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Introduction to Smart Licensing Using Policy Hands-On Lab

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Agenda



- Deployment Modes
 - Direct Access to CSSM
 - CSLU
 - SSM On-Prem
- Troubleshooting Smart Licensing
- Lab Details



Introduction



Smart Licensing Using Policy

- Smart Licensing using Policy first implemented in IOS-XE version 17.3.2.
- Policy determines the reporting frequency for each license type.

• Custom policies available for certain use cases based on contract agreements.



Difference between SL and SLP

Key Differences

Legacy Smart License (SL)

- Mandatory evaluation mode
- Registration to CSSM/satellite for compliance
- Licenses reported at regular intervals
 Registration & Report



Smart Licensing using Policy (SLP)

- No registration or evaluation mode
- Allows usage of un-enforced licenses
- Usage reports gathered and sent later



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RUM (Resource Utilization Measurement) report

- Generated by the Product Instance
- Generated for each license IN USE
- > Cisco authentic, cert-signed by the HW chip onboard
- > Can be pulled from the device via APIs or CLIs
- > Can be exported from the device to a file
- > May be accompanied by other requests (e.g. DLC or SLAC request)
- An ACK from CSSM may include RUM report IDs, authorization codes, trust codes, policy files

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RUM



Reporting: What data does Cisco care about?

Required dat	ta fields for SV	/ reconciliation period	er customer.	per product

UDI	HW Product serial number
SW	SW Unique ID SN
SW Package + Reg ID	Software product package and entitlement tag
Count	Software use count per license entitlement
Time and date stamp	Per license entitlement change and use

Device hostname is included in RUM reports in IOS-XE 17.9.1 onwards.

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SLP Policy (IOS-XE)



Default policy

- ✓ Unenforced Perpetual Licenses:
 - First report 365 days
 - Subsequent reports Not required
- ✓ Unenforced Subscription Licenses:
 - First report 90 days
 - Subsequent reports 90 days
- ✓ On license change:
 - Perpetual Within 90 days
 - Subscription Within 90 days

Custom policies available based on contract agreements (e.g. military/government devices)

#show license status
<...>

Policy:

Policy in use: Merged from multiple sources. Reporting ACK required: yes (CISCO default)

Unenforced/Non-Export Perpetual Attributes: First report requirement (days): 365 (CISCO default) Reporting frequency (days): 0 (CISCO default) Report on change (days): 90 (CISCO default)

Unenforced/Non-Export Subscription Attributes: First report requirement (days): 90 (CISCO default) Reporting frequency (days): 90 (CISCO default) Report on change (days): 90 (CISCO default)



Default Policy vs Custom Policy

Policy definition displayed in "show license all"

Custom Policy (Example)

Policy:

Policy in use: Installed On Jan 10 16:39:30 2023 CET Policy name: <CustomerName Policy> Reporting ACK required: yes (Customer Policy) Unenforced/Non-Export Perpetual Attributes: First report requirement (days): 365 (Customer Policy) Reporting frequency (days): 0 (Customer Policy) Report on change (days): 365 (Customer Policy) Unenforced/Non-Export Subscription Attributes: First report requirement (days): 365 (Customer Policy) Reporting frequency (days): 0 (Customer Policy) Report on change (days): 365 (Customer Policy) Enforced (Perpetual/Subscription) License Attributes: First report requirement (days): 0 (CISCO default) Reporting frequency (days): 0 (Customer Policy) Report on change (days): 0 (Customer Policy) Export (Perpetual/Subscription) License Attributes: First report requirement (days): 0 (CISCO default) Reporting frequency (days): 0 (Customer Policy) Report on change (days): 0 (Customer Policv)

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Default Policy

Policy:

Policy in use: Merged from multiple sources. Reporting ACK required: yes (CISCO default)

Unenforced/Non-Export Perpetual Attributes: First report requirement (days): 365 (CISCO default) Reporting frequency (days): 0 (CISCO default) Report on change (days): 90 (CISCO default) Unenforced/Non-Export Subscription Attributes: First report requirement (days): 90 (CISCO default) Reporting frequency (days): 90 (CISCO default) Report on change (days): 90 (CISCO default) Enforced (Perpetual/Subscription) License Attributes: First report requirement (days): 0 (CISCO default) Reporting frequency (days): 0 (CISCO default) Report on change (days): 0 (CISCO default) Export (Perpetual/Subscription) License Attributes: First report requirement (days): 0 (CISCO default) Reporting frequency (days): 0 (CISCO default) Report on change (days): 0 (CISCO default)

Authorization Code (SLAC) for HSEC



Applies

- to:
- ✓ ISR1000
- ✓ ISR4000
- ✓ C8200(L)
- ✓ C8300
- ✓ C8500(L)
- ✓ C8000v
- ✓ CSR1000v
- ✓ C9300X
- ✓ C9400X

- Required for any purchased export-controlled software
- > High Performance Security (HSEC) license
 - > To enforce a US export law that prevents selling/exporting devices capable of encryption > 250 Mbps to restricted countries.
- Requested from CSSM or installed at manufacturing
- License status change on the Virtual Account:
 - Available \implies Reserved (not included in RUMs)
- > SLAC can be returned (reserved license becomes available again)



Deployment Types

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SLP Direct Access

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SLP Connected directly to CSSM

Config on Product Instance

1. Smart Transport Config

(config) # license smart transport smart
(config) # license smart url default

2. Establish Trust with CSSM

license smart trust id <token-from-CSSM> all

(optional) If non-default trustpoint was configured:

Smart Transport is generally recommended.

Call-Home should work ... but it is legacy.

A single token can be used for multiple products, if it didn't expire.

(config) # ip http client secure-trustpoint SLA-TrustPoint

(optional) If VRF needs to be used:

(config)# license smart vrf <name>

For Smart Transport (17.9.x onwards)

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High Security (HSECk9) license



- Enforced license must be acquired before use
- Requires SLAC to be installed first.

ISR4000(config))#licen	se feature	hseck9	C	Applical	<mark>ole to</mark>	ISR1k/4k	and	Catalyst	8200/8300	Edge)
or											
C8000v# license	smart	authorizati	ion request	add	hseck9	local	(Applical	ole t	o Catalys	st8000v/930)0 <mark>x/94</mark> 00x)

*Mar 11 13:37:57.320: %SMART_LIC-6-AUTHORIZATION_INSTALL_SUCCESS: A new licensing authorization code was successfully installed on PID:C8000V,SN:99F5xxxxx *Mar 11 13:37:57.596: %SMART_LIC-6-EXPORT_CONTROLLED: Usage of export controlled features is allowed for feature hseck9

Cat8000#show license authorization

Overall status: Active: PID:C8300-2N2S-6T,SN:FDOxxxxxx Status: SMART AUTHORIZATION INSTALLED on May 08 08:45:52 2021 UTC Last Confirmation code: xxxxxx

SLP Connected directly to CSSM - connectivity test

- HTTPS connection to smartreceiver.cisco.com
 - Configure DNS or add static host entry
 - IP addresses might change (use nslookup, dig or similar utility)

Test connectivity with Telnet



\$ telnet smartreceiver.cisco.com 443 /ipv4 [/source-int <N>] [/vrf <M>]
Trying 146.112.58.81...
Connected to smartreceiver.cisco.com.
Escape character is '^]'.



SLP Connected directly to CSSM - Verification



SLP CSLU

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CSLU Functions

What is CSLU?

Cisco Smart License Utility can be deployed as micro service on Windows/Linux host

Can also be integrated as software component with controller-based products (e.g. Cisco Catalyst Center)

Able to deliver an on-line or offline connectivity model for the license data.



CSLU Different Form Factor





CSLU Key Functions

Administer all licenses and their associated device

Sends authorization code requests to CSSM, receives authorization codes from CSSM and can install authorization codes on a device

Collects usage reports from the device and upload these usage reports to SA/VA in CSSM

The RUM report ACK from CSSM is collected online, or offline, and provided back to a device



CSLU Preferences (Administration Panel)

references		1 Switch CSLU between Online or
CSSM Connectivity	CSLU Connectivity	Offline Mode.
CSLU in online mode	Device Service Port * 8182	2 Select Smart Account
10	REST API Port * 8180	3 Select Virtual Account
	Smart Account SDWAN LabTests 2 Smart Account	4 Validated Device: Check to
285M Retry Interval * 900	Virtual Account	prevent PI to be created on receipt of
CSSM URL * https://swapi-stage0.cisco.com/services/api/smart-accounts-and-licensing/v2/	SLE_Routing_Demo	usage report
HTTP PROXY HOST http://proxy.esl.cisco.com:80	Validate Device	5 Default connection method as
Dauth URL Dauth URL	Device Initiated 5 Push Mode	Device Initiated (Push)
mpar/course-real-cisco-connearionent.onunz	CSLU Initiated - NETCONF	OR
	CSLU Initiated - RESTCONF 6 Pull	





(config) # ip http client source-interface <interface>

SLP Connected through CSLU – Pull Mode

Config on Product Instance

1. CSLU URL Config

(config)# license smart transport cslu

(optional) configure HTTP client source interface

(config) # ip http client source-interface <interface>

(optional) if NETCONF is used

(config) # netconf-yang

(optional) if RESTCONF is used

(config) # ip http secure-server (config) # restconf (config) # ip http authentication local

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Config on CSLU for Pull Mode

1. Add devices manually in CSLU or perform bulk upload with .csv file

Add Product	
Host Identifier	
Host * 172 10 11 2	
Connection Method	
CSLU Initiated - NETCONF	
CSLU Initiated - RESTCONF	
CSLU Initiated - REST API	

2. Select Product Instance(s) and click "Collect Usage

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CSLU with HTTPS

• Collect CSLU certificate from CSLU (<working_dir>/conf) and upload it to the IOSXE device

Product Instance Service Port * 8182		This	s PC → Local Disk	(C:) > Users > Administrat	or > AppData > Roamin	ng > CSLU > conf	
REST API Port* 8180	÷		Name	^	Date modified	Туре	Size
	,		cslu.conf		4/24/2021 10:35 AM	CONF File	2 KI
mart Account			🔄 cslu.crt	N	12/4/2020 1:03 AM	Security Certificate	2 KI
		1	cslu.key	Type: Security Certificate	4/2020 1:03 AM	KEY File	2 KI
/irtual Account	:5	*		Size: 1.06 KB			
		*		Date modified: 12/4/2020 1:0	3 AM		
Validate Device							
SLU Working Directory							

Router(config)#crypto pki trustpoint CSLU Router(ca-trustpoint)#enrollment terminal

```
Router# more bootflash:cslu.crt
<base 64 encoded certificate displayed>
```

Router(config) #crypto pki authenticate CSLU

```
Enter the base 64 encoded CA certificate.
-----BEGIN CERTIFICATE-----
<...>
-----END CERTIFICATE-----
```

```
% Do you accept this certificate? [yes/no]: yes
% Certificate successfully imported
```

Router(config) #license smart url cslu https://<IP-addr>:8543/cslu/v1/pi

- Create a new trustpoint on the device
- · Display the contents of the .crt file
- Import the CSLU certificate under the new trustpoint
- Configure CSLU URL using HTTPS and port 8543

SLP SSM On-Prem

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SLP Connected through On-Prem



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From On-Prem

https://<On-Prem-FQDN>/cslu/v1/pi/TAC-Workshop-6

Press ctrl + c to copy selected text to clipboard.

1. CSLU URL Config

(config)#license smart transport cslu
(config)#license smart url cslu https://<On-Prem-FQDN>/cslu/v1/pi/TAC-Workshop-6

2. Disable revocation check

Config on Product Instance

(config) #crypto pki trustpoint SLA-TrustPoint
(ca-trustpoint) # revocation-check none

3. CLI to Push RUM Report

license smart sync all

(optional) configure HTTP client source interface

(config) # ip http client source-interface <Interface-Name>

No CRL check for TLS certificate self-signed by On-Prem

On-Prem: Registration URL vs CSLU Transport URL

nart Software Manager On-F	Prem > Smart Licensing	TAC-Workshop 👻
Smart Licensi	ng	
Alerts Invento	Convert to Smart Licensing Reports Preferences Activity	
Local Virtual Account:	Default	
General	Licenses Product Instances SL Using Policy Event Log	
Local Virtual Account		
Description	This is the default virtual account created during company account creation.	
Default Local Virtual Ac	count: Yes	
Product Instance Regis The registration tokens below For products that support Sm "destination address http" on New Token	tration Tokens r can be used to register new product instances to this Local Virtual Account. For products that support Smart Transport, you must configure the "license smart url" on the product to use the Sant Licensing Using Policy that use cslu as transport, you must configure the "license smart transport cslu" to use the CSLU Transport URL. For legacy products that still use Smart Call Home to use the product to use the product to use the product to use the sant Call Home Registration URL. The recommended method is Smart Transport. Please consult your Products Configuration Guide for setting the destination URL value.	mart Transport Registration URL. , you must configure the lue.
	Standard SL (Call Home) https://ssm1-lab.cisco.com/cslu/v1/pi/TAC-Workshop-6	Standard SL nart Transport)

https://ssm1-lab.cisco.com/Transportgateway/services/DeviceRequestHandler

https:// ssm1-lab.cisco.com /SmartTransport

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On-Prem: Host Common Name





On-Prem: Tenants & Local Accounts



On-Prem: Account sync vs SLP license usage sync

- Admin workspace -> Synchronization
 - Every 30 days or on-demand
 - Standard SL + license count
 - RUM reports for SLP are not included

m Admin	Workspace			cisco	
oftware N	lanager On-Prem	ı			
S	nchronization				8
	Accounts	Schedules	Event Log		
Settings				0	Major 0 Minor
	Sync Selected			workshop	Q
**	Select number of records 10	 Showing Page 	1 of 1 (10 Records) < >		
Support	Name	Satellite Name	Last Synchronization Synchronizati	on Due Alerts	Actions
Center	TAC-Workshop	TAC-Workshop	2023-Jan-23 00:00:20 2023-Feb-22 00	0:00:20 Synchronization Successful	Actions
	Select number of records 10	▼ Showing Page	1 of 1 (10 Records) < >		Disable Scheduled Sync
Synchroniz					Data Privacy
					Network Synchronization

- Licensing workspace -> Reports tab
 - SLP usage sync (1:01 AM daily)
 - Manual: "Synchronize now with Cisco"

Alerts	Inventory	Convert to Smart Licensing	Reports	Preferen
Reports				
Reports	Usage Sche	dules		
Synchronizati	on schedule with Cisc	Synchronization	null schedule with the	devices
Synchronizatio	on schedule with Cisc	co Synchronization	pull schedule with the	e devices
Synchronization Synchror	n schedule with Cisc	synchronization	pull schedule with the	e devices
Synchronization Synchron Schedule sync	on schedule with Ciscon ization schedu chronization for speci	so Synchronization	pull schedule with the	e devices
Synchronization Synchron Schedule syn Synchronizy	n schedule with Cisco	so Synchronization	pull schedule with the	e devices
Synchronizatio Synchron Schedule syn Synchronize	n schedule with Cisco nization schedu chronization for speci e now with Cisco	Synchronization	pull schedule with the	e devices
Synchronization Synchron Schedule syn Synchronization Days	n schedule with Cisco	Synchronization	pull schedule with the	e devices
Synchronization Synchron Schedule syn Synchroniz Days	In schedule with Cisco	Synchronization Ile with Cisco fied times	pull schedule with the	e devices

On-Prem: SLP Sync with CSSM (demistyfied)

- RUM report sent to OnPrem
- Product Instance starts polling for ACK
- OnPrem syncs daily with CSSM (obtains ACK for pending RUMs)
 - or manual sync through "Synchronize with Cisco"
- OnPrem responds with ACK upon next check from Product Instance



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HSECk9 via SSM On-Prem



CSSN

- Make Product Instance known to SSM On-Prem and CSSM:
 - 1. Push RUM report to SSM On-Prem
 - 2. Perform SLP sync with CSSM
 - 3. Wait for ACK on Product Instance
- [CSSM] Generate Auth Code for Product Instance, save it as Auth File
- > [SSM On-Prem] Import Auth File
- > [Product Instance] Trigger SLAC request

```
license feature hseck9
    or
license smart authorization request add hseck9 local
```

Automated through Bulk Auth (available in SSM 8-202206 and IOS-XE 17.7.x)

Usage sync

ACK

SSM On-Prem

ACK

SSM On-Prem already has the Auth Code (Auth File) and will respond



Troubleshooting Smart Licensing





Is it a Smart Licensing problem?

- Identify the actual troublemaker
- More than one layer might be causing the issue





Useful IOS-XE commands for troubleshooting SLP

- show license status
- show license summary
- show license all
- show license tech support
- show crypto pki trustpoint

One-stop-shop output

show tech license

- TIP
- show license eventlog [days] SL related events
- show license history message Messages exchanged with CSSM / SSM On-Prem

Licensing communications details

 View messages (XML format) sent between device and CSSM / SSM On-Prem

show license history message Message History (oldest to newest): Trust Establishment: Usage Reporting: Result Polling: Authorization Request: Authorization Return: Trust Sync:

- Did the device send the request?
- Was the response received?
- Any errors reported?

Lab Details



Scenarios

- Direct Access to CSSM (Connected Mode)
- Working with CSLU
 - Push/Pull
 - Online/Offline mode
- Air-gapped device (Offline Mode)
- CSSM On-Prem
- Troubleshooting Challenge

Hands-on Time!



Wrapping up...



Key Takeaways

- In SLP all unenforced licenses are authorized by default
- RUM report created for each license in use
- License reporting intervals determined by policy
- By default the SLP transport refers to CSLU modify as needed
- Smart Transport preferred over Call Home
- Verify connectivity before claiming licensing problem
- "License factory reset" is the last resort remedy (reload required)



Thank you

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