



Deploying Cisco Industrial Network Director (IND) with Cisco ISE using pxGrid

About this document

This document is for Cisco Engineers and Customers deploying Cisco Industrial Network Director (IND) Release 1.3 or greater with Cisco Identity Services Engine (ISE) version 2.4 using pxGrid (Platform Exchange Grid). The reader should have some familiarity with ISE and IND and pxGrid.

Cisco IND is registered with pxGrid as a publisher and publishes information on endpoint attributes to ISE for IOTASSET Dictionary.

This document covers the registration process which involves importing a certificate from IND into ISE and also generating a self-signed certificate on ISE and then importing that certificate into IND. ISE features an Internal Certificate Authority(CA) for deploying pxGrid certificates.

Technical Details

Cisco IND is a Network Management tool for Industrial Networks which can detect Industrial endpoints such as PLC, HMI, I/O drives etc. IND also collects device attributes from these devices by communicating over Native protocols CIP, Profinet, Modbus etc.

Cisco IND can register with ISE and push the device attributes for these Industrial endpoints using pxGrid. IND will be acting as a pxGrid publisher and ISE as a pxGrid subscriber

Cisco IND pushes endpoint attributes such as assetID, assetDeviceType, assetMacAddress, assetIpAddress, assetProductID, assetProtocol, assetVendor, etc, and ISE subscribes to this information into "IOTASSET" Dictionary for the same attributes. ISE can use these attributes to Profile the Industrial endpoints based on Vendor, Type and location etc to apply Policies based on Organizational Security requirements.

Importing/Generating Certificate from ISE to import on IND

There are 2 methods to generate Certificate for ISE that needs to be imported into IND, first is using ISE Internal CA Authority and the second method is using External CA Authority, we will discuss both methods below.

Method 1: Generating Certificate using ISE Internal CA Authority

Note: The Instructions below shows generating Certificate using PKCS12 format, we can also generate certificate in .PEM or .CER format and import on IND

Generating Certificate for ISE that can be imported to pxGrid clients such as IND etc

Step 1 Select **Administration > pxGrid Services > Certificates** and enter the relevant information as shown below

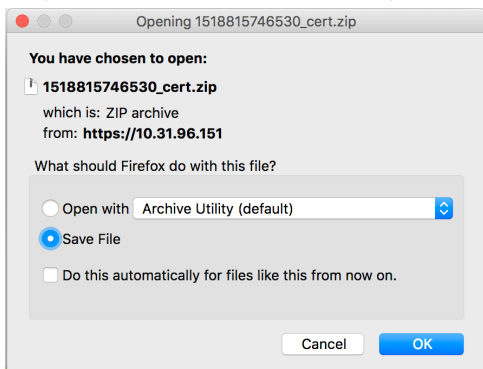
The screenshot shows the 'Generate pxGrid Certificates' page in the Cisco ISE Administration console. The fields and their corresponding instructions are:

- I want to:** Generate a single certificate (without a certificate signing request) - Select option to generate certificate without sign request
- Common Name (CN):** INDISE_Certificate - Give a name to certificate
- Description:** pxGrid Certificate to be imported by IND - Enter a description
- Certificate Template:** PxGrid_Certificate_Template
- Subject Alternative Name (SAN):** IP address, 10.31.96.151 - IP address of ISE
- Certificate Download Format:** PKCS12 format (including certificate chain; one file for both the certificate chain and key) - Select PKCS12 format for the certificate
- Certificate Password:** [Redacted] - Certificate password, which needs to be entered on IND when importing into IND
- Confirm Password:** [Redacted]

Buttons: Reset, Create. Status: Connected to pxGrid ise-ind-demo.cisco.com

Step 2 Click **Create**

Step 3 Click **OK** to save the .zip file and extract the certificate onto the local drive

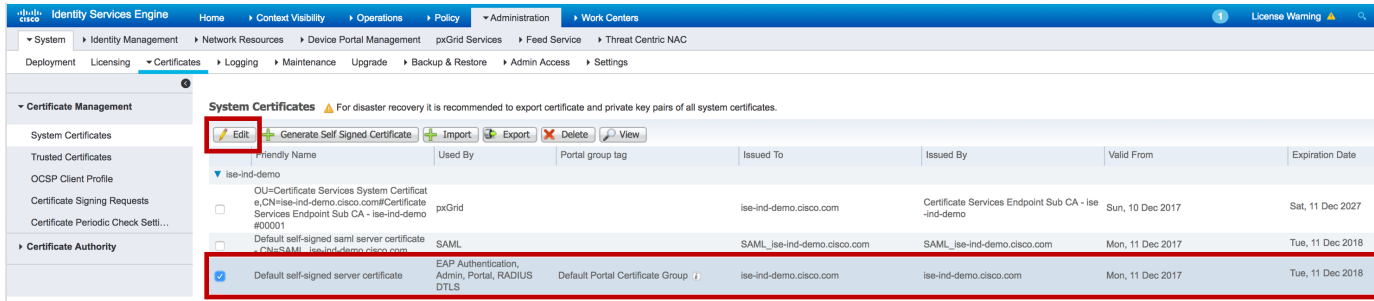


Method 2: Import Certificate from ISE using External CA Authority

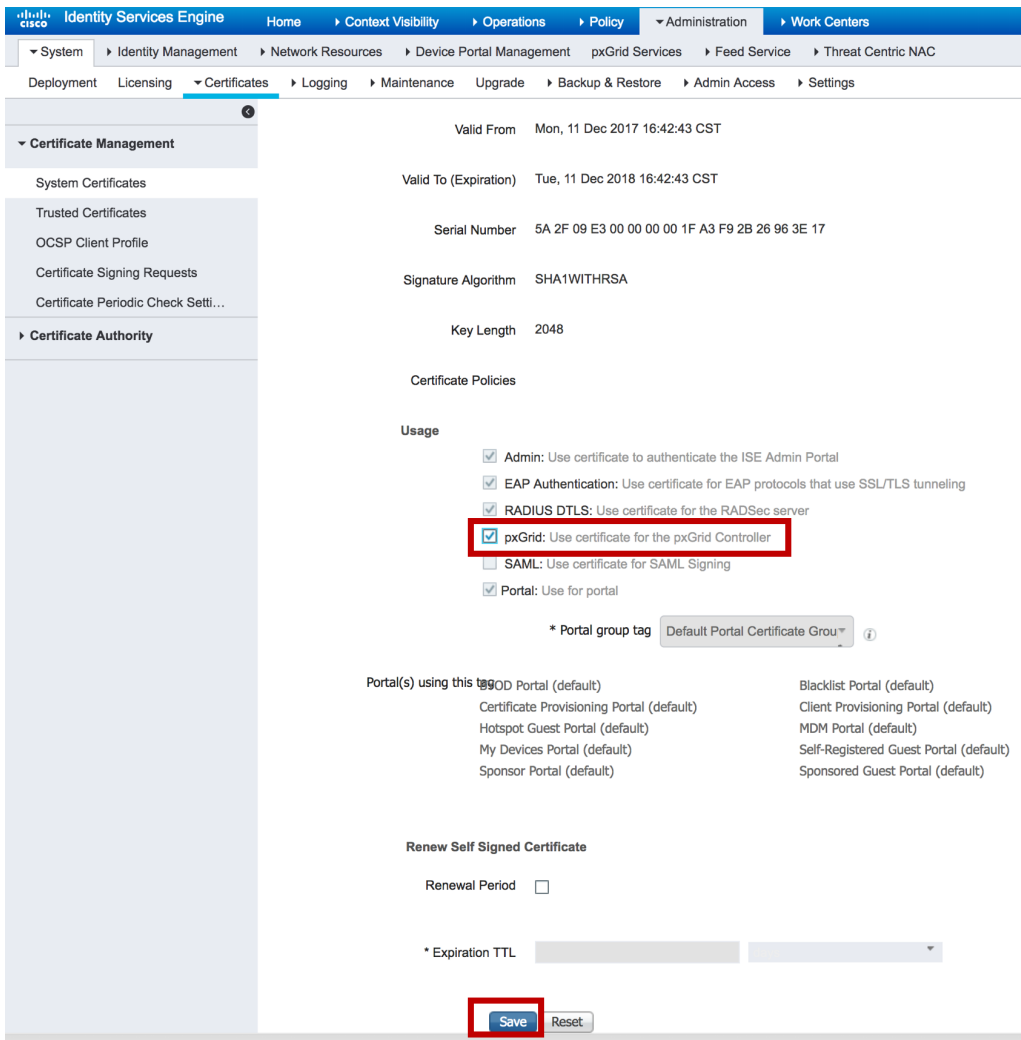
Note: Only use this method if you are using External CA Authority.

Technical Details

Step 1.1 On ISE Navigate to the page **Administration > System > Certificates > System Certificates** and select the certificate from External CA and click **Edit**.

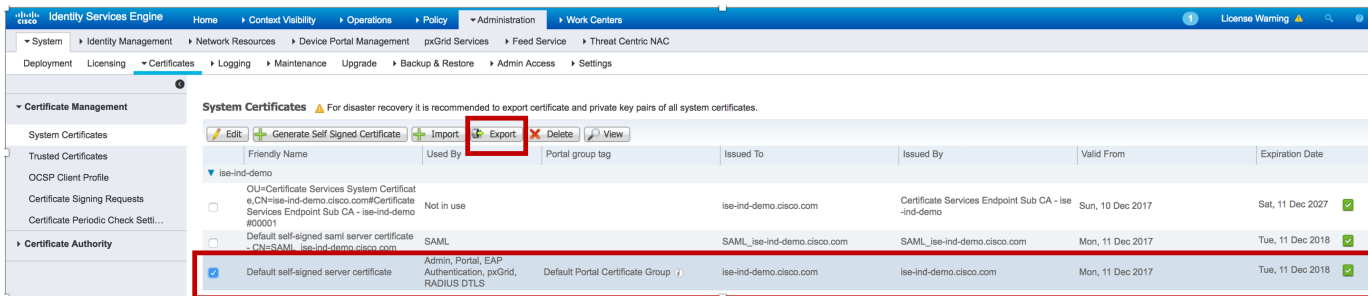


Step 1.2 Enable pxGrid on this certificate to be used by pxGrid clients by selecting **pxGrid** option and then click **Save** as shown below.

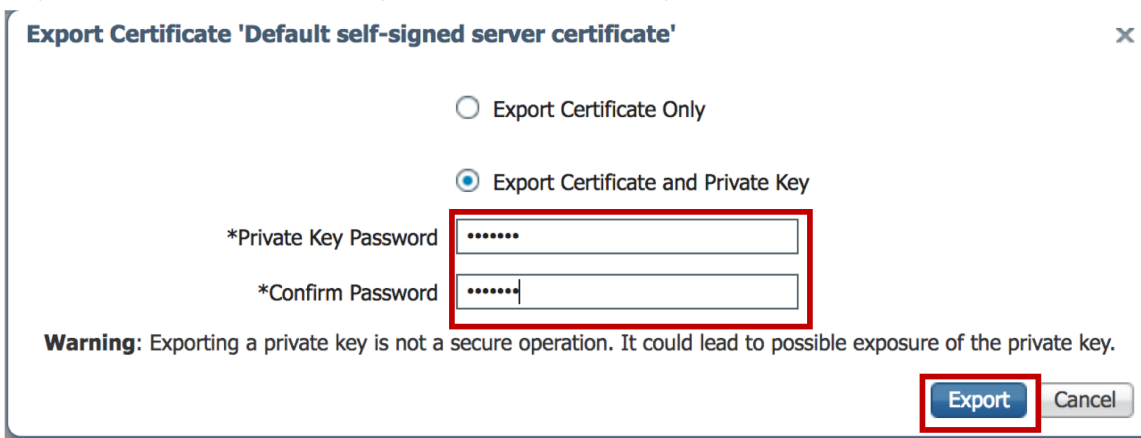


Step 1.3 Export the certificate by selecting the certificate and click **Export**.

Technical Details



Step 1.4 Enter the **Private Key Password** and Click **Export** for the certificate and confirm as shown below.

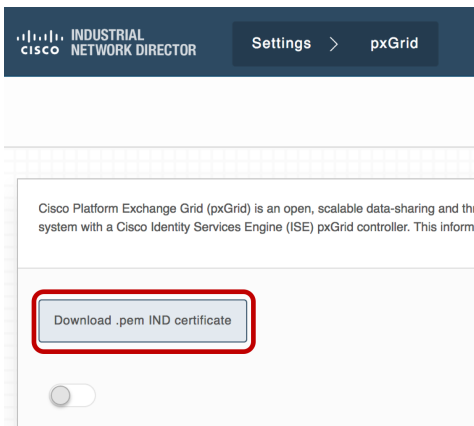


Step 1.5 Save the certificate to be used in later steps to import into IND.

Downloading Certificate from IND

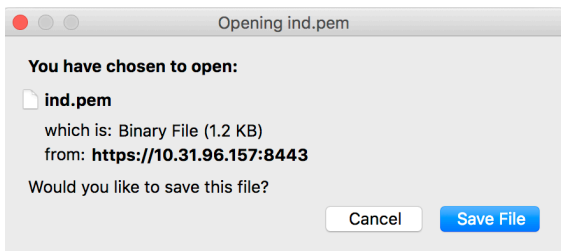
Step 4 On IND UI Navigate to the page **Settings > pxGrid**

Step 5 Click on **Download .pem IND Certificate** as shown below



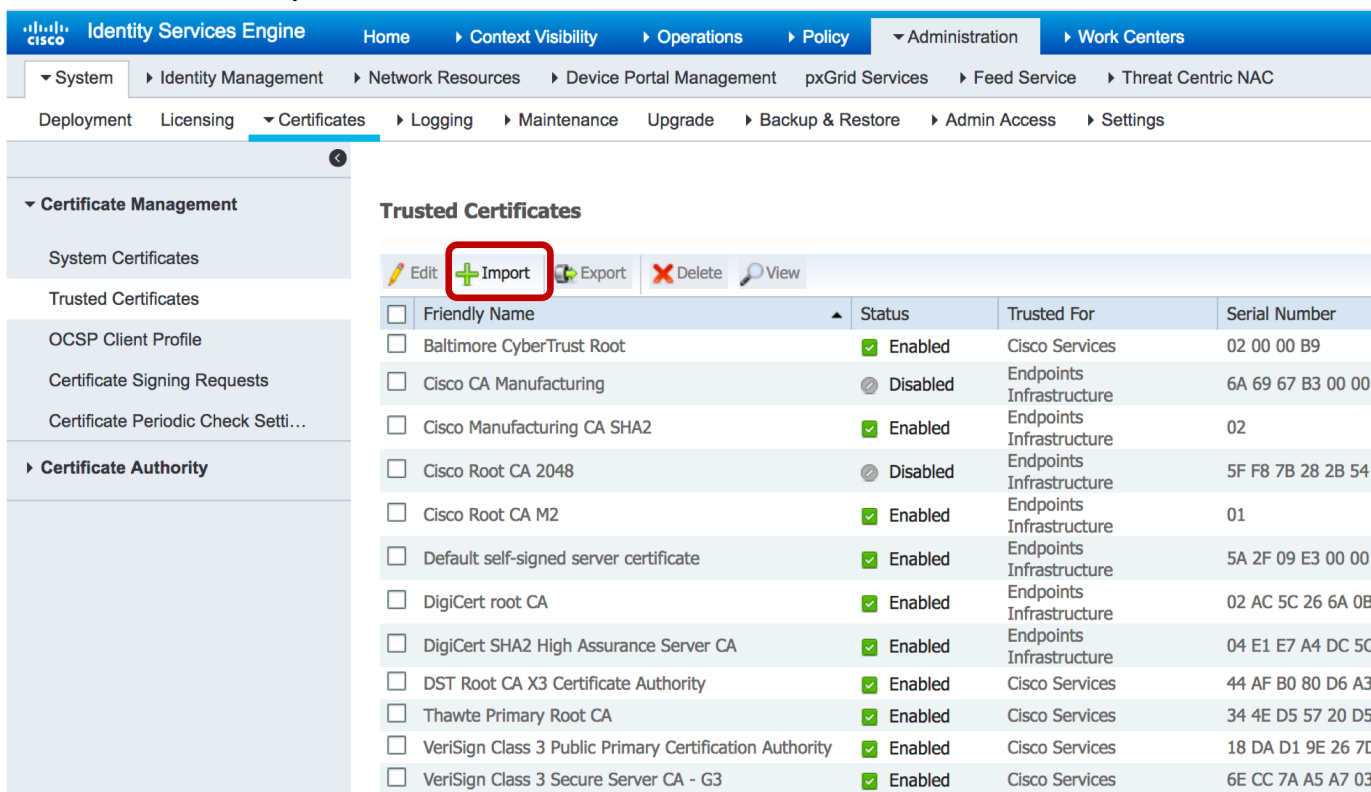
Step 6 Save ind.pem file to the local disk by clicking on **Save File**

Technical Details

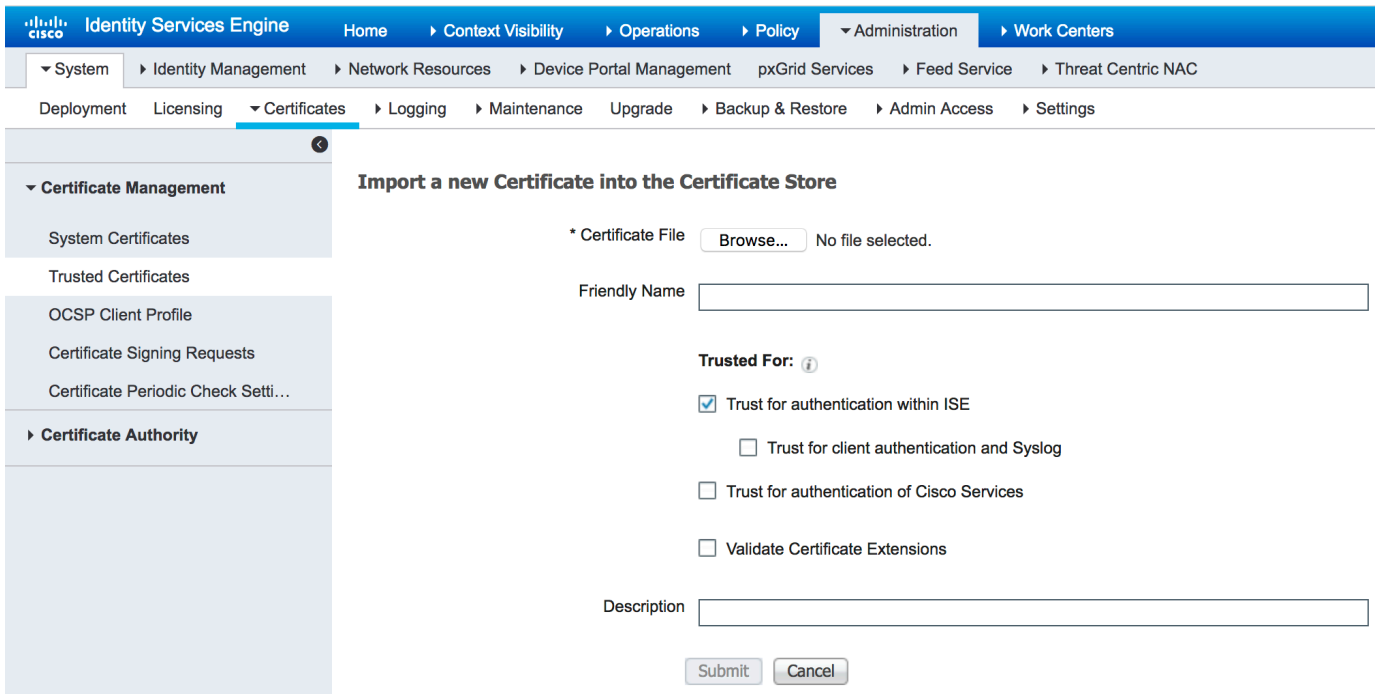


Import IND Certificate into ISE, this certificate will allow ISE to bulk download asset information from IND

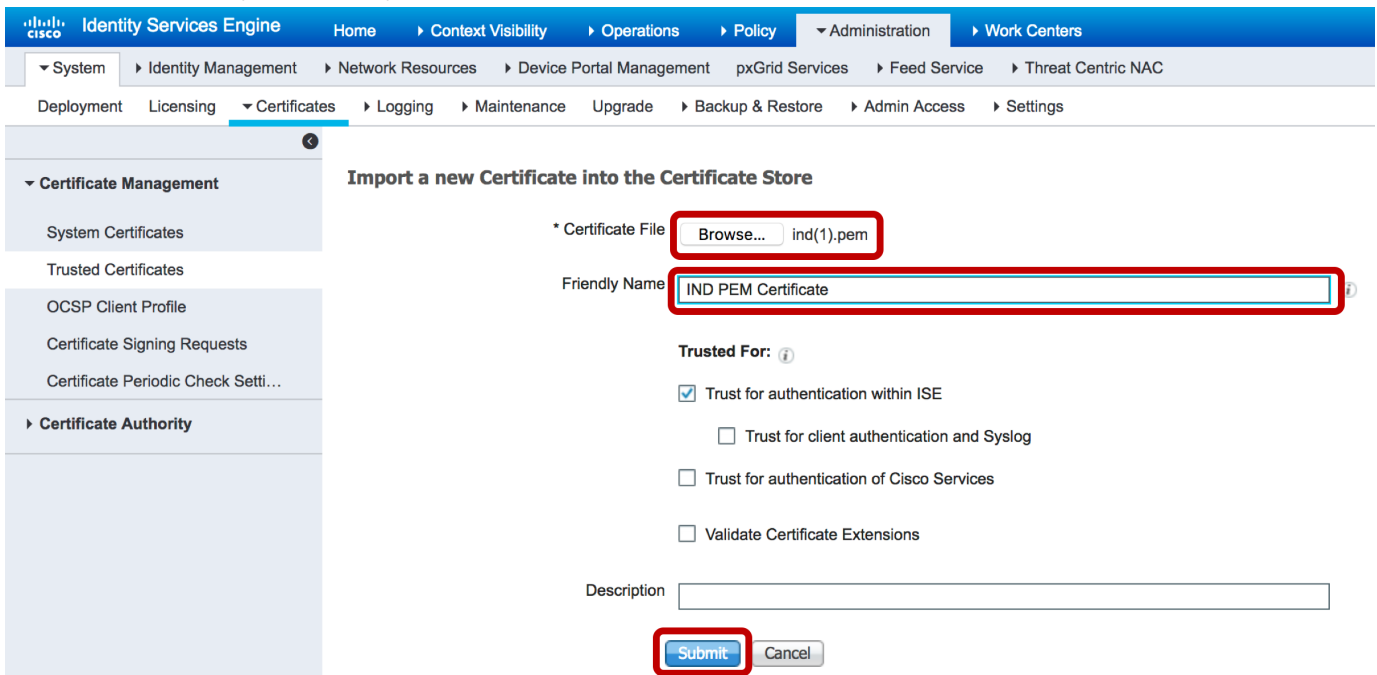
Step 7 On ISE, Navigate to **Administration > System > Certificates > Certificate Management > Trusted Certificates** and click **Import** as shown below



Step 8 ISE will prompt you to import the Certificate into Certificate store

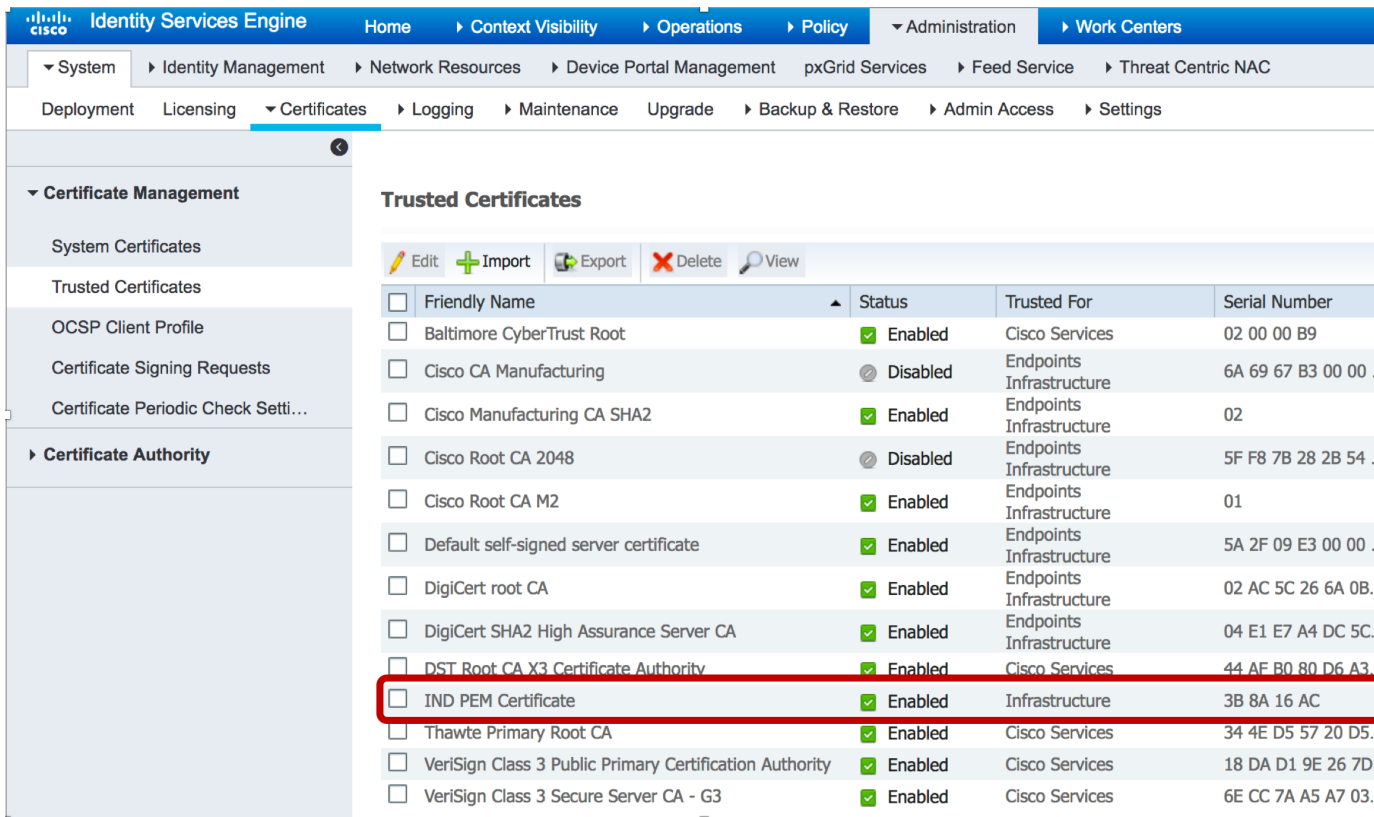


Step 9 Click **Browse** to select the ind.pem file on local disk from Step 6, give a name to the certificate and click **Submit** to complete the import of the certificate.



Step 10 Import completed, see the list for certificate from IND on ISE as shown below

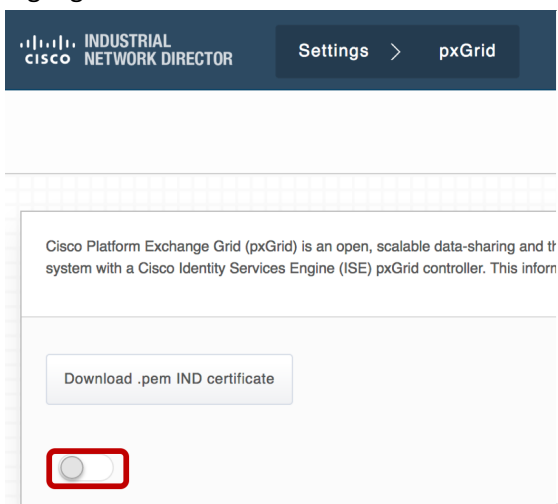
Technical Details



Complete IND Registration with pxGrid

Import Certificate from ISE to IND

Step 11 On IND UI, navigate to the page **Settings > pxGrid** and click/slide the toggle to enable pxGrid as highlighted below in red.



Step 12 IND will prompt to enter details of ISE server.

Technical Details

INDUSTRIAL NETWORK DIRECTOR Settings > pxGrid

pxGrid

Enable pxGrid- Settings

Connect Using the Existing Node
 Register a New Node

ISE Server

Server *

Node Name *

Certificate Password

Cancel Upload Certificate

Step 13 If this is the first time you are registering IND with pxGrid, select **Register a New Node** and enter ISE server details and certificate password from Step 1 as shown below and click **Upload Certificate**.

INDUSTRIAL NETWORK DIRECTOR Settings > pxGrid

pxGrid

Enable pxGrid- Settings

Connect Using the Existing Node
 Register a New Node

ISE Server

Server *

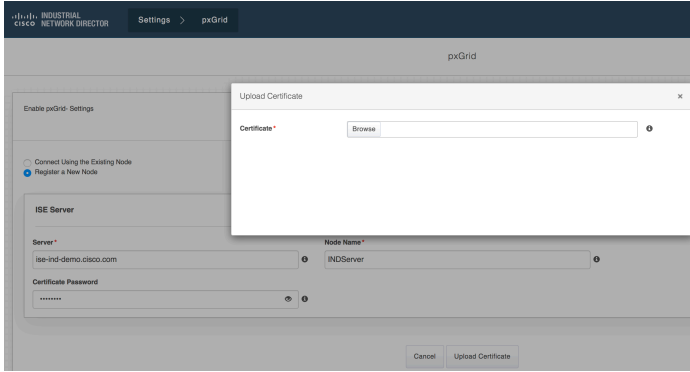
Node Name *

Certificate Password

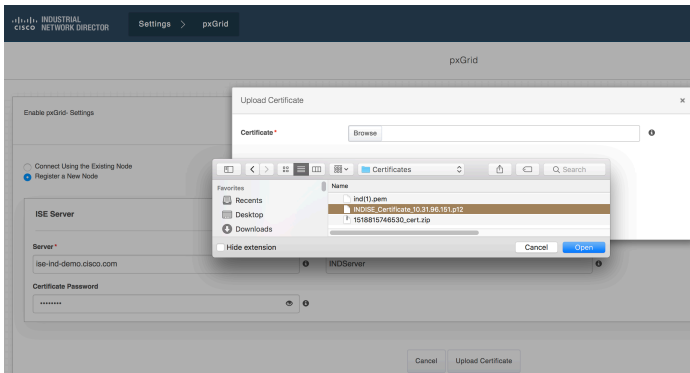
Cancel Upload Certificate

Step 14 Window pops up to select the certificate.

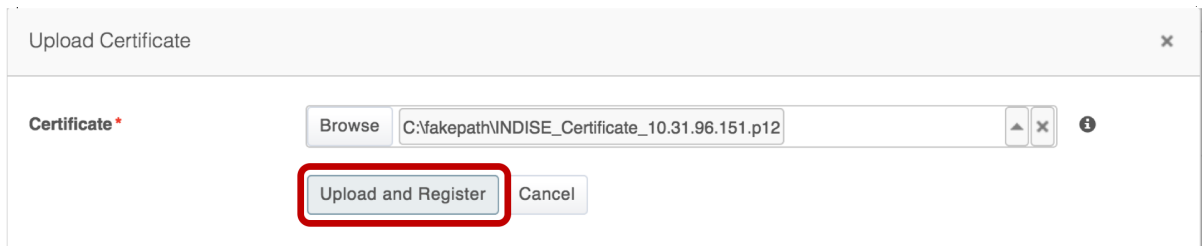
Technical Details



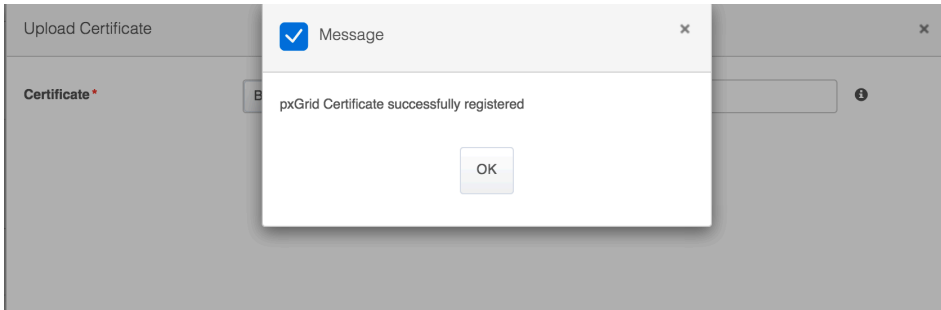
Step 15 Click **Browse** and select the certificate from local disk saved in Step 3.



Step 16 Click **Upload and Register** as shown below.

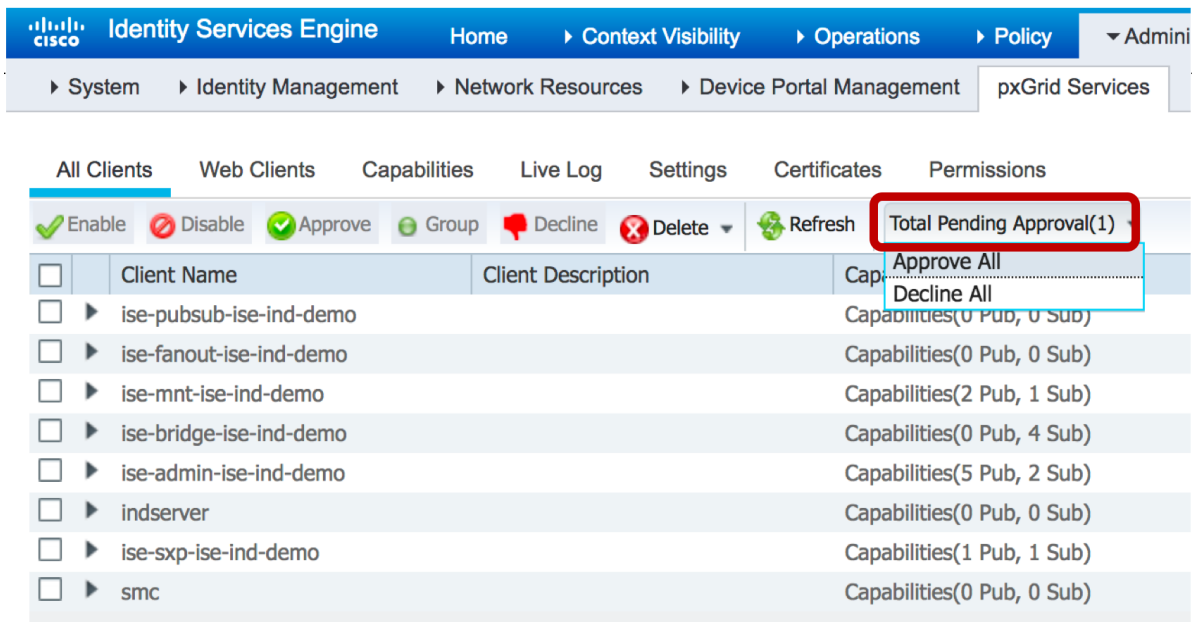


Step 17 pxGrid certificate should be registered successfully look for below message and click **OK**.

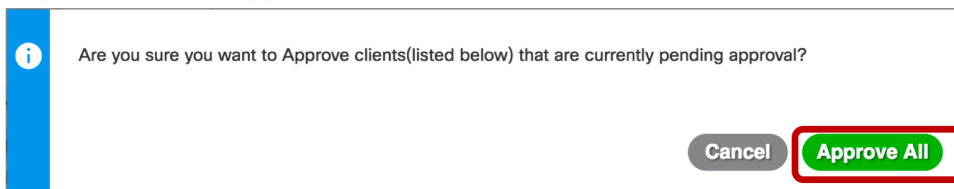


Approve IND Request on ISE

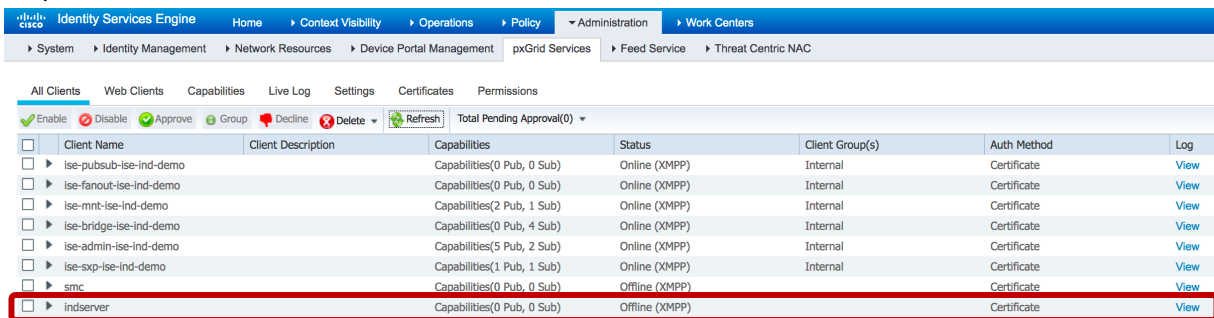
Step 18 On ISE Navigate to **Administration > pxGrid Services > All Clients**, you should see a request for Pending Approval as **Total Pending Approval (1)** as shown below, Click on **Total Pending Approval (1)** to see a drop down and click on **Approve All** to approve the request from IND.



Step 19 Click on **Approve All** as shown.

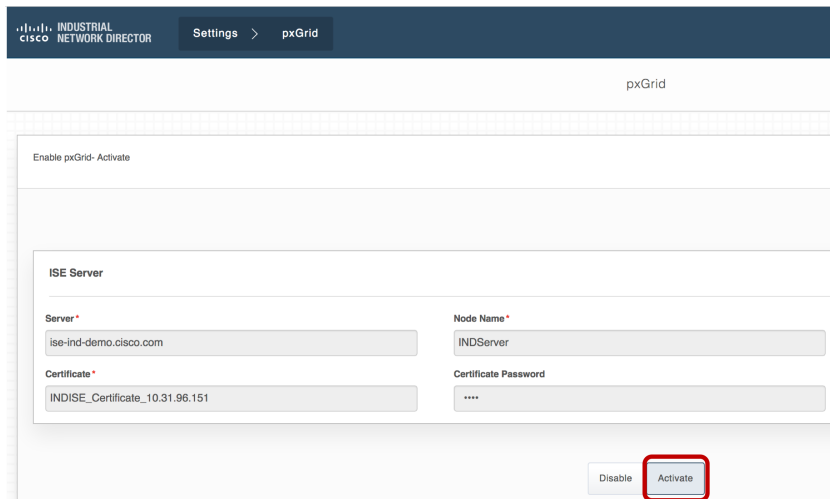


Step 20 You should see IND on the list of clients as shown below

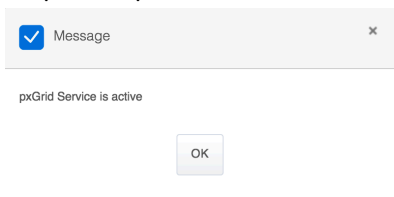


Activate pxGrid on IND

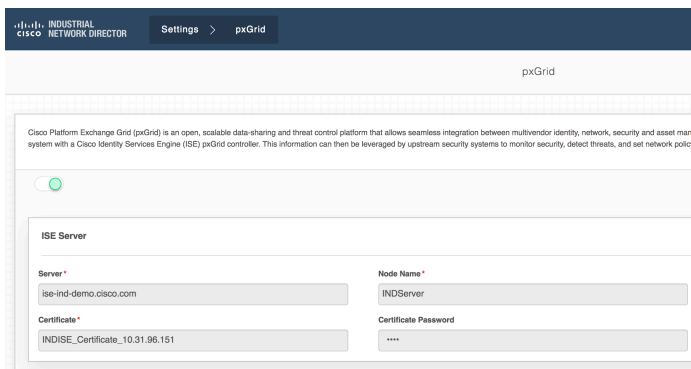
Step 21 Go back to IND and activate, Navigate to **IND > Settings > pxGrid** and click on **Activate** as shown below.



Step 22 pxGrid becomes active as shown below.



Step 23 Completed pxGrid registration and activation on IND, pxGrid page on IND should look as shown below.



Verify if IND is sending endpoint attributes to ISE

If IND send device attributes you should be able to find attributes on ISE endpoint attributes

Step 24 On ISE Navigate to **Context Visibility > Endpoints**, select an endpoint and look for attributes as shown below, these are the additional attributes supplied by IND for Industrial endpoints and can be used in ISE Profiling policies.

Cisco Identity Services Engine	
TotalFailedTime	5
UseCase	Host Lookup
User-Fetch-User-Name	00-1D-9C-CC-84-53
User-Name	001d9ccc8453
UserType	Host
allowEasyWiredSession	false
assetConnectedLinks.assetDeviceType	Switch
assetConnectedLinks.assetId	40109
assetConnectedLinks.assetIpAddress	192.168.119.116
assetConnectedLinks.assetName	IE4000-1
assetConnectedLinks.assetPortName	FastEthernet1/5
assetDeviceType	HMI
assetGroup	Barcelona_Plant > Cell-1
assetId	40110
assetIpAddress	192.168.119.33
assetMacAddress	00:1d:9c:cc:84:53
assetName	192.168.119.33
assetProductId	PanelView Plus_6 100
assetProtocol	CIP
assetSerialNumber	12551566
assetVendor	Rockwell Automation/Allen-Bradley
e041a910-0085-11e8-9661-82afacd4c1d2	Barcelona_Plant > Cell-1
ip	192.168.119.33
operating-system	Microsoft Windows Mobile 5.0 - 6.1 or Zune audio player (firmware 2.2)
operating-system-result	Microsoft Windows Mobile 5.0 - 6.1 or Zune audio player (firmware 2.2)

References

[Cisco ISE Configuration guides](#)

<https://www.cisco.com/c/en/us/support/security/identity-services-engine/products-installation-and-configuration-guides-list.html>

[Cisco IND Configuration guides](#)

<https://www.cisco.com/c/en/us/support/cloud-systems-management/industrial-network-director/tsd-products-support-series-home.html>

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