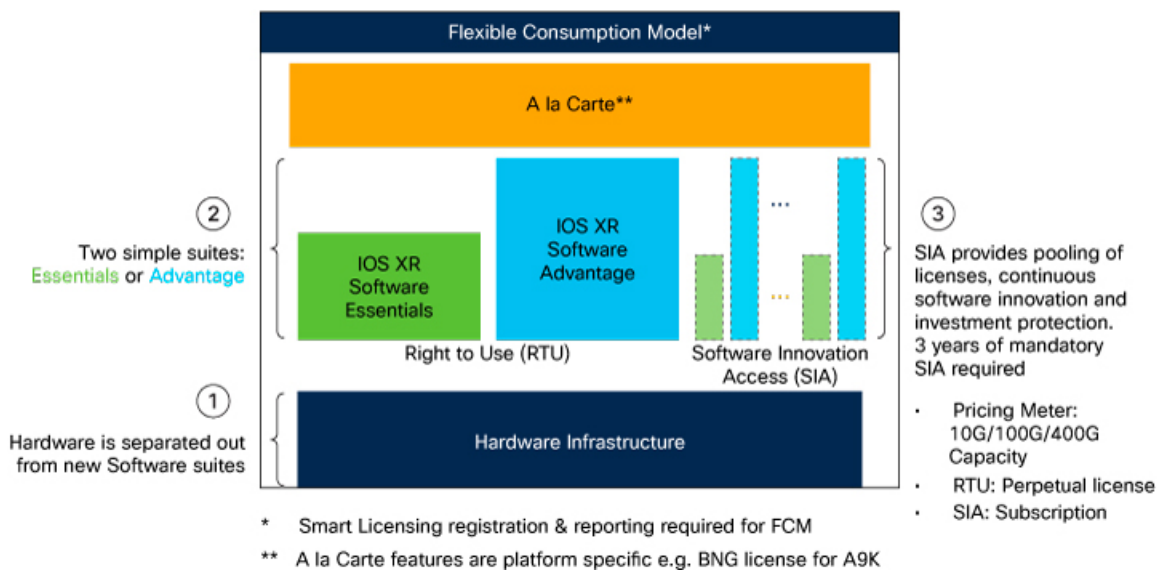
Flexible Consumption model licenses are checked for usage on a daily basis. The daily license usage is reported to the Smart Licensing Manager at Cisco.com.

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.



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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-ED-100G-RTU1.
- **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-ED-100G-RTU1.
- **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-ED-100G.
- **Tracking Licenses:** Are the licenses that are required for the hardware for its operation. An example of a tracking license is A99-32X100GE-TRK.

## Enable FCM

**Step 1** Use the `license smart flexible-consumption enable` command to enable FCM model on the device.

```
Router(config)# license smart flexible-consumption enable
Router(config)# commit
```

Alternatively, use the YANG data model `Cisco-IOS-XR-smart-license-cfg` to enable FCM:

```
<rpc xmlns="urn:ietf:params:xml:ns:netconf:base:1.0" message-id="101">
  <get-config>
    <source>
      <running/>
    </source>
    <filter>
      <licensing xmlns="http://cisco.com/ns/yang/Cisco-IOS-XR-smart-license-cfg">
        <flex-consumption/>
      </licensing>
    </filter>
  </get-config>
</rpc>
```

**Step 2** Use the `show running-config license smart flexible-consumption enable` command to verify the FCM configuration.

```
Router# show running-config license smart flexible-consumption enable
```

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## Flexible Consumption Model Licenses

The table shows the various FCM licenses for ASR 9000 Series routers.

**Table 2: FCM Licenses and Consumption Usage Pattern**

License Name	Hardware Supported	Consumption Pattern
Essential Licenses: • ESS-ED-100G-RTU1  Advantage Licenses: • ADV-ED-100G-RTU1	Line cards: • A9K-16X100GE-TR • A99-32X100GE-TR • A99-16X100GE-X-SE	The number of essential or advanced licenses consumed depends on the number of active ports on a chassis.

License Name	Hardware Supported	Consumption Pattern
<p>Hardware Tracking Licenses:</p> <ul style="list-style-type: none"> <li>• A99-32X100GE-TRK</li> <li>• A9K-16X100GE-TRK</li> <li>• A99-16X100G-X-TRK</li> <li>• A99-8X100GE-TRK</li> <li>• A9K-48X10GE-1G-TRK</li> <li>• A99-48X10GE-1G-TRK</li> <li>• A9K-MOD400-TRK</li> <li>• A9K-24X10GE-1G-TRK</li> <li>• A9K-400GE-LAN-TRK</li> <li>• A9K-MOD200-TRK</li> <li>• ASR-9901-TRK</li> <li>• ASR-9902-TRK</li> <li>• A9903-8HG-PEC-TRK</li> <li>• A9K-400GE-LAN-TRK</li> </ul>	<p>Tracking licenses are named based on the hardware supported.</p>	<p>The number of licenses consumed depends on the hardware in use.</p>
<p>RTU Licenses:</p> <ul style="list-style-type: none"> <li>• Essential: ESS-ED-100G-RTU1</li> <li>• Advantage: ADV-ED-100G-RTU1</li> </ul> <p>SIA Licenses:</p> <ul style="list-style-type: none"> <li>• Essential: ESS-ED-100G-SIA3</li> <li>• Advantage: ADV-ED-100G-SIA3</li> </ul> <p>Upgrade Licenses:</p> <ul style="list-style-type: none"> <li>• Essential: A9K-ESS-ED-100G-EU</li> <li>• Advantage: A9K-ADV-ED-100G-EU</li> </ul>	<p>Line cards:</p> <ul style="list-style-type: none"> <li>• A9K-24X10GE-1G-SE</li> <li>• A9K-24X10GE-1G-TR</li> <li>• A9K-48X10GE-1G-SE</li> <li>• A9K-48X10GE-1G-TR</li> </ul>	<p>The number of essential or advanced licenses consumed depends on the number of active ports on a chassis.</p> <p>Either SIA or Upgrade license is consumed and that depends on the system configuration</p>

### Usage Guidelines for FCM Licenses

These are the guidelines for deploying the license on ASR 9000 Series routers.

- Support for 100G licenses is available only on:
  - A9K-16X100GE-TR
  - A99-32X100GE-TR

- A99-16X100GE-X-SE
- A9K-20HG-FLEX-SE/TR
- A99-24HG-FLEX-SE/TR
- A99-32X100GE-X-SE/TR
- A9K-8HG-FLEX-SE/TR

- The consumption of a particular license can be derived from its license type. If the license type is based on increments of 10G, then a 100G interface consumes ten 10G tags. Likewise, a 40G interface consumes four 10G tags.

### Advantage with Essential Licenses

This table lists the available Essential SIA licenses, Upgrade RTUs, Upgrade SIAs, traditional conversion licenses, and CM conversion licenses and its description.

**Table 3: Advantage with Essential Licenses**

License Product ID	License Description
ADN-ED-100G-SIA3	Edge Advantage with Essentials SIA per 100G for 36-59 months
ADN-ED-100G-SIA5	Edge Advantage with Essentials SIA per 100G for 60-120 months
ADN-ED-400G-SIA3	Edge Advantage with Essentials SIA per 400G for 36-59 months
ADN-ED-400G-SIA5	Edge Advantage with Essentials SIA per 400G for 60-120 months
ESS-ADN-ED-100G	Edge Essentials to Advantage Upgrade RTU per 100G
ESS-ADN-ED-400G	Edge Essentials to Advantage Upgrade RTU per 400G
ADN-ED-100G-SIAST	Edge Advantage with Essentials SIA per 100G 1-35 months Term
ADN-ED-400G-SIAST	Edge Advantage with Essentials SIA per 400G 1-35 months Term
ESS-ADN-ED-100G-S5	Edge Essentials-Advantage Upgrade SIA per 100G 60-120 months
ESS-ADN-ED-100G-S3	Edge Essentials -Advantage Upgrade SIA per 100G 36-59 months
ESS-ADN-ED-100G-ST	Edge Essentials - Advantage Upgrade SIA per 100G 1-35 months Term
ESS-ADN-ED-400G-S5	Edge Essentials -Advantage Upgrade SIA per 400G 60-120 months
ESS-ADN-ED-400G-S3	Edge Essentials -Advantage Upgrade SIA per 400G 36-59 months
ESS-ADN-ED-400G-ST	Edge Essentials - Advantage Upgrade SIA per 400G 1-35 months Term
ADN-ED-100G-RTU1	Edge Advantage with Essentials Software RTU License per 100G
ADN-ED-400G-RTU1	Edge Advantage with Essentials Software RTU License per 400G

License Product ID	License Description
ESS-ED-400G-SIAST	Edge Essentials SIA per 400G 1-35 months Term
A9K-CONV-ADN	ASR 9000 Consumption Model conversion to Flexible Consumption Model: ADN-ED-100G-RTU1
A9K-CONV-ESS-400G	ASR 9000 Traditional license conversion to Flexible Consumption Model: ESS-ED-400G-RTU1
A9K-CONV-ADN-400G	ASR 9000 Traditional license conversion to Flexible Consumption Model: ADN-ED-400G-RTU1
A9KCM-CONV-ADN	ASR 9000 CM conversion to Flexible Consumption Model: ADN-ED-100G-RTU1
A9KCM-CONV-ESS400G	ASR 9000 CM conversion to Flexible Consumption Model: ESS-ED-400G-RTU1
A9KCM-CONV-ADN400G	ASR 9000 CM conversion to Flexible Consumption Model: ADN-ED-400G-RTU1

### Advanced Licenses

This table lists supported Advanced licenses, license PIDs, their eligibility criteria, and software features.

**Table 4: Advanced Licenses and Software Features**

Advanced Licenses	License PID	Eligibility Criteria	Software Feature Enablement
nV Satellite	A9K-NVSAT1-LIC	per-number	Feature is enabled if command output of <b>show nv satellite status brief</b> generates nonzero output.
H-QoS	<ul style="list-style-type: none"> <li>• A9K-HQoS-RTU-10</li> <li>• A9K-HQoS-RTU-1</li> <li>• A9K-HQoS-100G-X</li> </ul>	per-10G/1G/100G	<ol style="list-style-type: none"> <li>1. Execute the <b>show qos summary queue loc 0/X/cpu0 out</b> command on each line card slot.</li> <li>2. Count the number of queues for each physical interface Don't count lines which have N/A as QueueID.</li> <li>3. Interface qualifies for license if it uses more than eight queues.</li> </ol>
LI	A9K-LI-LIC	per-chassis	Feature is enabled when the show output of the <b>show install active summary</b> command matches <b>-li-px</b> .



Timing	A9K-MOBILE-LIC	per-chassis	Feature is enabled when the show output of <b>show ptp interfaces</b> or <b>show frequency synchronization interfaces brief</b> displays at least one interface.
Adv Optical	<ul style="list-style-type: none"> <li>• A9K-DWDM-RTU-10</li> <li>• A9K-DWDM-RTU-1</li> </ul>	per-10G/1G	<p>Execute <b>show controllers hundredGigE 0/X/0/X internal</b> and <b>show controllers tenGigE 0/X/0/X internal</b> commands for each 10GE and 100GE interface in the chassis.</p> <p>The interface qualifies for license for OTN transport mode.</p>
MACSec	A9K-MAC-RTU-10	per-10G	Execute the <b>show macsec mka interface</b> command. Each main-interface in the output qualifies for a license.
OAM	<ul style="list-style-type: none"> <li>• A9K-OAM-RTU-10</li> <li>• A9K-OAM-RTU-1</li> <li>• A9K-OAM-100G-X</li> </ul>	per-10G/1G/100G	<p>Execute the <b>show ethernet cfm local maintenance-points mep</b> and <b>show ethernet cfm local maintenance-points mip</b> commands.</p> <p>Each main-interface in the output qualifies for a license.</p> <p>Interfaces appearing under several commands require only one license. This captures MEPS/MIPS and Y.1731 PM.</p>

Virtual Interface	S-A9K-VIRT-RTU-10	per-10G	<p>Execute the <b>show interfaces summary</b> command.</p> <p>If the output displays IFT_BVI instances, run the command for BVIs.</p> <p>If the output displays IFT_PW_ETHER instances, run the command for PW-HE.</p> <p><b>BVI:</b></p> <ol style="list-style-type: none"> <li>1. Run the <b>show l2vpn bridge-domain detail</b> command. For each bridge-domain in the output, check if the bridge-domain contains a BVI. If a bridge-domain doesn't contain BVI, there's nothing to license.</li> <li>2. If a bridge-domain contains a BVI, each main-interface in that bridge-domain qualifies for a license.</li> <li>3. If the output shows Bundle-Ether, use it <b>show int bundle-ether X</b> to find members.</li> <li>4. Interfaces appearing under several bridge-domains require only one license.</li> </ol> <p><b>PW-HE:</b></p> <ol style="list-style-type: none"> <li>1. Run the <b>show generic-interface-list</b> command.</li> <li>2. Each main-interface in the output qualifies for a license if it downloads to FIB and the number of items should be nonzero.</li> <li>3. If the output shows Bundle-Ether, use the <b>show int bundle-ether X</b> command to find members.</li> <li>4. Interfaces appearing several times require only one license.</li> </ol>
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VxLAN	A9K-VXLN-RTU-10	per-10G/per 1G/per 100G	<ol style="list-style-type: none"> <li>1. Execute the <b>show l2vpn bridge-domain</b> command.</li> <li>2. For each bridge-domain in the output, check if the bridge-domain contains a list of VNIs.</li> <li>3. If a bridge-domain doesn't contain a list of VNIs, there's nothing to license. You can proceed to the next-bridge domain.</li> <li>4. If a bridge-domain contains a list of VNIs, each main-interface in that bridge-domain qualifies for a license.</li> <li>5. Interfaces appearing under several bridge-domains require only one license.</li> </ol>
EVPN	A9K-EVPN-RTU-10	per-10G/per 1G/per 100G	<ol style="list-style-type: none"> <li>1. Execute the <b>show l2vpn bridge-domain</b> command.</li> <li>2. For each bridge-domain in the show output, check the bridge-domain types—<b>pbb-edge</b> or <b>pbb-core</b>.</li> <li>3. If the bridge-domain type isn't <b>pbb-edge</b> or <b>pbb-core</b>, there's nothing to license. You can proceed to the next bridge-domain.</li> <li>4. If the bridge-domain type is <b>pbb-edge</b> or <b>pbb-core</b>, then each main-interface in that bridge-domain qualifies for a license.</li> <li>5. Interfaces appearing under several bridge-domains require only one license.</li> </ol>
BNG	<ul style="list-style-type: none"> <li>• S-A9K-BNG-LIC-8K</li> <li>• S-A9K-BNG-ADV-8K</li> </ul>	Per-number	<ol style="list-style-type: none"> <li>1. Run the <b>show subscriber session all summary</b> command.</li> <li>2. View all subscribers reported as "activated".</li> </ol> <p>Verify the IPv4/IPv6 and dual-stack subscribers.</p> <p>Each dual-stack subscriber is only counted once.</p>

## Non-Consumption Model Licenses

This table lists the licenses for Non-Consumption Model (CM) line cards:

**Table 5: Non-CM Line Cards Software Licenses for Cisco IOS XR 64-bit**

Non-CM Line Cards Software License PID	Description
A9K-800G-IVRF	ASR 9000 8-port 100 GE Infrastructure VRF Right to Use License
A9K-400G-IVRF	ASR 9000 4-port 100 GE Infrastructure VRF license Right to Use License
A99-1200G-IVRF	ASR 9900 Infrastructure VRF license Right to Use License
A9K-800G-AIP-SE	ASR 9000 8-port 100 GE Advance IP Service Edge Right to Use License
A9K-800G-AIP-TR	ASR 9000 8-port 100 GE Advance IP Transport Optimised Right to Use License
A9K-400G-AIP-SE	ASR 9000 4-port 100 GE Advance IP Service Edge Right to Use License
A9K-400G-AIP-TR	ASR 9000 4-port 100 GE Advance IP Transport Optimised Right to Use License
A99-1200G-AIP	ASR 9900 12port 100GE Advanced IP Right to Use License
A9K-800G-OPT-LIC	ASR 9000 8-port 100 GE Advance Optical Right to Use License
A9K-400G-OPT-LIC	ASR 9000 4-port 100 GE Advance Optical Right to Use License
A99-1200G-ADVRTNG	ASR 9900 12port 100GE Advanced Routng Right to Use License
S-A9K-9901-AIP-LC	ASR 9000 Smart License L3 VPN for NON PAYG 9901 System
S-A9K-9901-VRF-LC	ASR 9000 Smart License I-VRF for NON PAYG 9901 System
S-A9K-9901-120AIP	ASR 9000 Smart License L3 VPN for 120G PAYG 9901 System
S-A9K-9901-256AIP	ASR 9000 Smart License L3 VPN for 256G PAYG 9901 System
S-A9K-BNG-ADV-8K	ASR 9000 Smart License for BNG license for Advance Features
S-A9K-BNG-LIC-8K	ASR 9000 BNG License Unit for 8000 subscribers
A9K-24P-80GRTU-SE	ASR 9000 80G Upgrade license for 24-port 10G/1G dual rate Service Edge
A9K-24P-80GRTU-TR	ASR 9000 80G Upgrade license for 24-port 10G/1G dual rate Transport Optimized
A9K-48P1GE-AIP-SE	ASR 9000 Advance IP Service Edge License for full scale VRFs for 48-port 1G mode

Non-CM Line Cards Software License PID	Description
A9K-48P1GE-AIP-TR	ASR 9000 Advance IP Transport Optimized License for full scale VRFs for 48-port 1G mode
A9K-48P10G-SE-UPG	ASR 9000 48-port 1G to 10G Service Edge Upgrade License
A9K-48P10G-TR-UPG	ASR 9000 48-port 1G to 10G Transport Optimized Upgrade License
S-A9903-8HG-IVRF	ASR 9003 800G Infrastructure VRF license Right to Use License
S-A9903-8HG-AIP	ASR 9003 800G Advance IP Right to Use License
S-A9903-8HG-CGN	ASR 9003 800G CGN Right to Use License
S-A9K-MACSEC-10	ASR 9000 MACsec 10G License
S-A9K-MACSEC-40	ASR 9000 MACsec 40G (4x10G) License
S-A9K-MACSEC-100	ASR 9000 MACsec 100G (10x10G) License
S-A9K-4HG-IVRF	ASR 9000 400G Infrastructure VRF license Right to Use License
S-A9K-4HG-AIP-TR	ASR 9000 400G Advance IP Transport Optimised Right to Use License
S-A9K-4HG-AIP-SE	ASR 9000 400G Advance IP Service Edge Right to Use License
S-A9K-4HG-CGN	ASR 9000 400G CGN Right to Use License
S-A9902-IVRF	ASR 9902 Infrastructure VRF license Right to Use License
S-A9902-AIP	ASR 9902 Advance IP Right to Use License
S-A9902-CGN	ASR 9902 CGN Right to Use License
S-A9902-OPTLIC	ASR 9902 Optical Right to Use License



**Note** A9K-48P1GE-AIP-TR license is not supported on Cisco IOS XR 32 bit software.

This table shows license consumption for Non-Consumption Model (CM) line cards:

**Table 6: Feature wise requirement for Non-CM Line Cards**

License	Eligibility Criteria
AIP	If number of VRFs are greater than 8, AIP license is consumed.

License	Eligibility Criteria
IVRF	<p>If number of VRFs are less than or equal to 8, IVRF license is consumed.</p> <p>If customer has less than or equal to 8 VRFs, who purchased AIP license in their smart account, please contact your Cisco account representative if you see issues like insufficient IVRF licenses.</p> <p>The router consumes the IVRF license only when a physical interface on the line card has two or more VRFs.</p> <p><b>Note</b>      The router does not consider VRFs in the logical interfaces for IVRF licensing. You must configure two or more separate VRFs to request an IVRF license.</p>

## 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 7: 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 <i>Grace</i> period of 90 days expires.
License Authorization Status	NA	License Authorization Status is: <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> </ul>

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 8: 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
Sun Feb 14 22:25:36.115 UTC
Collection: LAST: Sun Feb 14 2021 22:24:40 UTC
            NEXT: Sun Feb 14 2021 22:25:40 UTC
Reporting:  LAST: Sun Feb 14 2021 22:24:40 UTC
            NEXT: Sun Feb 14 2021 22:25:40 UTC
SIA Status: In Compliance
```

Feature/Area	Entitlement	Count	
		Last	Next
FCM	Total A9K-48X10GE-1G LCs in the system	1	0
FCM	ASR9k Core & Agg Netw SW&Autom Adv 1.0 Perp RTU (pe	1	0
FCM	Advance Edge SIA per 100G Subscription	1	0
FCM	ASR9k Core & Agg Netw SW&Autom Ess 1.0 Perp RTU (pe	1	0
FCM	Essential Edge SIA per 100G Subscription	1	0

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

```
Router# show license platform summary
Mon Feb 15 12:10:00.009 UTC
Collection: LAST: Mon Feb 15 2021 12:09:17 UTC
            NEXT: Mon Feb 15 2021 12:10:17 UTC
Reporting:  LAST: Mon Feb 15 2021 12:09:17 UTC
            NEXT: Mon Feb 15 2021 12:10:17 UTC
*****IMPORTANT*****
SIA Status: Out of Compliance(Remaining Grace Period: 89 days, 23 hours)
            SIA license(s) status is Not Authorized.
            SW Upgrade will still be allowed as SIA Grace Period is remaining
*****
```

Feature/Area	Entitlement	Count	
		Last	Next
FCM	ASR9k Core & Agg Netw SW&Autom Adv 1.0 Perp RTU (pe	1	0
FCM	Advance Edge SIA per 100G Subscription	1	0
FCM	ASR9k Core & Agg Netw SW&Autom Ess 1.0 Perp RTU (pe	1	0
FCM	Essential Edge SIA per 100G Subscription		

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



```

Router# show license platform summary
Mon Feb 15 12:10:00.009 UTC
Collection: LAST: Mon Feb 15 2021 12:16:17 UTC
           NEXT: Mon Feb 15 2021 12:17:17 UTC
Reporting:  LAST: Mon Feb 15 2021 12:16:17 UTC
           NEXT: Mon Feb 15 2021 12:17:17 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           ASR9k Core & Agg Netw SW&Autom Adv 1.0 Perp RTU (pe  1    0
FCM           Advance Edge SIA per 100G Subscription                1    0
FCM           ASR9k Core & Agg Netw SW&Autom Ess 1.0 Perp RTU (pe  1    0
FCM           Essential Edge SIA per 100G Subscription

```

## 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 9: Feature History Table

Feature Name	Release Information	Feature Description
<a href="#">Smart Licensing Using Policy</a>	Release 24.4.1	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.
<a href="#">Essential and Advantage smart licenses in a combined entitlement</a>	Release 7.4.1	With this release, the Advanced licenses are now referred to as the Advantage licenses, without essential entitlement.  Also, a new license model – Advantage with Essentials, has been introduced that contains both Essential and Advantage licenses as a combined entitlement in a single PID. This simplifies the license procurement and management effort by eliminating the need to procure separate PIDs for Essential and Advantage licenses.
<a href="#">Support for Smart Licensing on ASR 9902 Routers, 0.8T PEC, and ASR 9000 5th generation 400G Line Cards.</a>	Release 7.4.1	Smart Licensing support is now extended to the following routers and line cards: <ul style="list-style-type: none"><li>• ASR-9902</li><li>• A9K-8HG-FLEX-SE/TR</li><li>• A9K-4HG-FLEX-SE/-TR line cards</li><li>• A99-4HG-FLEX-SE/TR line cards</li></ul>
<a href="#">Software Innovation Access</a>	Release 7.3.1	SIA license grants you access to the latest software upgrades which contain new features, bug fixes, and security enhancements for devices on your network. Also, it enables the consumption of Advantage and Essential Right-to-Use (RTU) licenses on your device, and allows portability of these RTU licenses from one device to another.

Feature Name	Release Information	Feature Description
<a href="#">Flexible Consumption Model Licenses</a>	Release 7.3.1	Support for Flexible Consumption Model (FCM) is now extended to the hardware: <ul style="list-style-type: none"> <li>• A99-8X100GE-SE</li> <li>• A9K-48X10GE-1G-SE</li> <li>• A99-48X10GE-1G-SE</li> <li>• A9K-MOD400-SE</li> <li>• A9K-24X10GE-1G-SE</li> <li>• A9K-4X100GE</li> <li>• A9K-MOD200-SE</li> <li>• ASR-9901</li> </ul>
<a href="#">Licensing Solutions and Offerings</a>	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.
<a href="#">Smart Licensing</a>	Release 5.2.0	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.