Smart Software Licensing

This section contains the following topics:

Smart Software Licensing

This chapter describes the different capabilities of Cisco Smart Software Licensing, and the different components involved in licensing your device. Some of the topics described are:

- Cisco Smart Software Manager (CSSM)
- Specific License Reservation (SLR)
- Licensing Feature Support

Note If your system is running IOS XE release 17.4.1 or greater, Smart Software Licensing is replaced by Smart Licensing Using Policy (SLP), which is discussed in the next chapter.

Licensing Feature Support

Smart Licensing is enabled by default on the ESR6300. Right-To-Use (RTU) licensing is not supported.

The ESR6300 uses the CDNA licensing model. This model uses the network-essentials (NE) and network-advantage (NA) license scheme. In this model, there are two stacks in the image license, the network-stack and the DNA-stack. The network stack packages features such as IOS features vpn, crypto features, mpls, bgp, etc. This stack is perpetual. The DNA stack has its own set of features get packaged DNAC, etc.

The Throughput-Based licensing on the Cisco ESR6300 has three levels:

Throughput	Network Essentials	Network Advantage
Default (50 Mbps)	ESR-6300-NE/DEF-K9	ESR-6300-NA/DEF-K9
Performance (250 Mbps)	ESR-6300-NE/PERF-K9	ESR-6300-NA/PERF-K9
Boost (2 Gbps)	ESR-6300-NE/BOOS-K9	ESR-6300-NA/BOOS-K9

Note A device can only have a single license – either Network-Essentials or Network-Advantage for the universalk9 image.

To find information about platform support and to know which license levels a feature is available with, use Cisco Feature Navigator. To access Cisco Feature Navigator, go to https://www.cisco.com/go/cfn. An account on cisco.com is not required.

Understanding Licensed Throughput Throttling

The Cisco ESR6300 limits egress throughput based on the license level installed on the platform. The egress throughput is determined by adding the current outbound throughput on all interfaces (either physical or TAP). If this calculated throughput exceeds the licensed throughput, packets will be randomly dropped.

For calculating throughput, the Cisco ESR6300 only uses the L2 header and payload. It does not take into account the 4 byte CRC that would be present on an Ethernet "wire," nor does it take into account the inter-frame gap and pre-amble that would typically be on the "wire." Most traffic generators do take these other items into account. As a result, with small packets especially, the throughput calculated by IOS may be much lower than the throughput reported by the traffic generator.

Features Supported in a License Package

The following table is an overview of the features supported in the License Packages:

Network Essentials	Network Advantage
Essential Routing Protocols: BGP, OSPF, EIGRP, IGMP, IGRP, ISIS, RIP	**Routing Capabilities:** Multicast, MPLS
Router Management: EEM, TACACS+, NETCONF, AAA, DNS, DHCP, DPI Visibility (Full FNF), IPSLA, Basic QoS (classification, policing, remarking, scheduling), NAT	**App-based Policy:** PFR, PBR, App-aware QoS Policy, App Performance Troubleshooting (co-related insights)
VPNs: GETVPN, FlexVPN, GRE, DMVPN (Hub Spoke)	**VPNs:** DMVPN (Full Mesh topology support), LISP
Security: IKE, IPSEC, PKI, MacSec, Zone-Based Firewall, Encryption Algorithms (AES, DES, 3DES, SHA, MD5), IPS (community signature), ALG, SSLVPN	

Specific License Reservation (SLR)

Specific License Reservation (SLR) is a functionality that enables you to deploy a software license on a device without communicating usage information to Cisco. This functionality is especially used in highly secure networks, and it is supported on platforms that have Smart Licensing enabled.

SLR lets you reserve a license for your product instance from the CSSM. These reserved licenses need not be renewed or reauthorized unless there is a license usage change on the device.

To enable and use the SLR feature, you must generate a reservation request code from the router device. Use this code in CSSM and generate an authorization code. When you enter this authorization code on the router, the license reservation becomes effective. After you enable license reservation, the system displays the License Reservation section, which is used to reserve licenses for your product.

Note It is assumed that the customer has their Smart Account/Virtual Account already created in CSSM (Cisco Smart Software Manager - (https://software.cisco.com) as part of the purchase setup. Entitlement usage are recorded and tracked in CSSM.

Cisco Smart Software Manager (CSSM)

CSSM is an intuitive portal where you can activate and manage all of your Cisco licenses. This section provides an overview.

Note Prior to licensing, it is assumed the customer has their Smart Account / Virtual Account already created in CSSM (https://software.cisco.com) as part of the purchase setup. Entitlement usage are recorded and tracked in CSSM.

Some of the highlights of CSSM are:

CSSM Validity Check includes ensuring

- • The Smart Account is authorized for Specific License Reservation
  • There are enough available perpetual licenses to authorize consumption
  • The Smart Account is authorized for any Export Restricted Functionality

• Transfers between Virtual Accounts is allowed

- • License consumption and product must transfer together

• Increased license consumption is allowed

- • • Authorized quantity will be persistent
  • • Product will strictly enforce reserved licenses/quantities – overage not allowed

• User may change registration, up or down by re-registering

• User may un-register product to release licenses to their pool

Prior to using CSSM, please view a short video about how to use the portal found here:https://www.cisco.com/c/en/us/buy/smart-accounts/software-manager.html

Click on the View Video button.

Smart Account

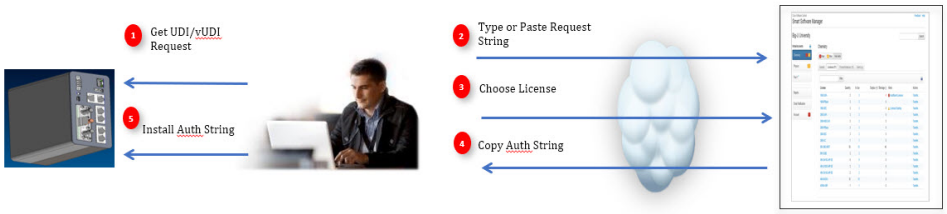
Prior to Smart Account authorization, Specific License Reservation (SLR) functionality is not available on CSSM. Request SLR authorization by sending an email to: smart-ops-support@cisco.com.

Include in the email a Smart Account Name & Domain and a brief justification why SLR is needed.

Specific License Reservation (SLR) Overview

Figure 1: SLR Installation Flow, on page 4 shows a graphical representation of the overall flow to install SLR. This involves a manual exchange of information between the Device and the CSSM.

Figure 1: SLR Installation Flow



The sequence of events for the installation is as follows:

1. Product Request (UDI/vUDI, etc.) entered into CSSM (~ 32 characters*)
2. Requested licenses and quantities chosen in CSSM
3. CSSM performs a validity check
4. CSSM returns an authorization locked to UDI/vUDI
5. Install the authorization string on your device

Configuring SLR

To enable Specific License Reservation for your device, you must execute the following commands.

```
Device(config)#license smart reservation
Device(config)#license boot level network-essentials
  % use 'write' command to make license boot config take effect on next boot

Device(config)#platform hardware throughput level ?
  250M  throughput in bps
  2G    throughput in bps
  50M   throughput in bps

Device(config)#platform hardware throughput level 50
% Please write mem and reload
% The config will take effect on next reboot
Device(config)#end
Device#
```

```
Device#show run | include license
license udi pid IR1101-K9 sn FCW2150TH0F
license boot level network-essentials
license smart reservation
platform hardware throughput level 50M

Device#show romvar
ROMMON variables:
 PS1 = rommon ! >
 MCP_STARTUP_TRACEFLAGS = 00000000:00000000
 THRPUT = 50
 LICENSE_BOOT_LEVEL = network-essentials,network-stack:esg;
 RET_2_RTS =
 BSI = 0
 RET_2_RCALTS =
 RANDOM_NUM = 1027275747
Device#
```

Configuring SLR for 2GB Throughput

The configuration for a 2Gb throughput requires an additional license. You **MUST** also have the hseck9 license.

```
Device(config)#license smart reservation
Device(config)#license boot level network-essentials
             % use 'write' command to make license boot config take effect on next boot

Device(config)#platform hardware throughput level ?
  250M  throughput in bps
  2G    throughput in bps
  50M   throughput in bps

Device(config)#platform hardware throughput level 2G
% 2G throughput level requires hseck9 license!
Device(config)#

Device(config)#license ?
  accept      Accept all further License Agreements
  agent       Configure LIC_AGENT
  boot        license boot config commands
  call-home   license call-home config commands
  feature     License features
  smart       Smart licensing
  udi         license udi

Device(config)#license feature ?
  hseck9      Enable hseck9 license

Device(config)#license feature hseck9
Device(config)#end

Device#show run | inc license
  license feature hseck9
  license udi pid ESR-6300-NCP-K9 sn FOC23232K8U
  license boot level network-essentials
  license smart reservation
Device#

Device#show run | inc platform
  platform qfp utilization monitor load 80
```

```
  platform hardware throughput level 50M
  no platform punt-keepalive disable-kernel-core
```

Check the ROMMON variables.

```
Device# show romvar

ROMMON variables:
 PS1 = rommon ! >
 RET_2_RTS =
 BOOT =
 MCP_STARTUP_TRACEFLAGS = 00000000:00000000
 THRPUT = 50
 LICENSE_BOOT_LEVEL = network-advantage,network-stack:esg;
 BSI = 0
 RET_2_RCALTS =
 RANDOM_NUM = 1904849863
Device#
```

Change the throughput level.

```
Device# platform hardware throughput level 2G
% Please write mem and reload
% The config will take effect on next reboot

*Nov 13 00:07:03.414: %SMART_LIC-5-EVAL_START: Entering evaluation period
```

Check the ROMMON variables and then save the configuration.

```
Device# show romvar
 ROMMON variables:
 PS1 = rommon ! >
 RET_2_RTS =
 BOOT =
 MCP_STARTUP_TRACEFLAGS = 00000000:00000000
 LICENSE_BOOT_LEVEL = network-advantage,network-stack:esg;
 BSI = 0
 RET_2_RCALTS =
 RANDOM_NUM = 1904849863
 THRPUT = 2000
Device#
*Nov 13 00:08:01.224: %SYS-5-CONFIG_I: Configured from console by console


Device# write mem
Building configuration...

[OK]
Device#
*Nov 13 00:08:12.264: %SYS-6-PRIVCFG_ENCRYPT_SUCCESS: Successfully encrypted private config
 file
```

Verify the configuration changes.

```
Device# show run | inc license
license feature hseck9
license udi pid ESR-6300-CON-K9 sn FOC23232KC7
license boot level network-advantage
license smart reservation
Device#

Device# show run | inc platform
platform qfp utilization monitor load 80
platform hardware throughput level 2G
platform punt-keepalive disable-kernel-core
Device#
```

```
Device#show license summary
  Smart Licensing is ENABLED
  License Reservation is ENABLED
  Registration:
   Status: UNREGISTERED
   Export-Controlled Functionality: NOT ALLOWED
  License Authorization:
   Status: EVAL MODE
   Evaluation Period Remaining: 69 days, 4 hours, 18 minutes, 29 seconds
  License Usage:
  License                 Entitlement tag               Count        Status
  -----------------------------------------------------------------------------
                          (ESR6300_P_50M_E)                 1        EVAL MODE
```

Requesting a Smart License Reservation

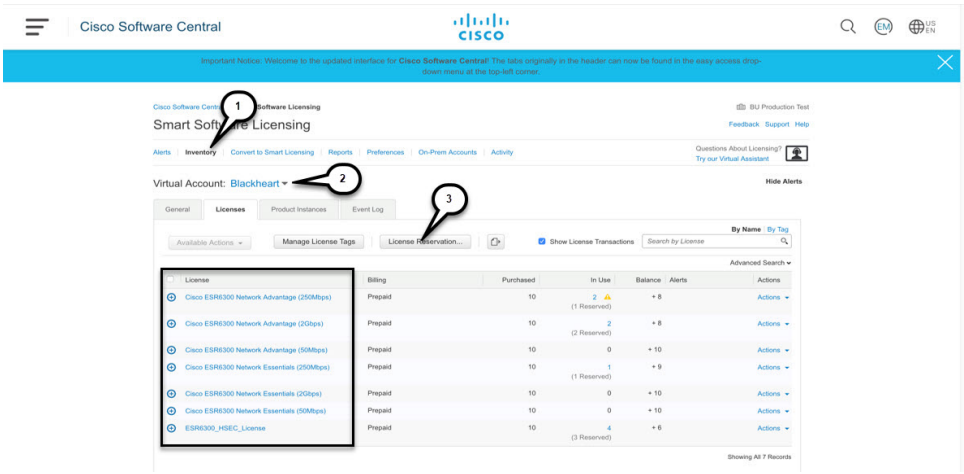
Use these commands to obtain a reservation request.

```
Device#license smart reservation ?
  cancel  Cancel a Smart License reservation request before the authorization code is
installed
  install Install a Smart License reservation authorization code
  request Request a license reservation
  return  Return a Smart License reservation authorization code that was installed

Device#license smart reservation request ?
  all   Reservation request for all the systems
  local Reservation request for the active system
  universal Request a universal license reservation (this option has been deprecated and
will be removed in the future)

Device#license smart reservation request all
Enter this request code in the Cisco Smart Software Manager portal:
Request code: CD-ZESR-6300-CON-K9:FOC23232KC7-AySKEQX96-85
Device#

Device# show license tech reservation
License reservation: ENABLED

Overall status:
  Active: PID:ESR-6300-CON-K9,SN:FOC23232KC7
      Reservation status: RESERVATION IN PROGRESS on Nov 12 21:33:35 2019 UTC
      Export-Controlled Functionality: NOT ALLOWED
      Request code: CD-ZESR-6300-CON-K9:FOC23232KC7-AySKEQX96-85
      Last return code: Cebj2B-5tRBm8-f7Dxmt-vi8Q4S-K3wx7f-ck5NRA-U6FoLe-xcMCEc-1bQ
```

SLR Installation Procedure Overview

Step 1 is now complete, and you have a request code. Steps 2, 3, and 4 require a manual exchange of information between the Device and CSSM. A high level overview follows:

Figure 2: CSSM Smart License Interface



Log in to Cisco Smart Software Manager. You must log in to the portal using the Cisco provided username and password.

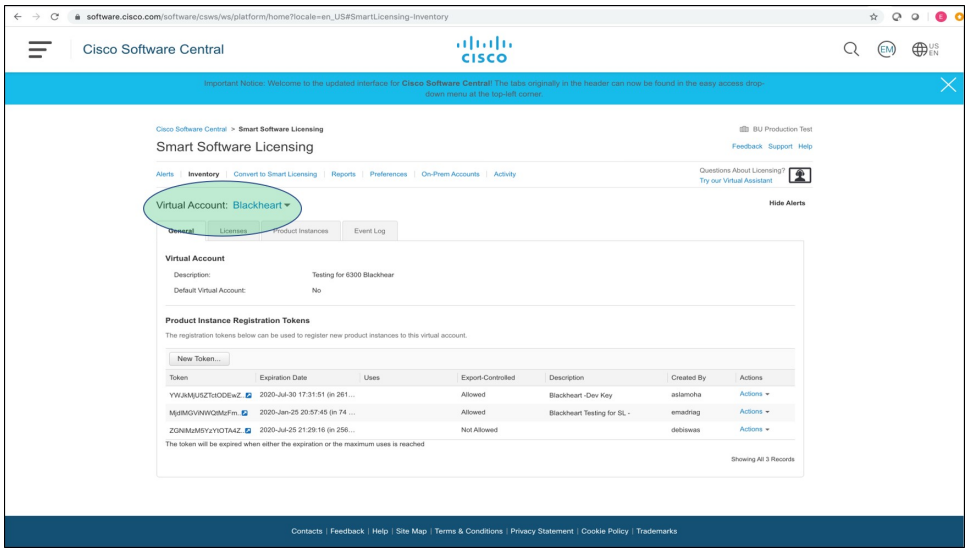
In this section, you will be navigating to the Inventory Tab (**1**), selecting your Virtual Account (**2**), and doing a License Reservation (**3**).

SLR Installation Procedure

Follow these steps to reserve a license in CSSM, and generate a reservation code.

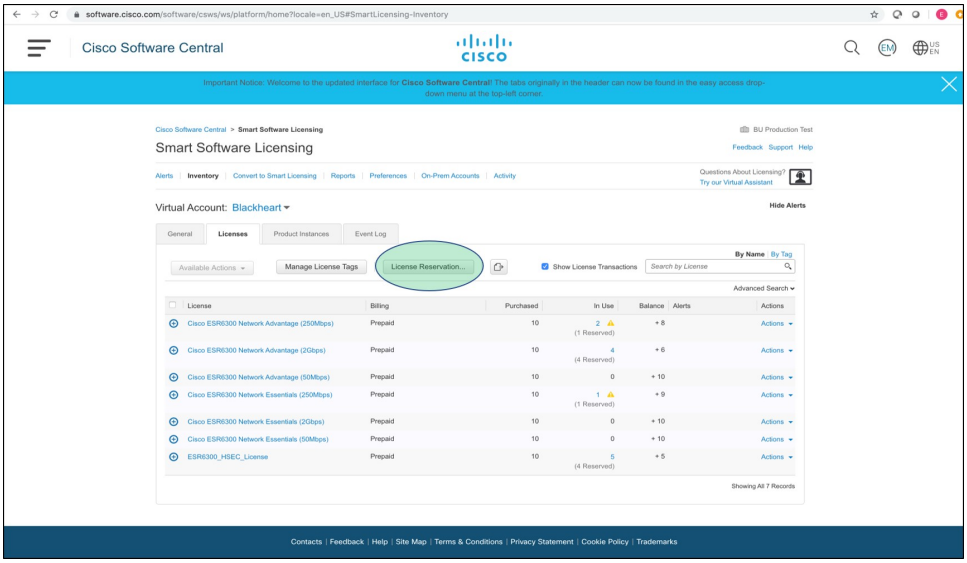
Step 1 From the Inventory Tab, click the down arrow beside **Virtual Account**.

Figure 3: Virtual Account



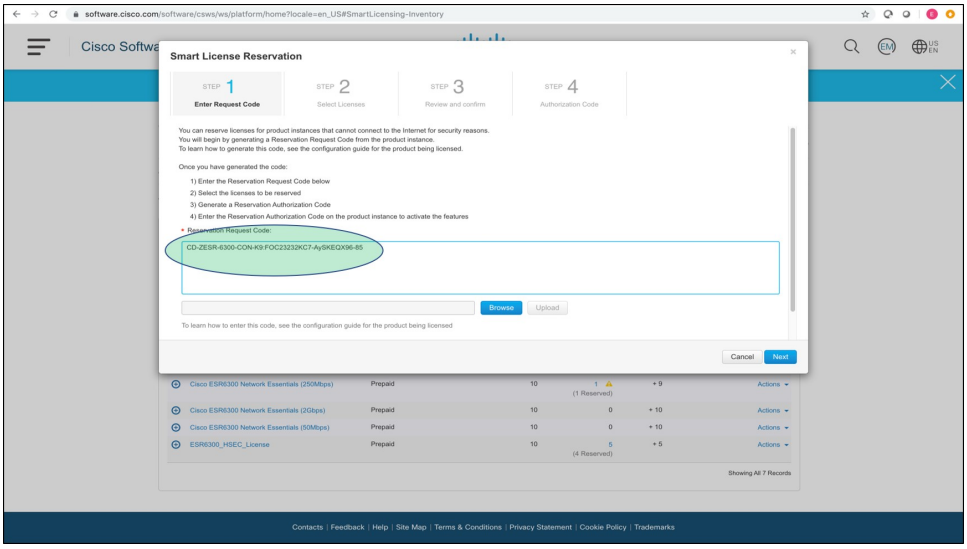
Step 2 Click on **License Reservation**.

Figure 4: License Reservation



Step 3 The Smart License Reservation Window appears.

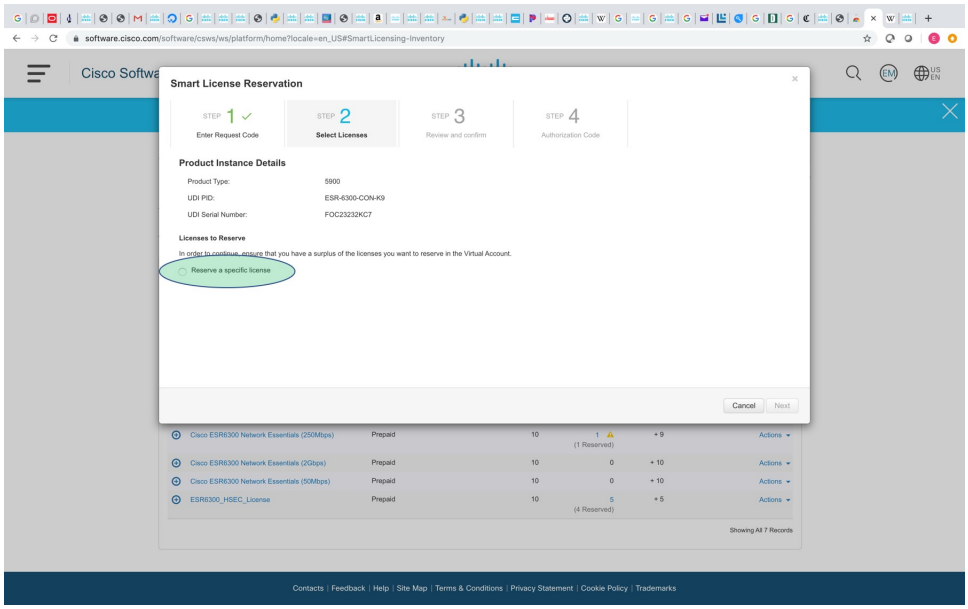
Figure 5: Smart License Reservation Window



Enter your Reservation Request Code and click **Next**.

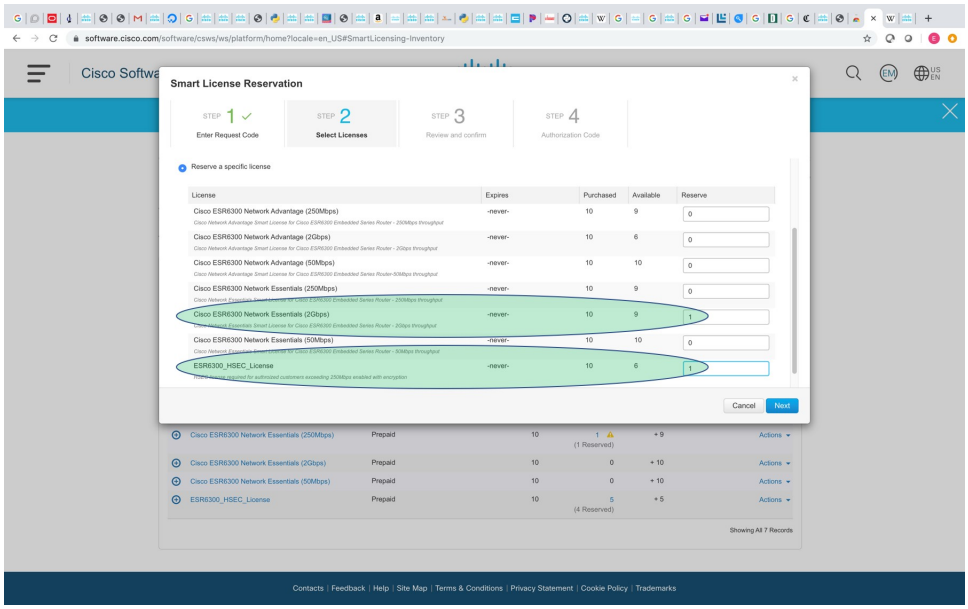
Step 4 Click on the circle beside Reserve a Specific License.

Figure 6: Reserve a Specific License



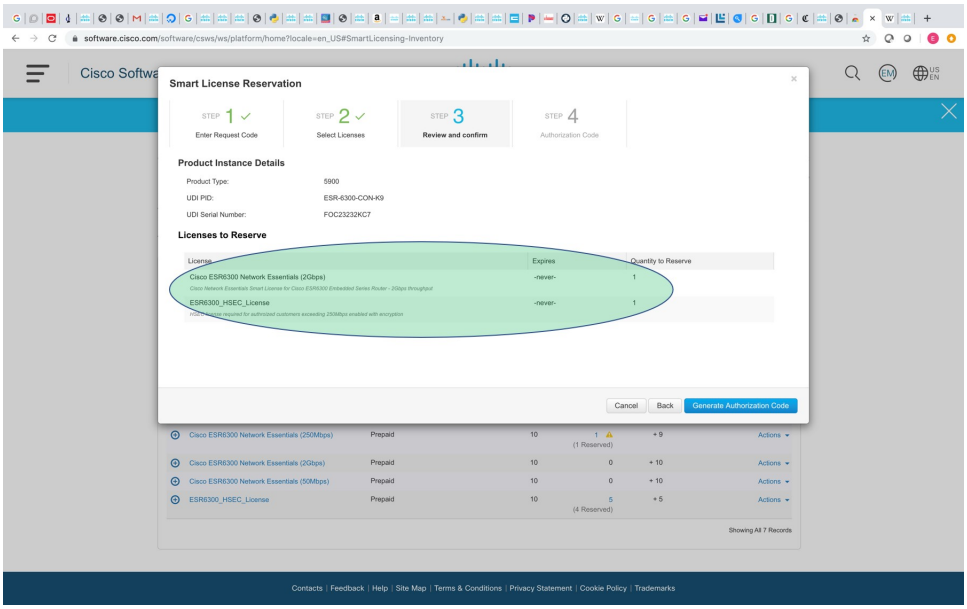
Step 5 Select your licenses by entering a number in the **Reserve** column. In this example, note that two licenses are required for the 2Gbs throughput to work: Cisco ESR6300 Network Essentials 2Gbps and ESR6300_HSEC_License.

Figure 7: Reserve Licenses



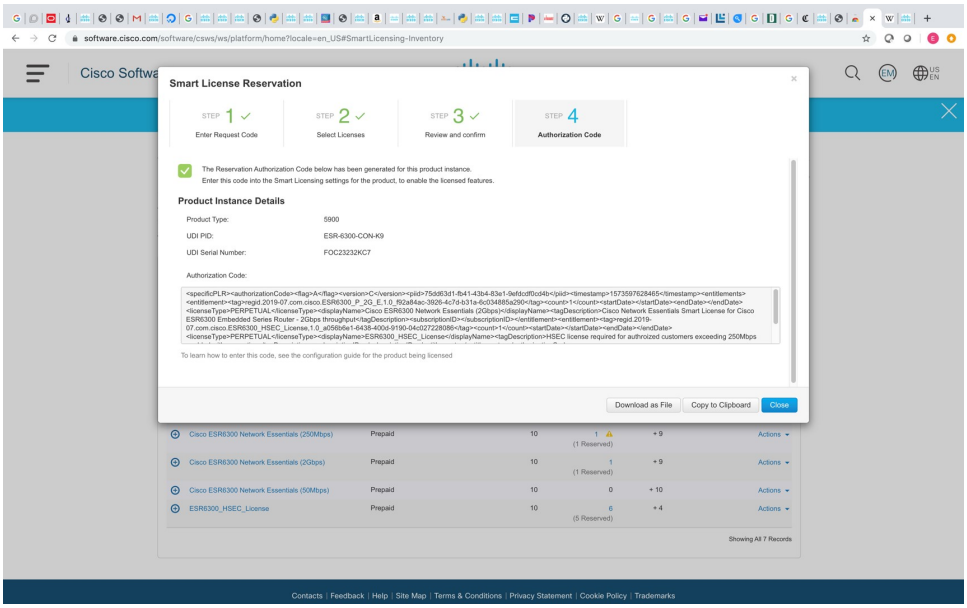
Step 6 Review your selections. If you are satisfied with the licenses, click **Generate Authorization Code**.

Figure 8: Review Licenses



Step 7 The Reservation Authorization Code is generated. The code is located in the text box below the Authorization Code:

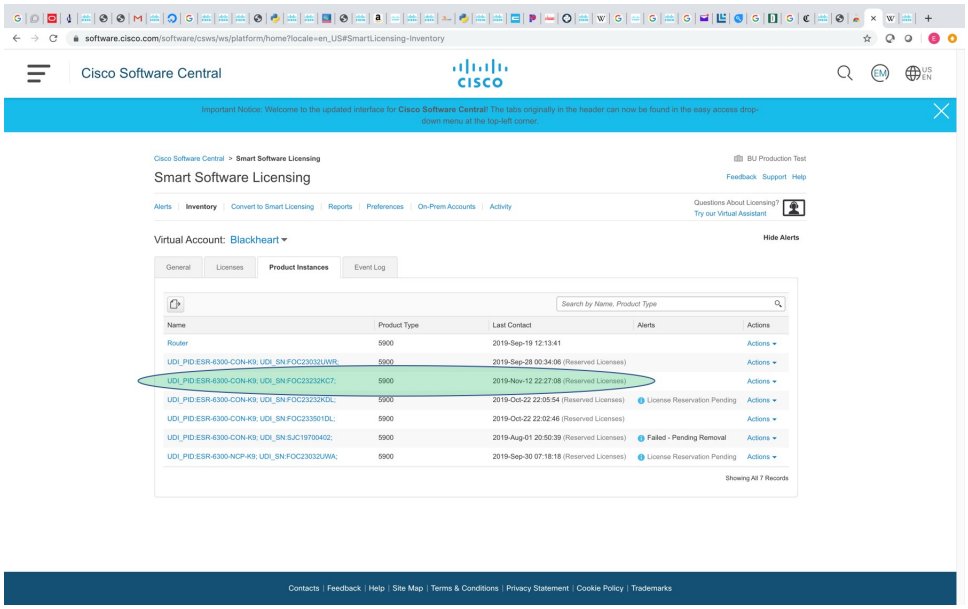
Figure 9: Authorization Code



You have the option to **Download as File**, or **Copy to Clipboard**. Use whichever method you wish to capture the code, then click **Close**.

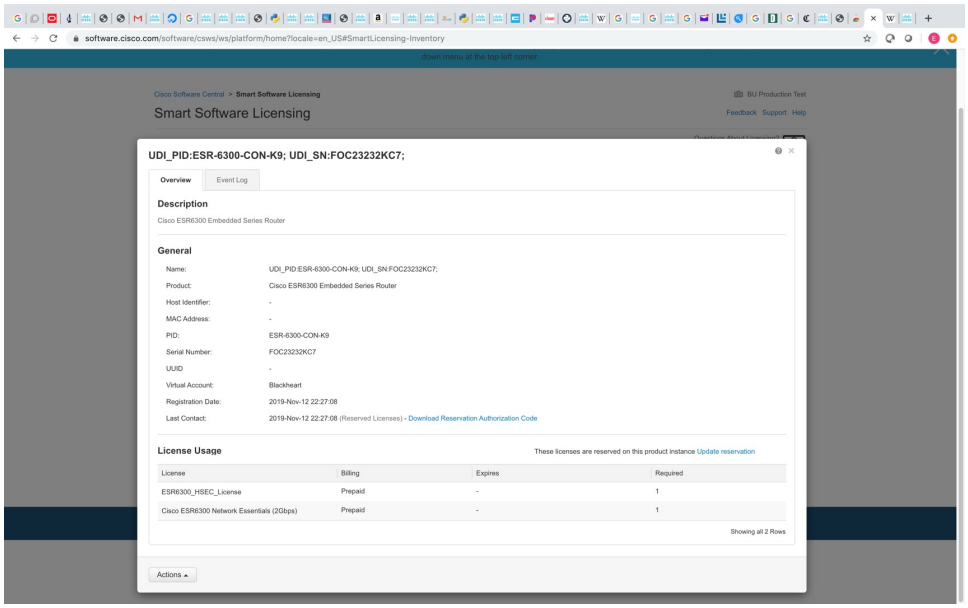
Step 8 After CSSM generates the Authorization Code, the Product Instance is registered with CSSM.

Figure 10: Product Instance Registered



Step 9 The license chosen for that Product Instance are now reserved.

Figure 11: Product Instance Reserved



What to do next

The following is an example of the Authorization Code for a combined ESR6300 HSEC/2GB Feature and Throughput License:

```
<specificPLR><authorizationCode><flag>A</flag><version>C</version><piid>9c9e4c78-ff00401faf6ebed57135cc13
</piid><timestamp>1570653908936</timestamp><entitlements><entitlement><tag>regid.2019-07.com.cisco.ESR6300_P_2G_A,1.0_7511e476-34a3-4ce7-b98d43e49d68be2f
</tag><count>1</count><startDate></startDate><endDate></endDate><licenseType>PERPETUAL</licenseType><displayName>Cisco
 ESR6300 Network Advantage (2Gbps)
</displayName><tagDescription>Cisco Network Advantage Smart License for Cisco ESR6300
Embedded Series Router-2Gbps throughput</tagDescription><subscriptionID>
</subscriptionID></entitlement><entitlement><tag>regid.2019-07.com.cisco.ESR6300_HSEC_License,1.0_a056b6e1-6438-400d-919004c027228086
</tag><count>1</count><startDate></startDate><endDate></endDate><licenseType>PERPETUAL</licenseType><displayName>ESR6300_HSEC_License
</displayName><tagDescription>HSEC license required for authroized customers exceeding
250Mbps enabledwithencryption</tagDescription>
<subscriptionID></subscriptionID></entitlement></entitlements></authorizationCode><signature>MEQCIFHWjVrFjhxdR7INAPOeDCPTZ2EIECKGINQ3ufzEehAiBn8/
bVqx3WyyX2SfUrG5+N5ztoEDDH1LL+wNqDc0kjSA==</signature><udi>P:ESR-6300-CON-K9,S:FOC23032UVB</udi></specificPLR>
```

Register the Device Using the Authorization Code

After you get the authorization code from CSSM, execute the following commands on your Device to complete the license reservation procedure:

From the executive privileged mode:

```
Device#license smart reservation install file flash:AuthorizationCode_NE_2G_HSEC.txt
Last Confirmation code UDI: PID:ESR-6300-CON-K9,SN:FOC23232KC7
    Confirmation code: c803ff96

*Nov 13 00:15:42.016: %SMART_LIC-6-AGENT_REG_SUCCESS: Smart Agent for Licensing Registration
 successful. udi PID:ESR-6300-CON-K9,SN:FOC23232KC7
*Nov 13 00:15:42.016: %SMART_LIC-6-AUTH_RENEW_SUCCESS: Authorization renewal successful.
State=authorized for udi PID:ESR-6300-CON-K9,SN:FOC23232KC7
*Nov 13 00:15:42.017: %SMART_LIC-6-RESERVED_INSTALLED: Specific License Reservation
Authorization code installed for udi PID:ESR-6300-CON-K9,SN:FOC23232KC7
*Nov 13 00:15:42.045: %SMART_LIC-6-EXPORT_CONTROLLED: Usage of export controlled features
is allowed
*Nov 13 00:15:42.065: %SMART_LIC-5-SLR_IN_COMPLIANCE: The entitlement
regid.2019-07.com.cisco.ESR6300_HSEC_License,1.0_a056b6e1-6438-400d-9190-04c027228086 in
use on this device is authorized
*Nov 13 00:15:42.083: %SMART_LIC-3-NOT_AUTHORIZED: The entitlement
regid.2019-07.com.cisco.ESR6300_P_50M_E,1.0_55eae012-2c42-4314-b86f-4457912bd170 is Not
Authorized to be used. Reason: License not present in SLR auth code
*Nov 13 00:15:42.083: %SMART_LIC-5-SLR_IN_COMPLIANCE: The entitlement
regid.2019-07.com.cisco.ESR6300_HSEC_License,1.0_a056b6e1-6438-400d-9190-04c027228086 in
use on this device is authorized
*Nov 13 00:15:42.094: %IOSXE_SMART_AGENT-3-NOTIFY_NOT_AUTHORIZED: Requested count 1 for
license level network-essentials_50M is in 'not authorized' state.

Device#
```

This command registers the device. The authorization code you copied as a file is used to activate smart licensing reservation for your device.When you run the **show license summary** command, the system displays the details of the reserved licenses.

```
Device#show license summary
Smart Licensing is ENABLED
License Reservation is ENABLED
Registration:
  Status: REGISTERED - SPECIFIC LICENSE RESERVATION
  Export-Controlled Functionality: ALLOWED
License Authorization:
  Status: AUTHORIZED - RESERVED
License Usage:
  License                 Entitlement tag        Count.  Status
```

```
  ------------------------------------------------------------------------------------------
  Cisco ESR6300 Networ... (ESR6300_P_2G_E)       1      AUTHORIZED
  hseck9                  (ESR6300_HSEC_License) 1      AUTHORIZED
```

Run the **show license tech reservation** command for additional details.

```
Device#show license tech reservation
License reservation: ENABLED

Overall status:
  Active: PID:ESR-6300-CON-K9,SN: FOC23232KC7
      Reservation status: SPECIFIC INSTALLED on Oct 08 18:44:11 2019 UTC
      Export-Controlled Functionality: ALLOWED
      Last Confirmation code: c803ff96

Specified license reservations:
  Cisco ESR6300 Network Essentials (2Gbps) (ESR6300_P_2G_E):
    Description: Cisco Network Essentials Smart License for Cisco ESR6300 Embedded Series
Router - 2Gbps throughput
    Total reserved count: 1
    Term information:
      Active: PID:ESR-6300-CON-K9,SN: FOC23232KC7
        License type: PERPETUAL
          Term Count: 1
  ESR6300_HSEC_License (ESR6300_HSEC_License):
    Description: HSEC license required for authorized customers exceeding 250Mbps enabled
with encryption
    Total reserved count: 1
    Term information:
      Active: PID:ESR-6300-CON-K9,SN: FOC23232KC7
        License type: PERPETUAL
          Term Count: 1
```

Step 5 is now complete. Authorization has been installed, and the Eval Mode status transitions to Authorized.

Uninstalling Specific License Reservation (SLR) Overview

The sequence of events for the de-installation is as follows:

1. On your Device, request a return code.
2. Log into CSSM.
3. Enter the return code into CSSM
4. CSSM performs a validity check
5. The consumed/used license is freed up
6. The Product Instance registration is deleted

Delete the License Reservation on the Device

On your device, perform the following:

```
Router#license smart reservation return all
This command will remove the license reservation authorization code and the device will
```

```
transition back to the unregistered state. Some features may not function properly.

Do you want to continue? [yes/no]: yes
Enter this return code in Cisco Smart Software Manager portal:
UDI: PID:ESR-6300-CON-K9,SN:FOC23032UVB
    CRi21J-Bvya2z-cDrUtB-8EyxuT-SYN68E-e5ises-Qi57ZE-Tg6GLv-fKb
Router#
*Oct 16 17:03:49.275 PDT: %SMART_LIC-5-EVAL_START: Entering evaluation period
*Oct 16 17:03:49.293 PDT: %SMART_LIC-6-EXPORT_CONTROLLED: Usage of export controlled features
 is not allowed
*Oct 16 17:03:49.296 PDT: %SMART_LIC-6-RESERVE_RETURNED: None License Reservation returned
 for UDI: PID:ESR-6300-CON-K9,SN:FOC23032UVB. Smart Agent is now unregistered.
Router#
```

Verify your command and take note of the return code:

```
Router# show license summary
Smart Licensing is ENABLED
License Reservation is ENABLED

Registration:
  Status: UNREGISTERED
  Export-Controlled Functionality: Not Allowed

License Authorization:
  Status: EVAL MODE
  Evaluation Period Remaining: 18 days, 8 hours, 27 minutes, 53 seconds

License Usage:
  License                 Entitlement tag                      Count      Status
  -----------------------------------------------------------------------------------
 Cisco ESR6300 Networ... (ESR6300_P_2G_E) 1     EVAL MODE

Router# show license reservation
License reservation: ENABLED

Overall status:
  Active: PID:ESR6300-K9,SN: FOC23232KC7
      Reservation status: NOT INSTALLED
      Export-Controlled Functionality: Not Allowed
      Last return code: CVsbTg-zEhpdp-YDaBGm-dg5Cms-qmGn7T-1BY3RQ-WnJEB1-cUbGB3-9WS
```

Uninstalling Specific License Reservation (SLR)

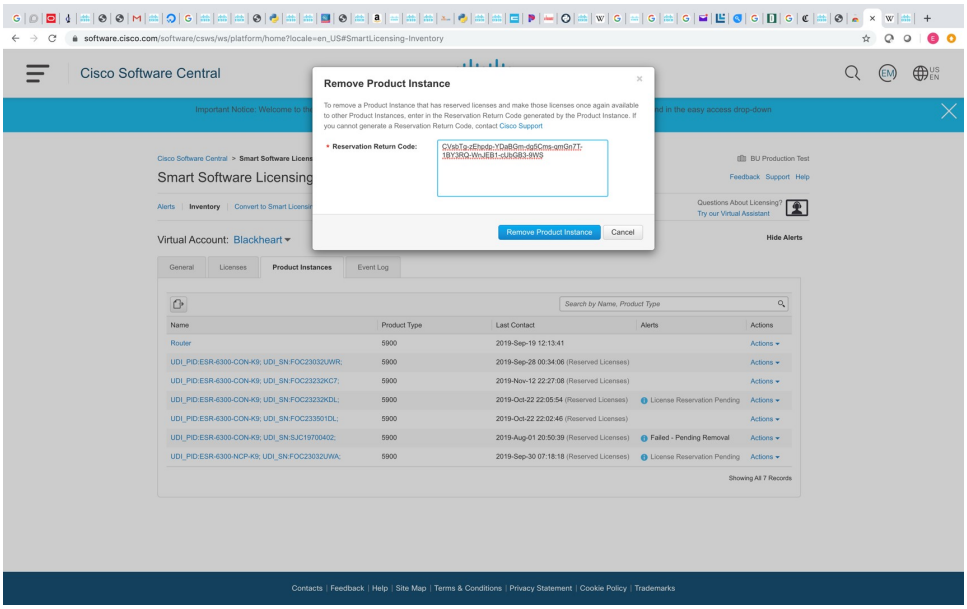
Log in to Cisco Smart Software Manager at https://software.cisco.com/#.

Click the **Inventory** tab. From the **Virtual Account** drop-down list, select your smart account.

From the **Product Instances** tab, for the device that you want to deregister, click **Actions**.

Locate the name of the UDI: PID: you are returning. Click **Remove**. The Remove Product Instance window appears.

Figure 12: Remove Product Instance

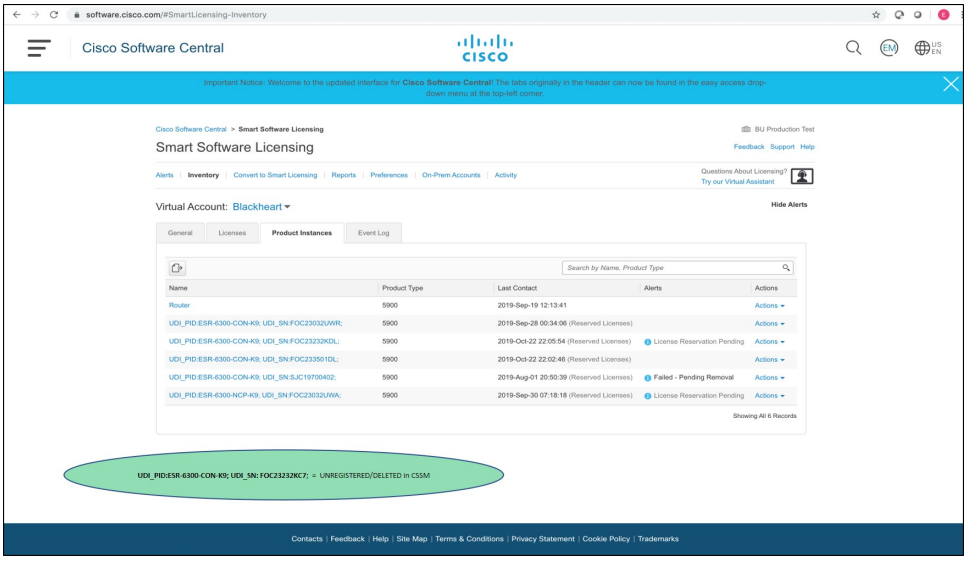


Enter the Reservation Return Code from your device.

Click **Remove Product Instance**.

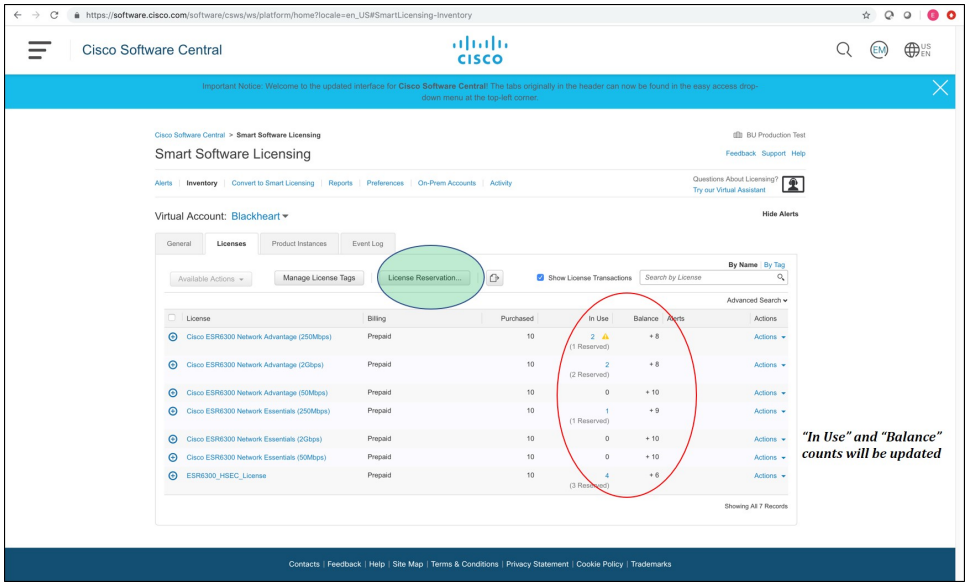
Cisco Smart Software Manager will return a message upon the successful removal of the product instance.

Figure 13: License Removed



Click on the License Reservation tab, and you can observe the In Use and Balance counts update.

Figure 14: License Counts



The task is now complete, and the license has been returned.

Additional Resources

For a more detailed overview on Cisco Licensing, go to cisco.com/go/licensingguide