Radiflow

# RADIFLOW ISID THREAT DETECTION SYSTEM INTEGRATION WITH CISCO ISE

# CONFIGURATION GUIDE

Radiflow

# Contents

## Executive Summary

This document describes this integrated solution, which offers the ability to leverage Cisco ISE's platform with the Radiflow iSID provided comprehensive asset inventory of the devices in the industrial network, including detailed asset information (such as device type, software/firmware version, etc).

In addition to that, that integration will allow enforce threat containment and prevention via integration with Adaptive Network Control (ANC) component while anomaly traffic or cyber threat will be detected by ISID.

iSID data in conjunction with the Cisco ISE platform enables creation and enforcement of a range of access policies to manage network security in flexible and dynamic way specifically in OT environments.

## Introduction

Radiflow iSID can be integrated with Cisco Identity Services Engine (ISE) in order to enrich the security enforcement capabilities of the network with contextual data from the OT operations.

Cisco ISE allows customers to provide highly secure network access to users and devices. It helps to gain visibility into what is happening in network, such as who is connected, which applications are installed and running, and much more. That visibility enables to enforce various security and access policies across the network.

iSID's Deep Packet Inspection engine is able to identify industrial assets on running industrial processes without the need for active discovery which would carry the risk of interrupting operations. iSID is able to supply this OT contextual data to Cisco ISE using the pxGrid API. ISE can use this OT asset information to apply Adaptive Network Control (ANC) policies which can be used to orchestrate appropriate levels of network access and security controls on a per device basis. The data shared by iSID can be propagated to other pxGrid integrated products in order to further enhance capabilities.

iSID-ISE integrated solution allows extended OT asset visibility and OT environment specific threats detection to manage and enforce customer-defined access policies in operational environments.

This guide is intended for ISID's users which required to integrate with Cisco ISE infrastructure.

# Solution Overview

iSID - Cisco ISE integration combines the following capabilities and functionality to powerful OT network detection and policy enforcement solution:

- OT Asset information, communication patterns and network anomalies gathered and detected by ISID,
- ISID detection of sensitive OT management commands,
- ISE policy engine that allows network engineers to set up policies according to specific cyber security policy,
- Authorization and authentication capabilities to control access to the network per device,
- Utilization of Cisco pxGrid framework for ISE integration,
- ISE Adaptive Network Control capabilities to enforce quarantine policy for rogue endpoint,
- More.

All these were integrated together to allow secure and resilient functionality of operational networks along with quick and timely response to potential cyber threats.

The Integration was tested on following ISID and ISE versions:

ISE – v 2.4 and higher, pxGrid – 2.0

ISID – v6.2.2.10 and above

# Use Cases

## OT policy creation and enforcement based on Radiflow iSID Device Information

ISE receives enriched data about the OT device, and will process it according to the profiles and policies which have been configured. The following use cases and their associated benefits are available:

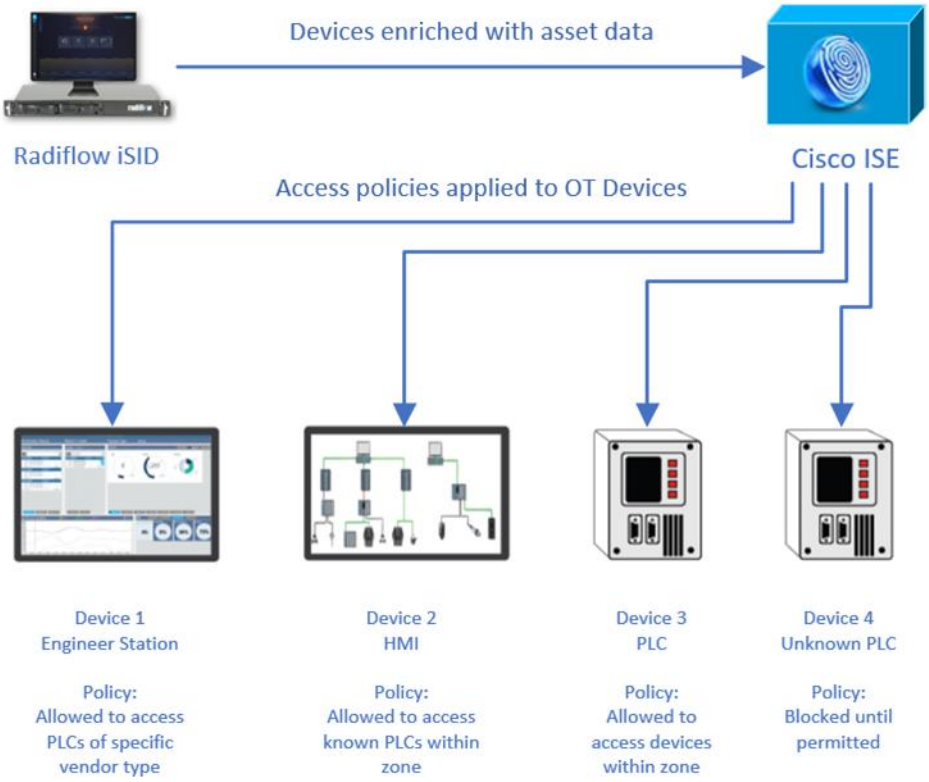
a. Enrich data in ISE with OT specific insights available with iSID's DPI engine. This will enable better administration and decision making within ISE by providing additional context.
b. b. Categorise devices by their type/function within the OT environment, and apply a default access policy based on this data. This can also be configured based on the detected IEC 62443 zone of the device. This will ensure that devices are quickly provisioned with an appropriate basic level of access to and protection on the network, and also allows appropriate/desired segmentation between the IT and OT networks.

## Policy Defined Segmentation

Devices can also be manually categorised by business process. Applying access policies to specific business processes can enable automatic micro-segmentation use cases. It can also be used to split networks into areas of separate administrative responsibility, ensuring engineers have access only to devices they are authorised to configure, and simplifying secure remote access to vendor networks.

## Threat containment and prevention using ANC

Devices can be "quarantined" based on alerts or anomalies detected by iSID. While it's extremely unlikely to be desirable for a production OT asset to be quarantined from network access, OT security engineer or OT network administrator can activated ANC capability within ISID and apply a relevant quarantine policy to increase OT security by restricting devices which were involved in security violation alert without interrupting active OT processes – which is useful in cases of disabling remote access to the device, or preventing new connections to and from the device and more.



# Authentication configuration

In order to configure iSID-ISE communication, there is a need to configure both ISE and iSID. The following steps should be performed to work with Cisco ISE and iSID in integrated way.

## Obtaining Your Cisco ISE Certificate

iSID-ISE integration requires a valid Cisco ISE certificate for each server in order to perform the integration.

Each server has its own unique corresponding certificate. Hence, the certificates cannot be shared or exchanged between servers.

1. Create a certificate for your application instance by downloading one from Cisco ISE as described in the Cisco Reference Manuals
    a. Deploying Certificates with Cisco pxGrid - Using an external Certificate Authority (CA) with Cisco ISE 2.x
    b. Internal Certificate Authority (CA) to Deploy Certificates to Cisco Platform Exchange Grid (pxGrid) Clients
2. Save certificate in your file system for current and subsequent iSID–ISE integration sessions.
3. When prompted for the Cisco ISE certificate - browse to the certificate saved in your system.

## Certificate Options

There are two types of credentials for obtaining/applying a Cisco ISE certificate:

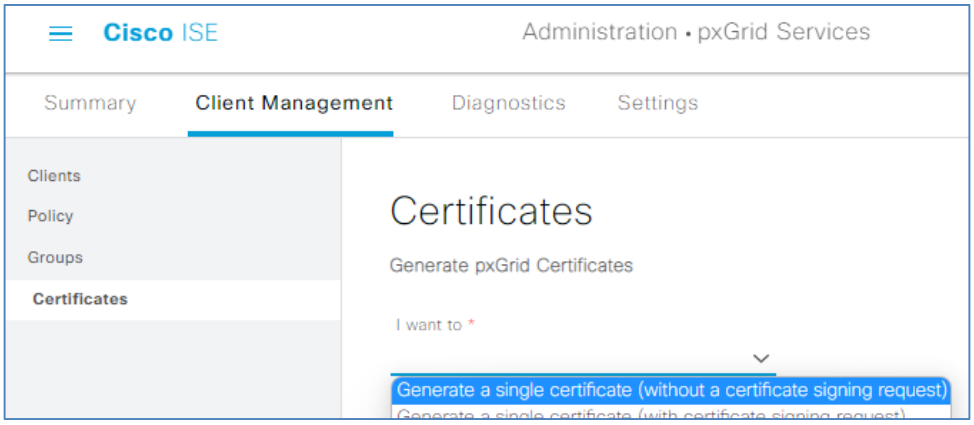
- Certificate-based connection – Used for an external Certificate Authority (CA)
- Password-based connection – Used for a local certificate

The password-based authentication will be used unless the certificate-based parameters are applied.

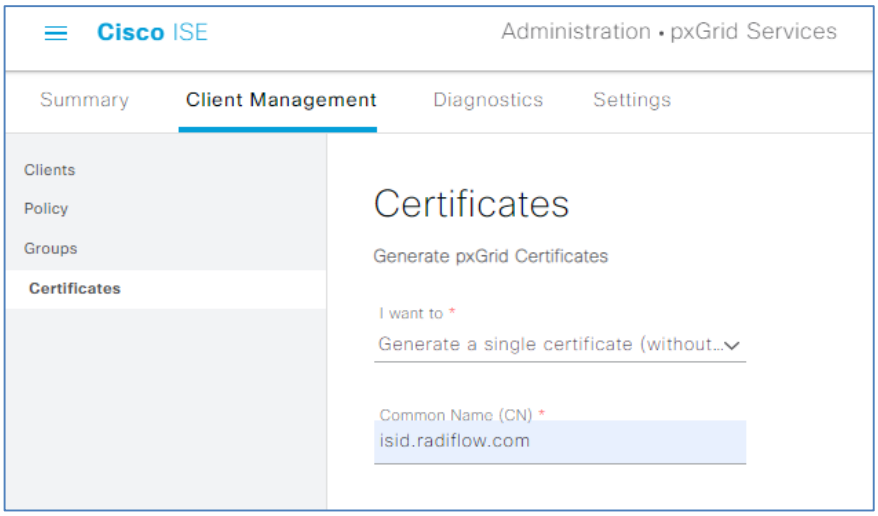
If you are using password-based authentication, select the checkbox to 'Allow Password Based Account Creation' in *Administration > pxGrid Services> Settings*.

As described in CISCO manual how to deploy certificate to pxGrid clients, fill out the following in *Administration > pxGrid Services > Client Management >Certificates*:

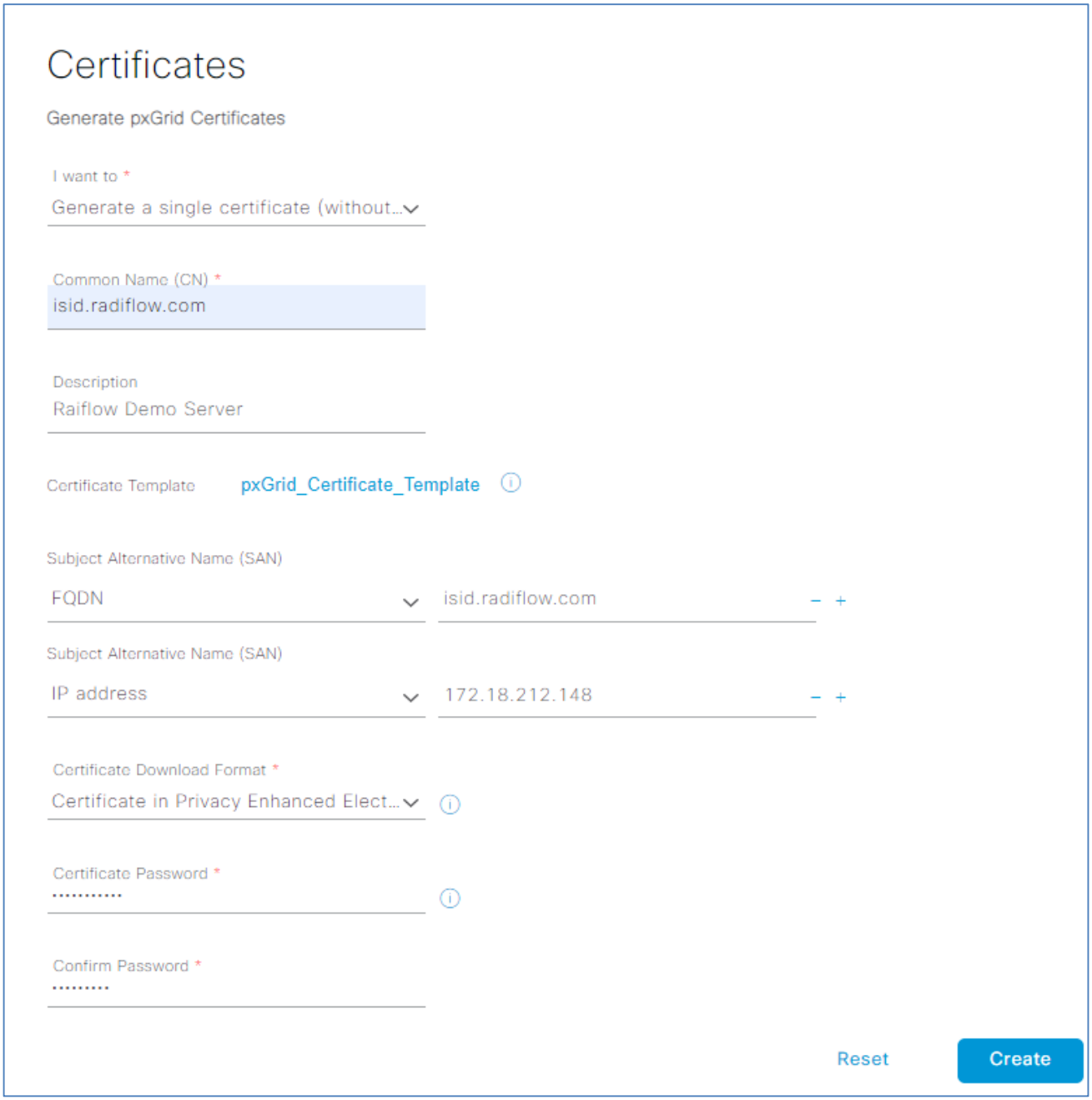
1. In the '*I want to field*':
   Enter '*Generate a single certificate (without a certificate signing request)*'




2. In the Common Name (CN) field:
   Enter your fully qualified domain name for iSID server.



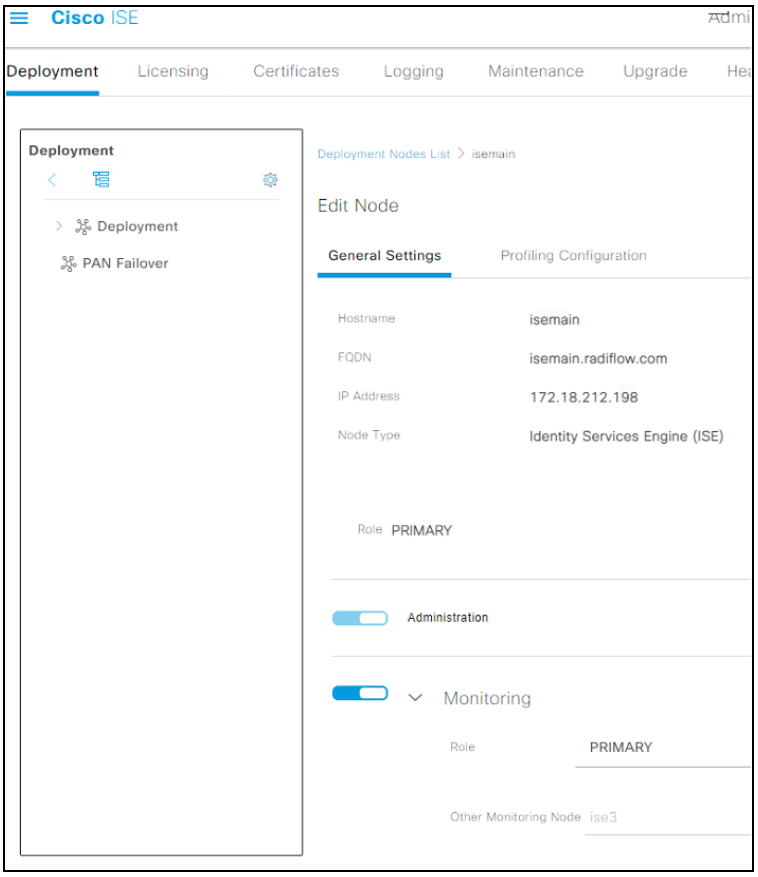

3. For the *Subject Alternative Name (SAN)*:
   Enter the iSID DNS and/or IP Address.
   - The download format is Privacy Enhanced Electronic Mail (PEM)
   - If you provide an optional Certificate Password, make sure to confirm it

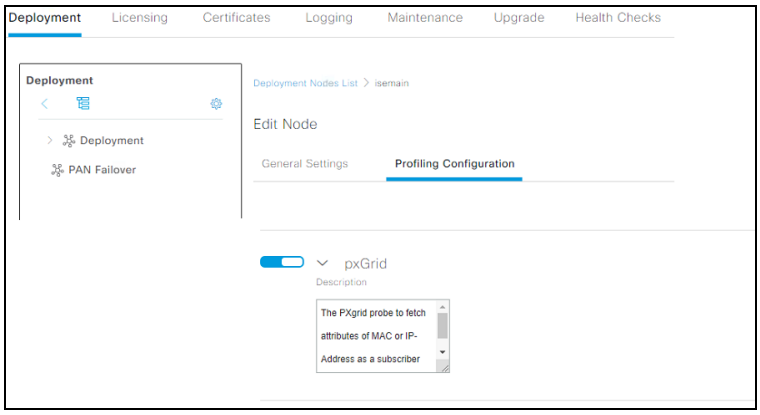



4. ISE creates the password based on the above input.

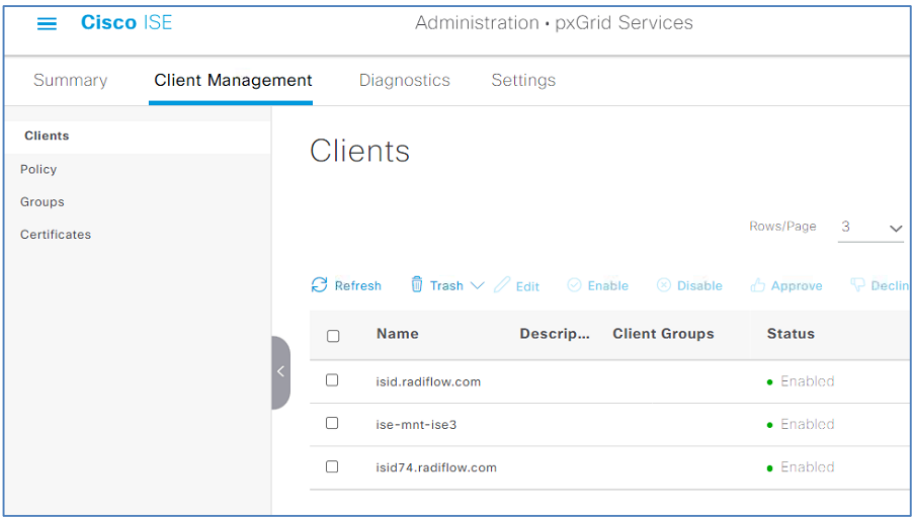
## Activate PxGrid in Cisco ISE

1. Select *Administration > System > Deployment* and edit the ISE node to enable pxGrid under both the *General Settings* tab and the *Profiling Configuration* tab.



2. Verify that the ISE pxGrid node has subscribed to the endpoint asset topic:
   Select *Administration > pxGrid Services > Web Clients*.




## Activate ERS in Cisco ISE

The External RESTful Services (ERS) APIs are based on HTTPS protocol and REST methodology and uses port 9060. ERS is designed to allow external clients to perform CRUD (Create, Read, Update, Delete) operations on Cisco ISE resources. ERS is based on the HTTP protocol and REST methodology. The External RESTful Services APIs support basic authentication. The authentication credentials are encrypted and are part of the request header. The Cisco ISE administrator must assign special privileges to a user to perform operations using the External RESTful Services APIs.

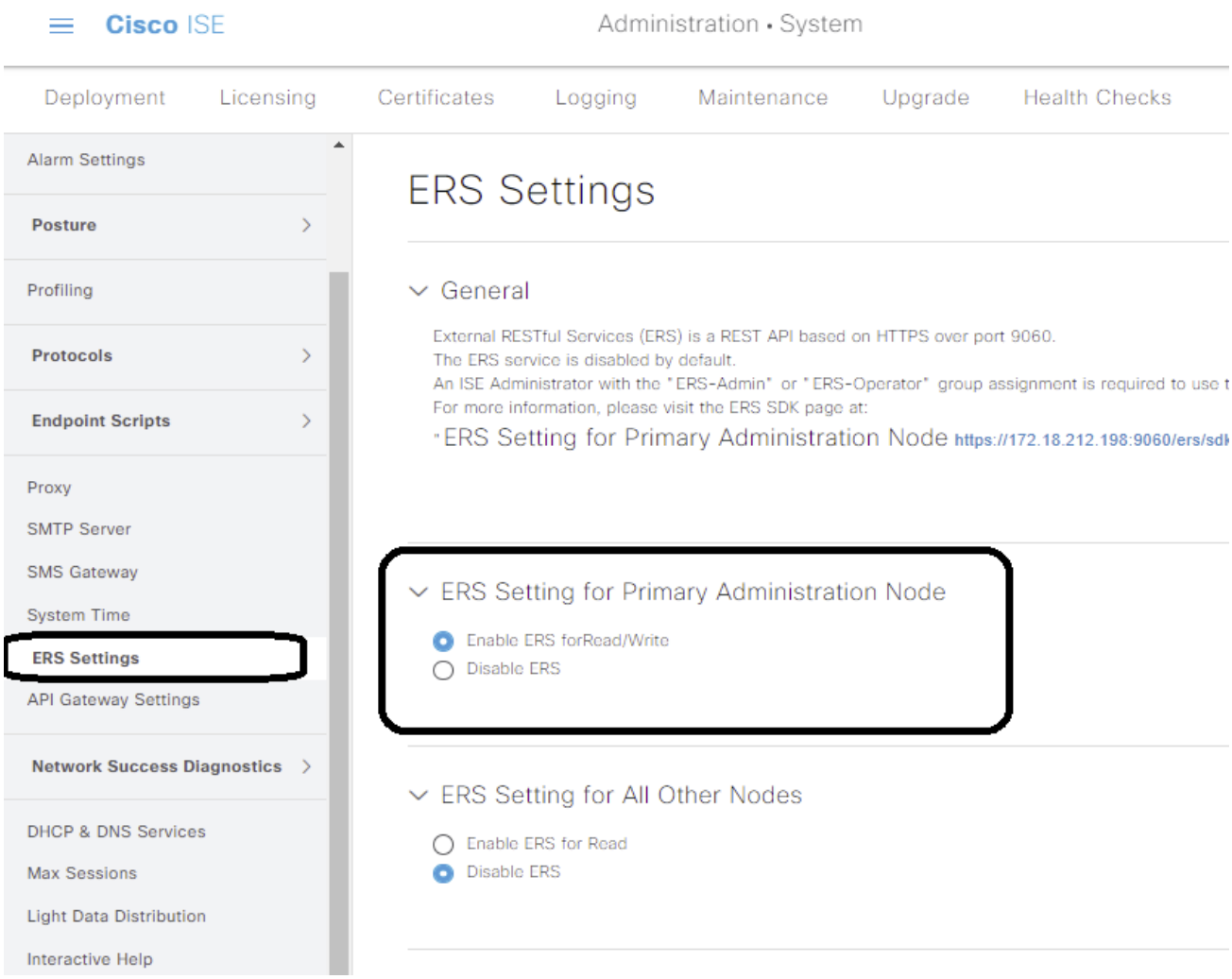
To perform operations using the External RESTful Services APIs (except for the Guest API), the users must be assigned to 'External RESTful Services Admin Group' and must be authenticated against the credentials stored in the Cisco ISE internal database (internal admin users)

Once the above is configured, the user will have full access to all ERS APIs (GET, POST, DELETE, PUT). This user can Create, Read, Update, and Delete ERS API requests. Hence, information relevant to additional attributes on Radiflow iSID, can be updated on Cisco ISE

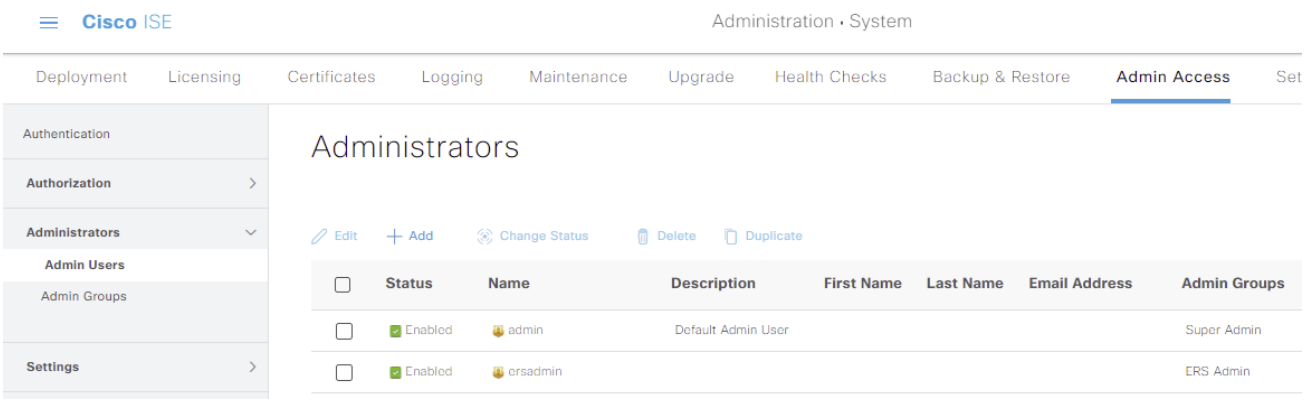
Please refer to Cisco Identity Services Engine API Reference Guide, Release 3.0 – Setting UP guide in order to

- Enable ERS (port 9060)
- Creating ERS Admin
- Setting up ERS for Sponsor Access

1. Select *Administration > System > ERS Settings* and select the 'Enable ERS for Read/Write' in the 'ERS for Primary Node'.




Note: Based on Cisco ISE guide, for field implementation, 'ers admin' needs to be defined with relevant permissions, as well as 'Setting up ERS for Sponsor Access'. Please refer to the mentioned above guide for detailed ERS definition instructions.



## Activate ANC (Adaptive Network Control)

Adaptive Network Control (ANC) is a service that runs on the Administration node. This service monitors and controls network access of endpoints. ANC allows you to reset the network access status of an endpoint to quarantine, unquarantine, or shut down a port. These define the degree of authorization for the endpoints in the network.

You can quarantine or unquarantine endpoints, or shut down the network access server (NAS) ports to which endpoints are connected, by using their endpoint IP addresses or MAC addresses. You can perform quarantine and unquarantine operations on the same endpoint multiple times, provided they are not performed simultaneously. If you discover a hostile endpoint on your network, you can shut down the endpoint's access.

ANC is disabled by default. ANC gets enabled only when pxGrid is enabled, and it remains enabled until you manually disable the service in the Admin portal. You must have Super Admin and Policy Admin role privileges to enable ANC in Cisco ISE. Detailed information regarding the ANC configuration can be found in: Cisco-ISE-admin-guide

# Configure iSID and Connect to Cisco ISE

On iSID side, needs to define and configure instance/s.

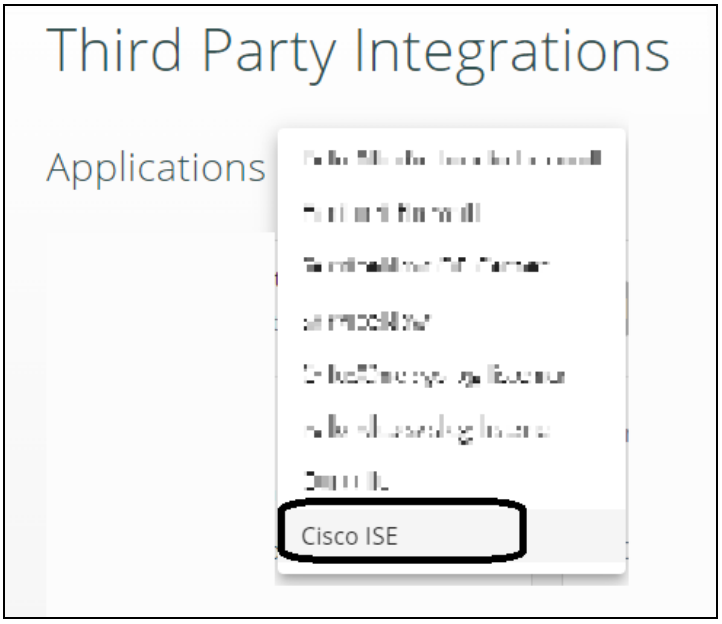
Before configuration of the ISE integration in iSID:

1. DNS for the ISE should be defined,
2. Certifications should be generated/provided by ISE, as explained above: [Obtaining Your Cisco ISE Certificate]

## ISE Instance creation

Navigate to *Configuration -> Third Party Integration*, and press on the '+' icon

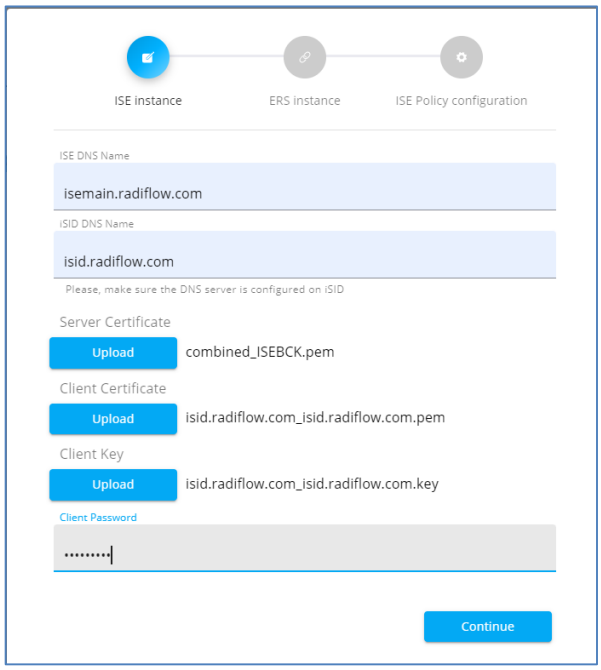

Select the 'Cisco ISE' from the drop-down list:



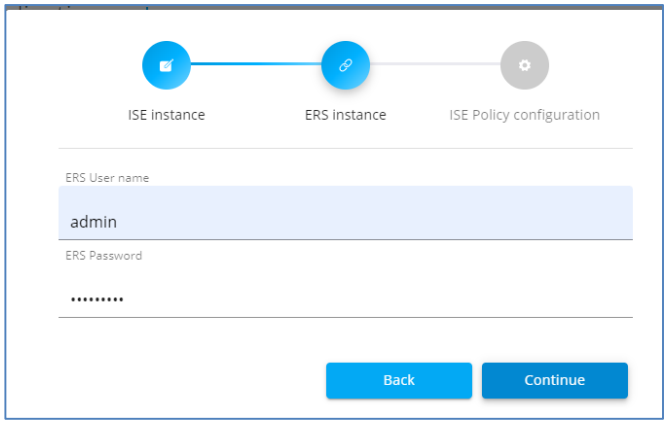
When the following Cisco ISE configuration appears, fill the relevant info (as in an example below):

- ISE DNS name
- iSID DNS name
- Server certificate // this is a *.pem file
- Client Certificate // this is *.pem file
- Client Key // this is *.key file
- Client password // used password when connecting to ISE

Upon completed, press the 'Continue' button in the lower right corner of the dialog to implement your choices.



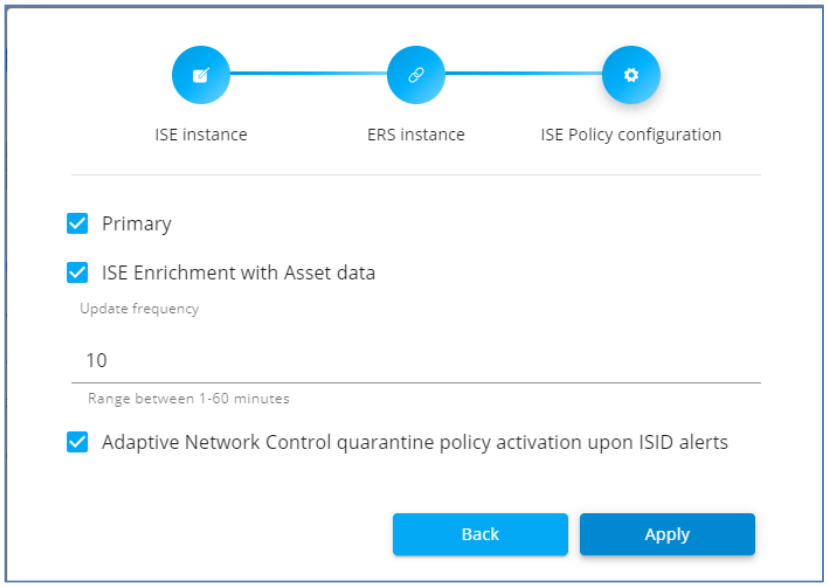

At the next step, 'ERS Instance', which is relevant for additional attributes, please provide the credential for the ERS. Then press the 'Continue'

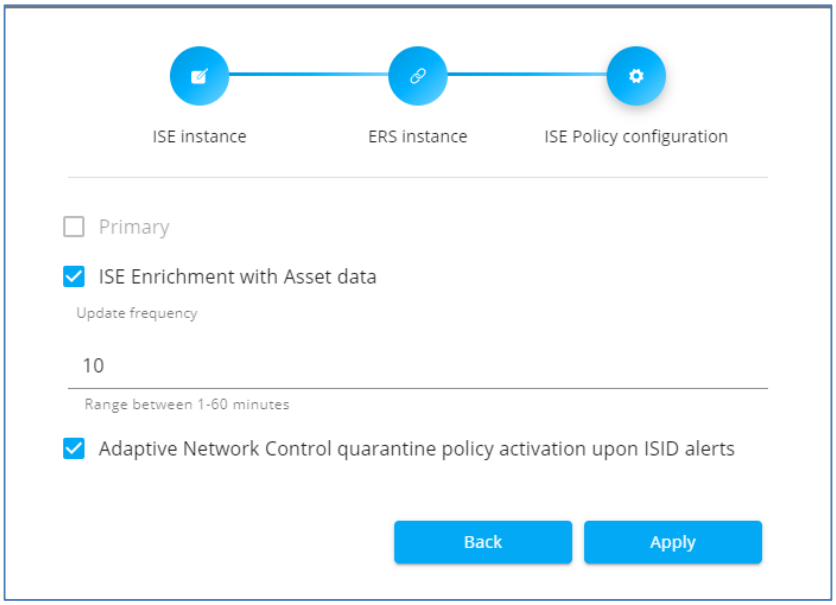


At the 'ISE Policy Configuration' step:

- Check/uncheck the 'Primary' checkbox based on the configured ISE desired (see below two examples).
- In the case ANC integration is required for quarantine policies, make sure this checkbox is marked.

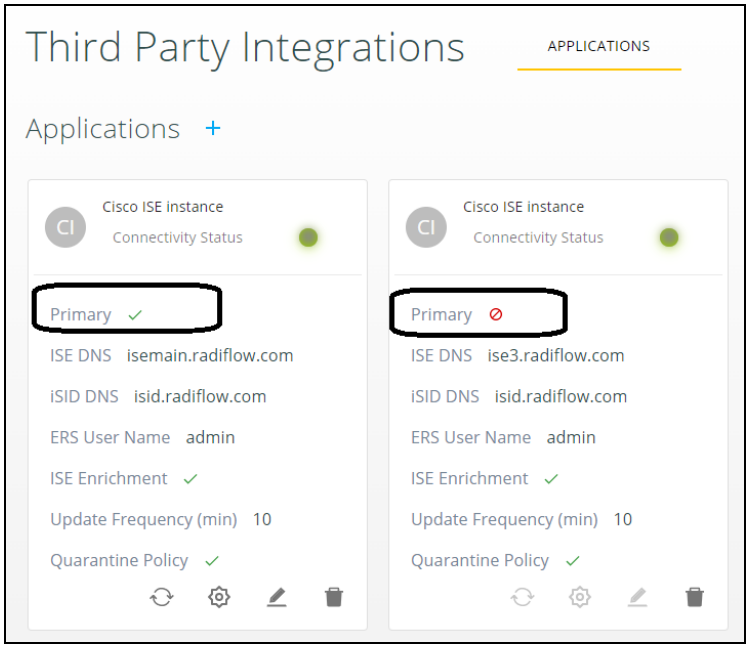
Confirm the Instance creation by pressing the 'Apply' button.




If needed, repeat the instance creation also for backup Cisco ISE instance.

By the end of the instance creation, similar to the following example should be presented in iSID:



# Configuration ISID asset attributes in Cisco ISE

At this point, iSID uses pxGrid to send OT Asset attributes to Cisco ISE to be used for asset classification and policies. In order to use these attributes in ISE, they should be defined as custom attributes.

The following attributes are sent:

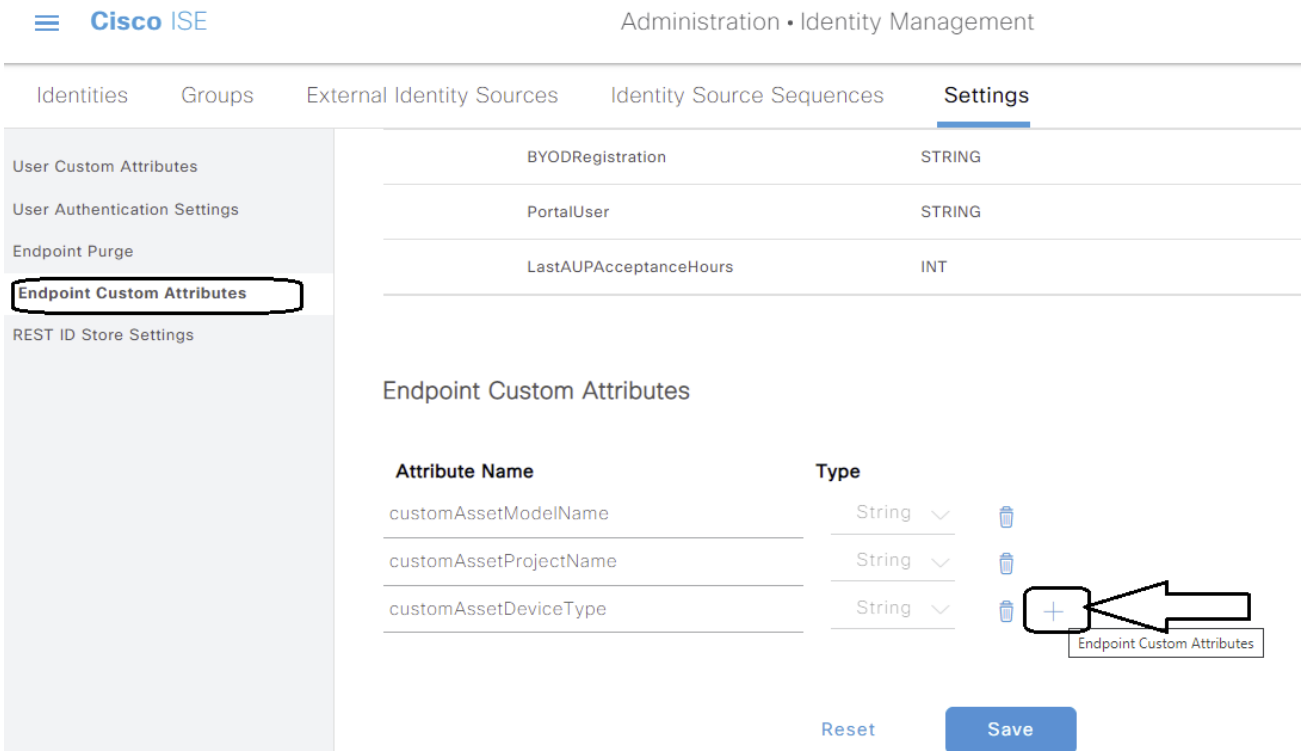
| Attribute Name | Meaning | ISE Properties |
|---|---|---|
| Asset_Name | Name | assetName |
| Asset_ID | Unique ID | assetId |
| Asset_IP | IP address | assetIpAddress |
| Asset_MAC | MAC address (can be array) | assetMacAddress |
| Asset_Vendor_Name | Vendor Name | assetVendor |
| Asset_Model_ID** | Manufacturer Model | assetProductId |
| Asset_Serial_Number | Manufacturer Serial Number | assetSerialNumber |
| Asset_type | Device Type (PLC, HMI, EWS, etc) | assetDeviceType |
| Asset_SW_rev** | Software version | assetSwRevision |
| Asset_HW_rev** | Hardware version | assetHwRevision |
| Asset_Protocol_List | Protocols used by device | assetProtocol |
| Asset_Model_Name** | Manufacturer Model Name | assetModelName |
| Asset_OS** | Operating system | assetOsName |
| Asset_Zone | 62443 Zone device belongs (DMZ, Basic, Control, etc) | assetZone |
| Asset_Risk | Risk/ exploitability score | Future |
| Asset_criticality | High, Medium, Low | Future |
| Asset_CVEs | List of CVE's relevant to device | Future |
| Asset_alerts | If device involved in unapproved alerts (T/F) | Future |

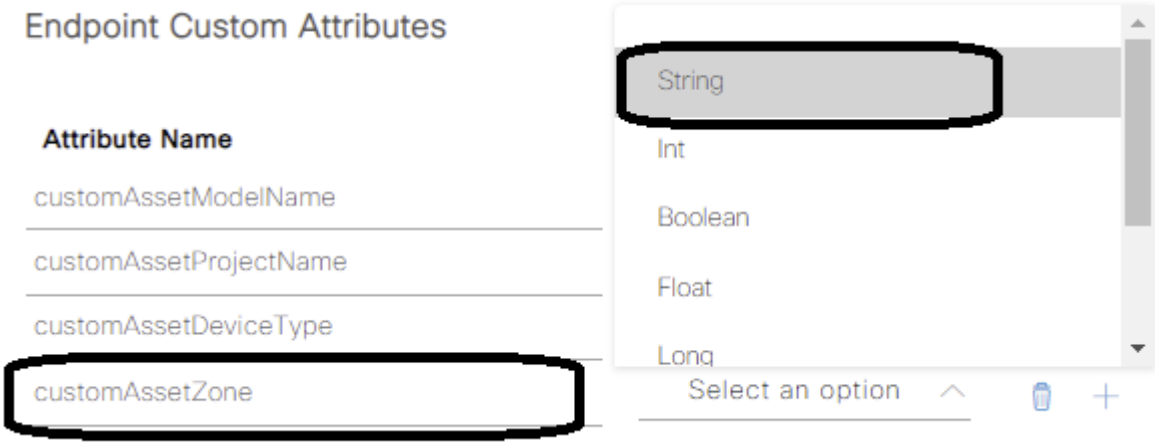
** = Supported based on protocol

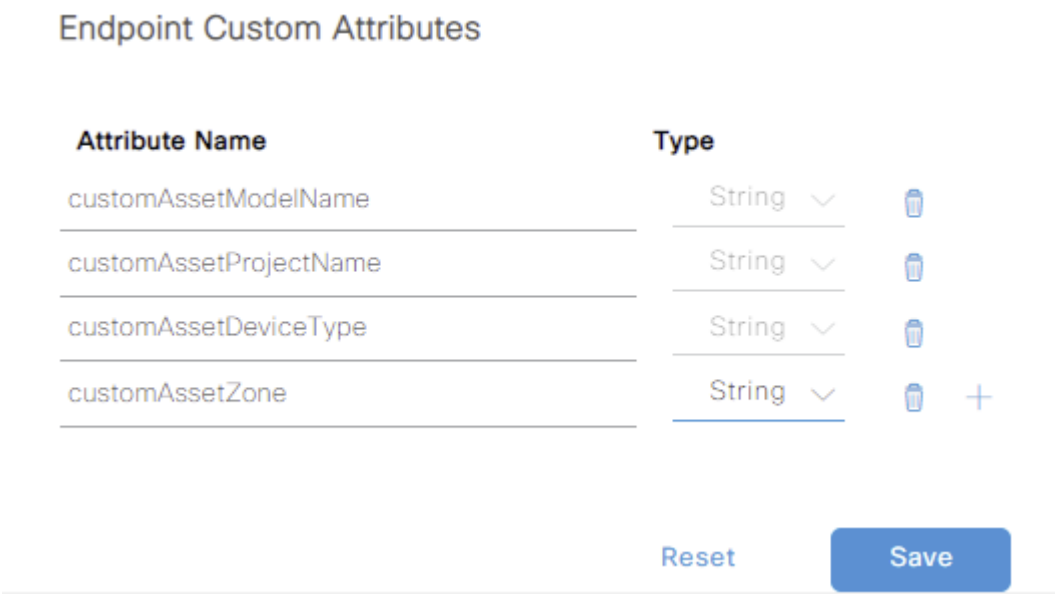
Use the following steps to define custom attributes.

1. Go to *Administration > Identity Management > Settings > Endpoint*

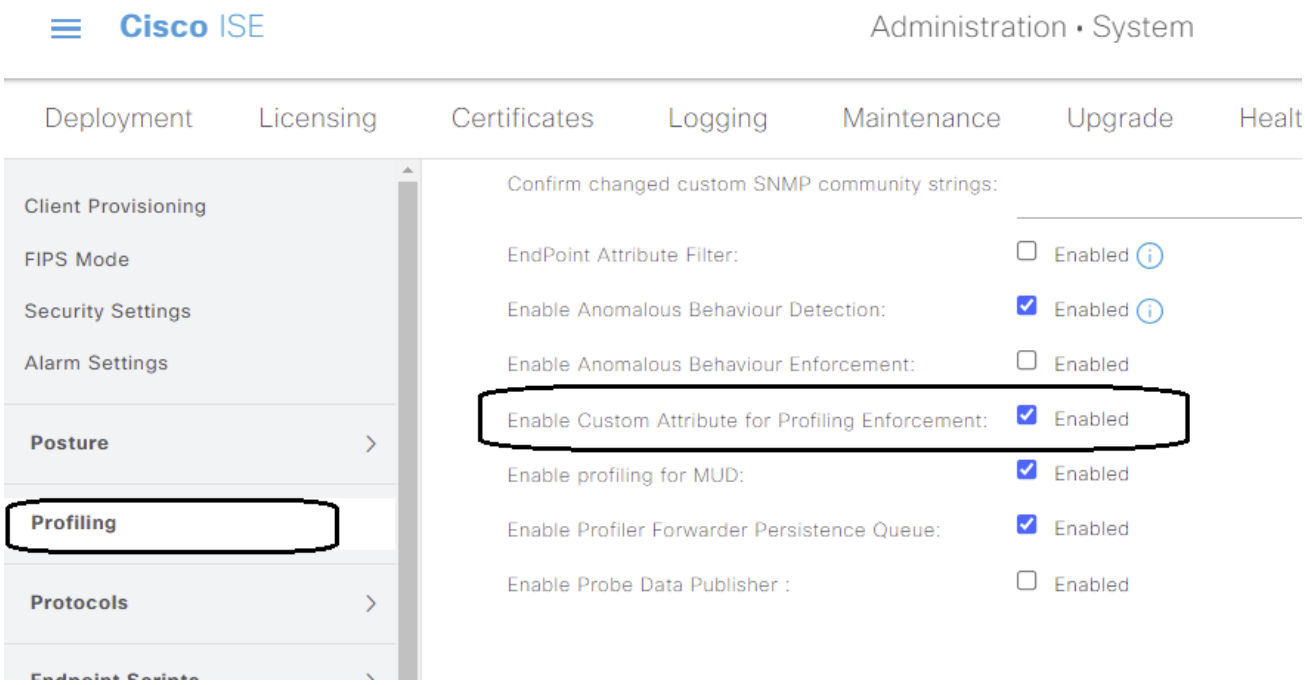
*Custom Attributes* and with the plus sign + define the custom attributes



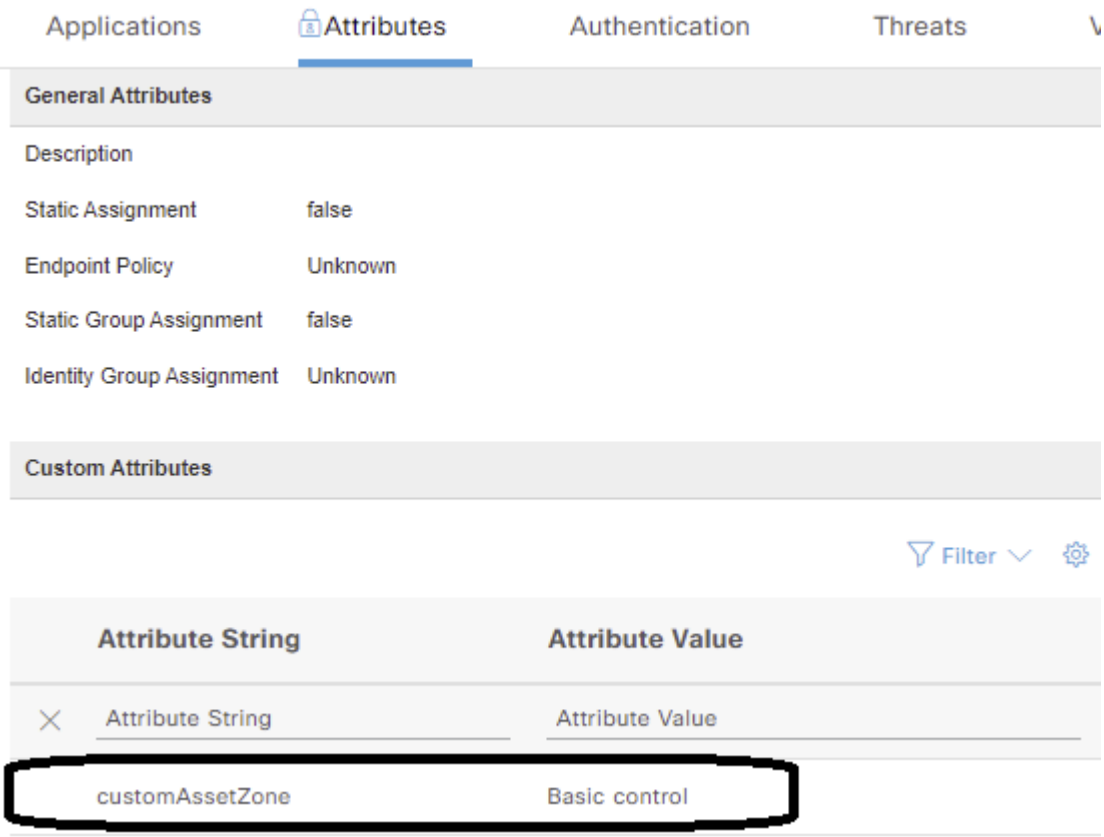






2. Enable the Custom Attributes for enforcement by selecting:
   *Administration > System > Settings > Profiling*:
   Check the checkbox for '*Enable Custom Attribute for Profiling Enforcement*'.



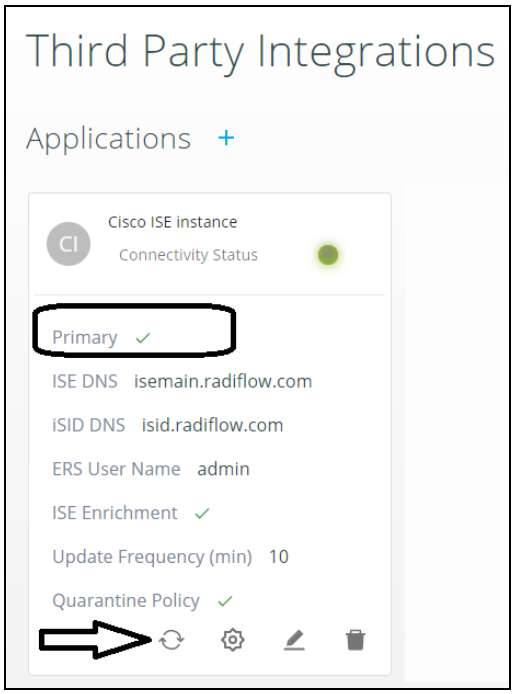
3. Check the custom attribute list at the assets attribute:

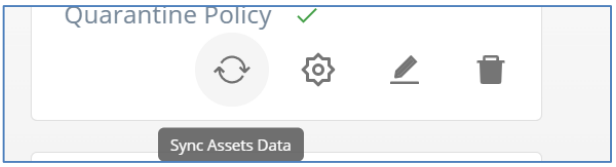


# ISID asset information updates in Cisco ISE

## Manual update

Based on the above example, iSID is about to update the active ISE server every 10 minutes. If user would like to interrupt and force update during this time, navigate to the *Configuration -> Third Party Integrations*, select the desired Instance and press the 'Sync Access Data'.



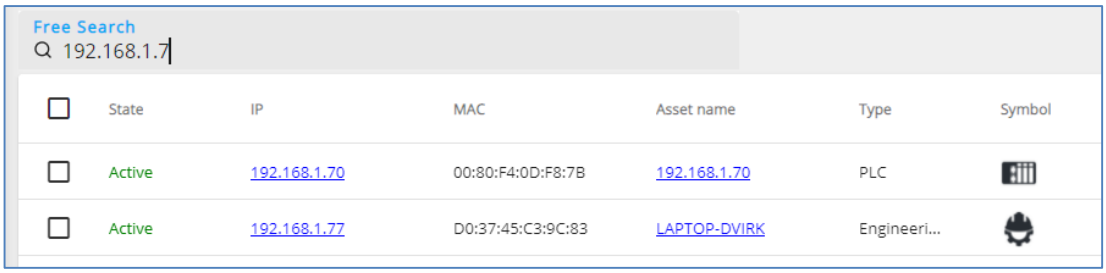




The result will be reflected in both iSID and active ISE as following.

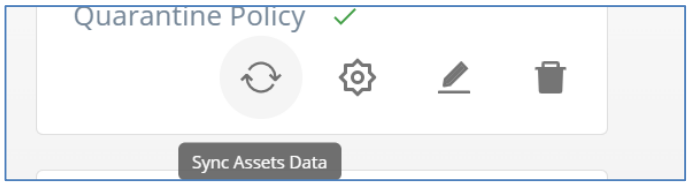
## Asset info synchronization example

Below is an example for manual synchronization of the assets.

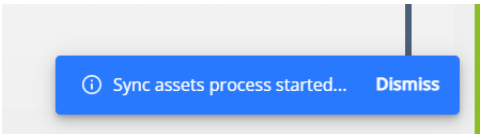
iSID indication: 2 new assets were discovered



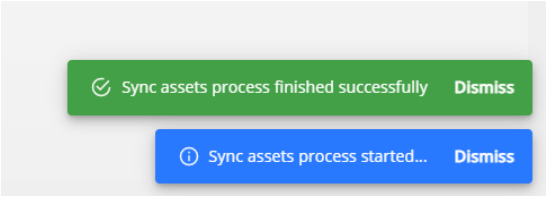

User press the sync' option:



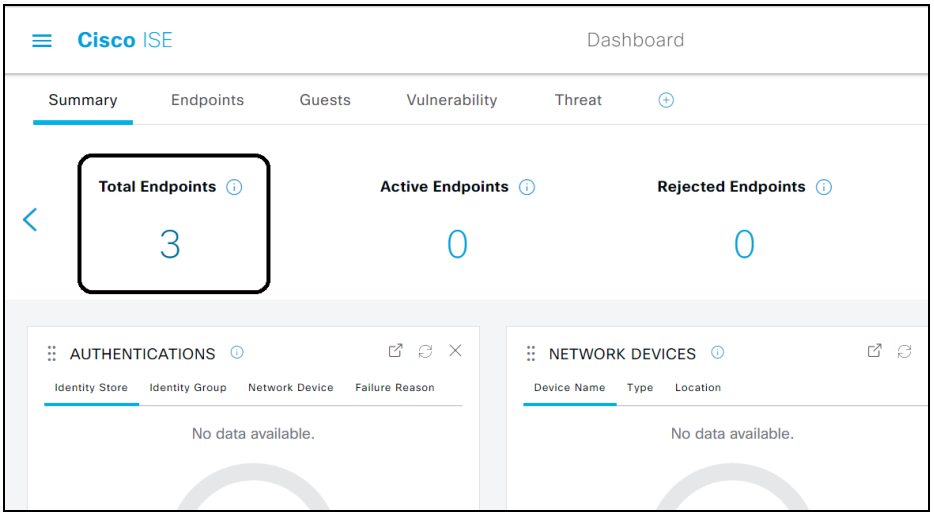

Blue balloon appears at the right bottom side of the screen, confirming the action:



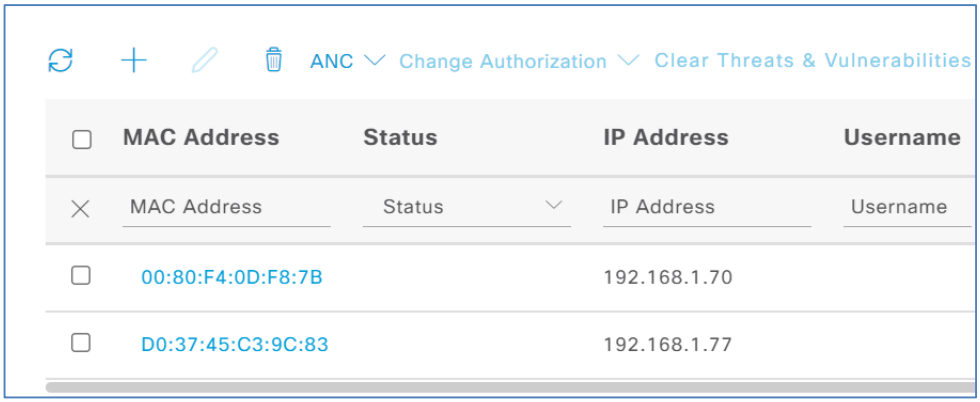

Upon successful synchronization, a confirmation will be presented (green balloon):



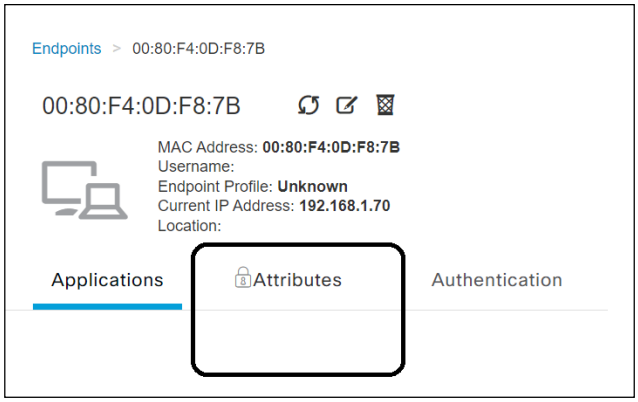
When login to the active ISE via the GUI – check the list of endpoints:



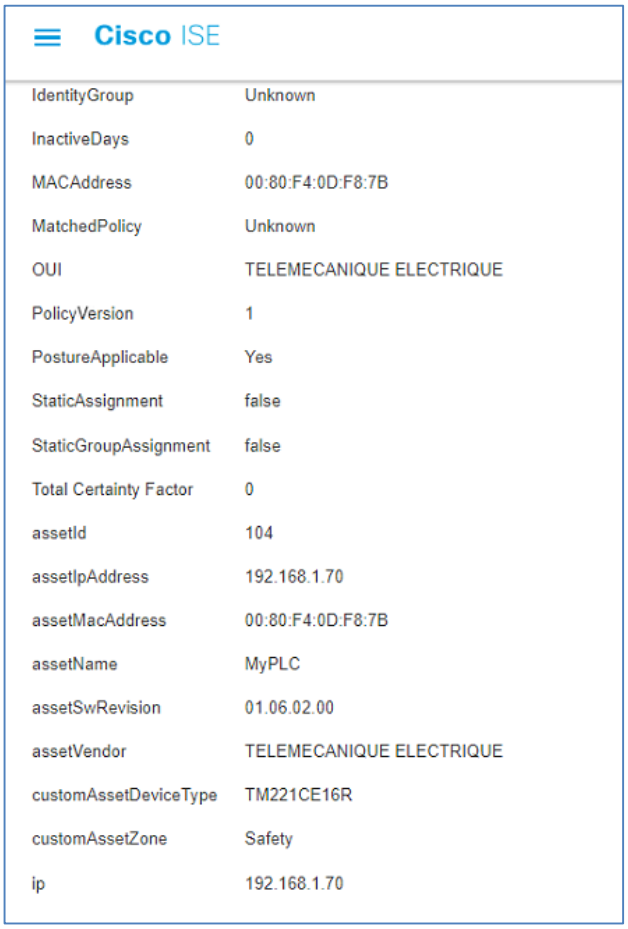

Then scroll down on the opened page and confirm seeing the assets:




Select one of the assets, and at the opened page scroll up to the 'Attribute':



Then scroll down to see the relevant attribute details:



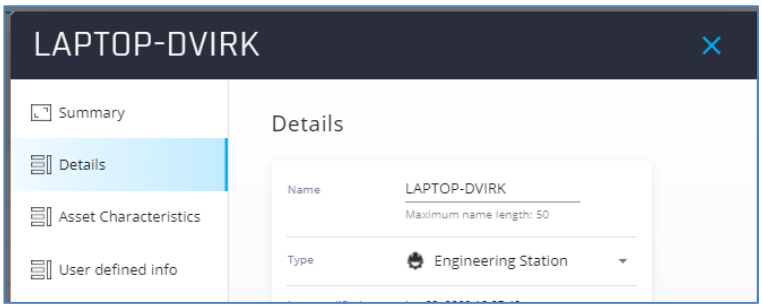
Cisco ISE

| | |
|---|---|
| IdentityGroup | Unknown |
| InactiveDays | 0 |
| MACAddress | 00:80:F4:0D:F8:7B |
| MatchedPolicy | Unknown |
| OUI | TELEMECANIQUE ELECTRIQUE |
| PolicyVersion | 1 |
| PostureApplicable | Yes |
| StaticAssignment | false |
| StaticGroupAssignment | false |
| Total Certainty Factor | 0 |
| assetId | 104 |
| assetIpAddress | 192.168.1.70 |
| assetMacAddress | 00:80:F4:0D:F8:7B |
| assetName | MyPLC |
| assetSwRevision | 01.06.02.00 |
| assetVendor | TELEMECANIQUE ELECTRIQUE |
| customAssetDeviceType | TM221CE16R |
| customAssetZone | Safety |
| ip | 192.168.1.70 |

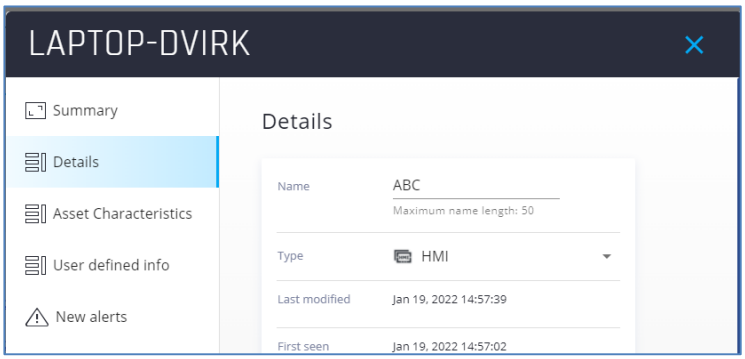
## Changes in asset attributes in ISID and ISE update

It is possible to get updates or make changes in iSID, such as: name, type, zone, etc.. an that information will be reflected in ISE once synchronized. For example, changing the asset 'LAPTOP-DVIRK' to 'ABC', and changing the zone from 'basic' to 'safety'

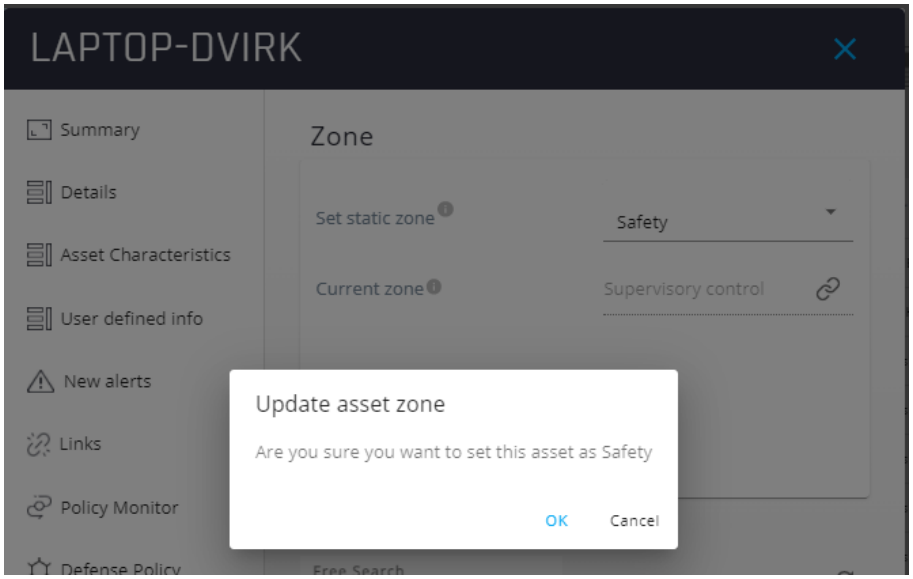
Before changing the name:

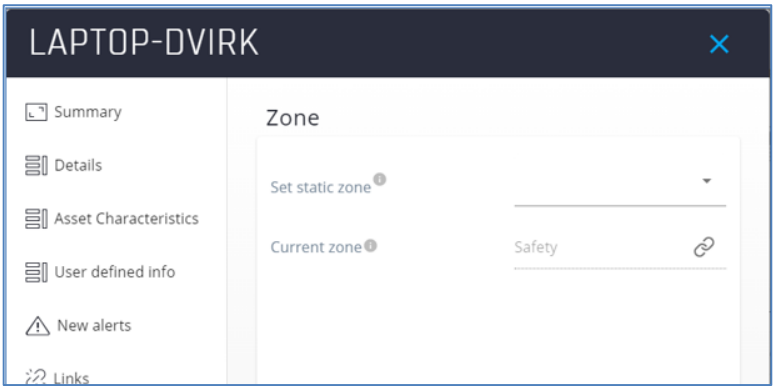



After changing the asset name:

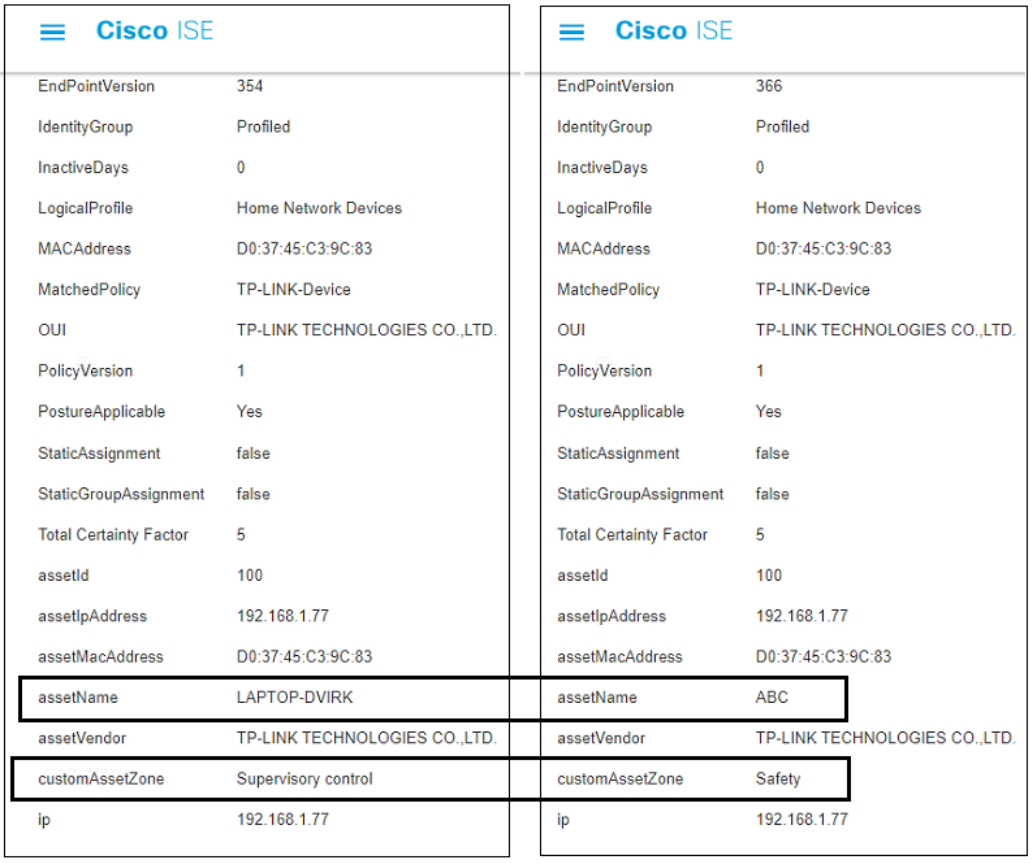



Before and after updating the zone:






Before and after the sync' the info will be reflected in Cisco ISE:



Cisco ISE

| | |
|---|---|
| EndPointVersion | 354 |
| IdentityGroup | Profiled |
| InactiveDays | 0 |
| LogicalProfile | Home Network Devices |
| MACAddress | D0:37:45:C3:9C:83 |
| MatchedPolicy | TP-LINK-Device |
| OUI | TP-LINK TECHNOLOGIES CO.,LTD. |
| PolicyVersion | 1 |
| PostureApplicable | Yes |
| StaticAssignment | false |
| StaticGroupAssignment | false |
| Total Certainty Factor | 5 |
| assetId | 100 |
| assetIpAddress | 192.168.1.77 |
| assetMacAddress | D0:37:45:C3:9C:83 |
| assetName | LAPTOP-DVIRK |
| assetVendor | TP-LINK TECHNOLOGIES CO.,LTD. |
| customAssetZone | Supervisory control |
| ip | 192.168.1.77 |

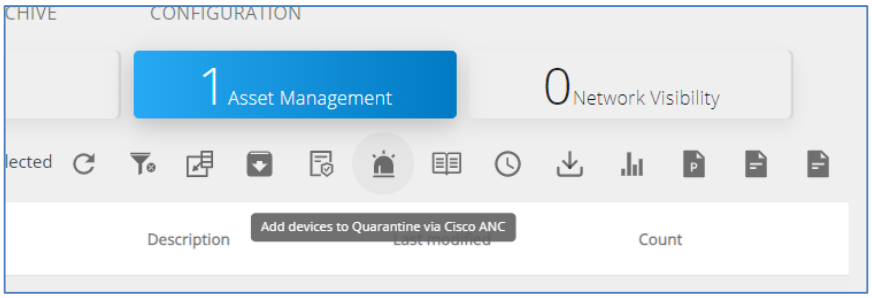
Cisco ISE

| | |
|---|---|
| EndPointVersion | 366 |
| IdentityGroup | Profiled |
| InactiveDays | 0 |
| LogicalProfile | Home Network Devices |
| MACAddress | D0:37:45:C3:9C:83 |
| MatchedPolicy | TP-LINK-Device |
| OUI | TP-LINK TECHNOLOGIES CO.,LTD. |
| PolicyVersion | 1 |
| PostureApplicable | Yes |
| StaticAssignment | false |
| StaticGroupAssignment | false |
| Total Certainty Factor | 5 |
| assetId | 100 |
| assetIpAddress | 192.168.1.77 |
| assetMacAddress | D0:37:45:C3:9C:83 |
| assetName | ABC |
| assetVendor | TP-LINK TECHNOLOGIES CO.,LTD. |
| customAssetZone | Safety |
| ip | 192.168.1.77 |

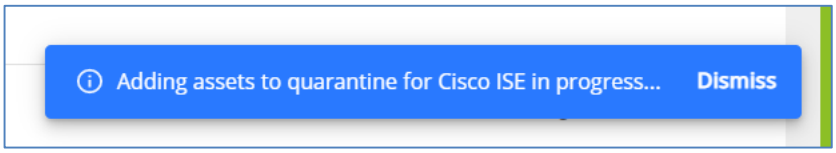
# ISID – ANC integration

Assuming alert is detected in iSID. If iSID operator has “administrator” or “cyber analyst” role, and he decides that the asset/s involved in this alert should be included in the quarantine list of Cisco ISE, there is a possibility to update Cisco ISE quarantine list with the asset/s details (MAC/s address).

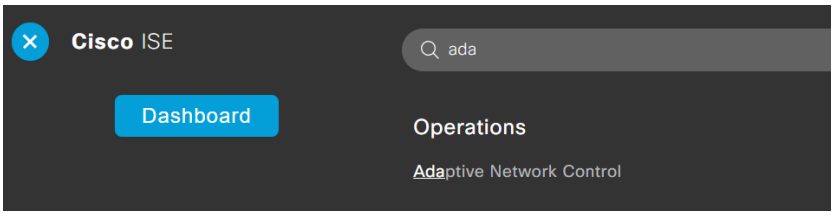
For example, a CVE alert has been detected in iSID. Analyst marks this alert and press the ‘Add devices to Quarantine via Cisco ANC’ icon:

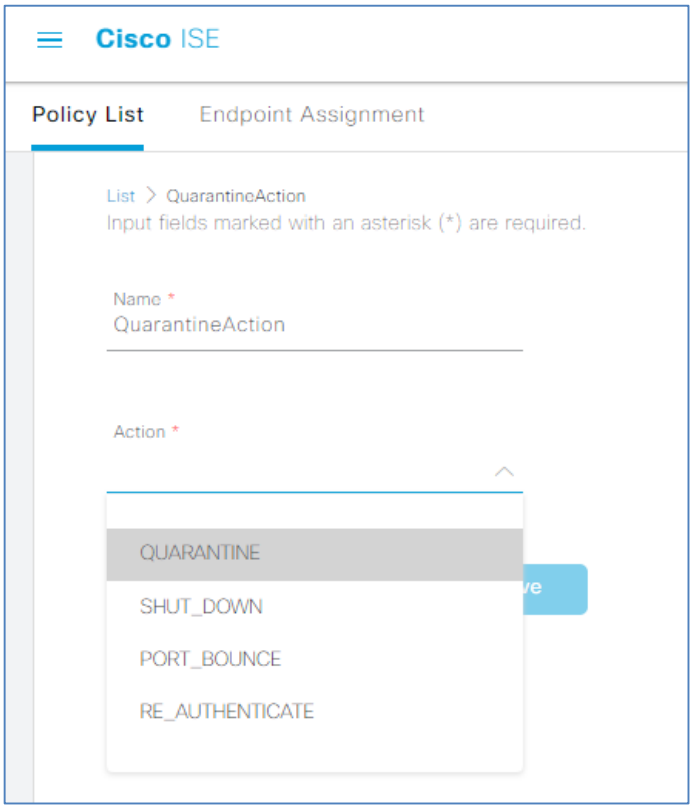


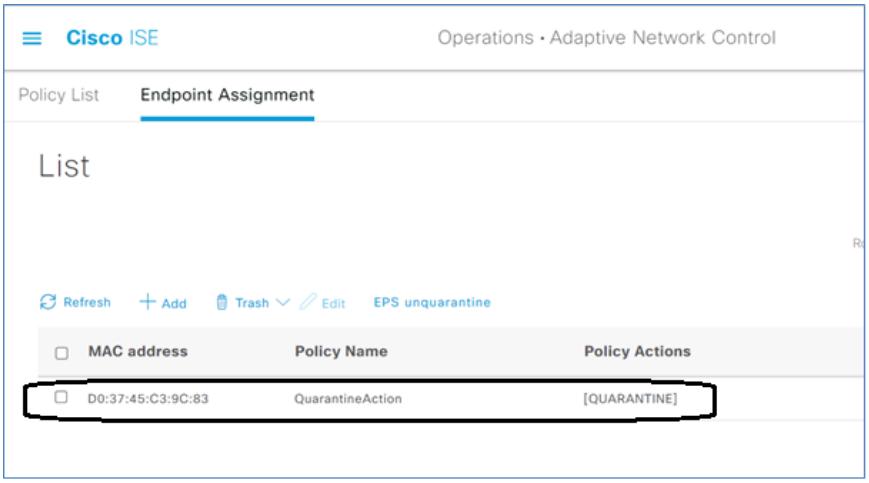

Analyst needs to confirm the ‘adding to quarantine’ action:


This information will be presented in Cisco ISE under *Adaptive Network Control > Endpoint Assignment:*



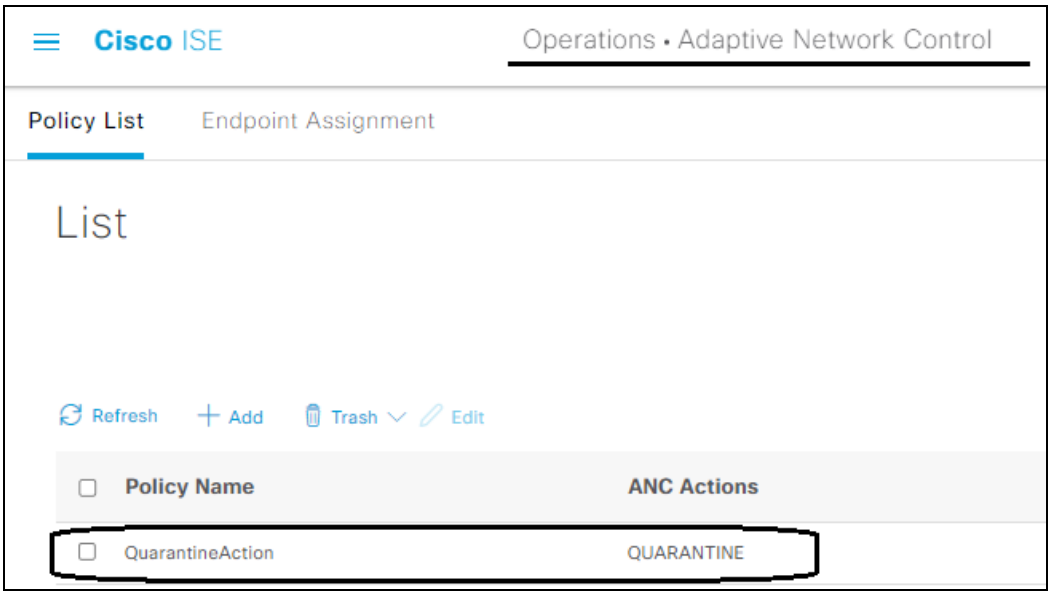


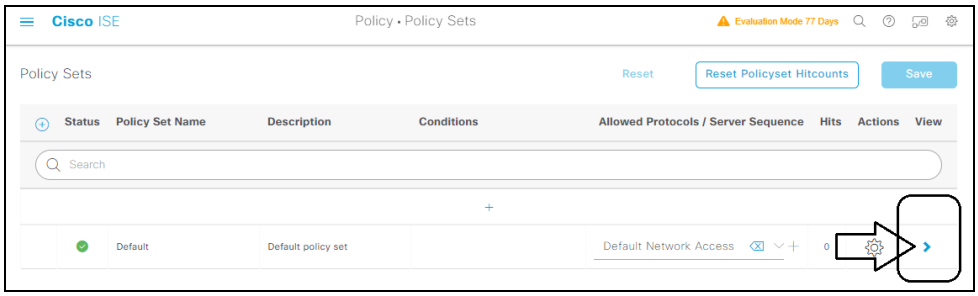

At this point it is up to the network administrator to decide which rule (policy-set) should be enforced.

For that, user needs to set a policy with ANC action, then bind this policy to the 'Policy-set' and then define which action will be taken on assets that match this policy.

To define a policy, navigate to '*Adaptive Network Control > Policy List*'. Press the 'Add' button and provide the policy name ('QuarantineAction' in our case) and Action ('Quarantine' in our case). Then press 'save'

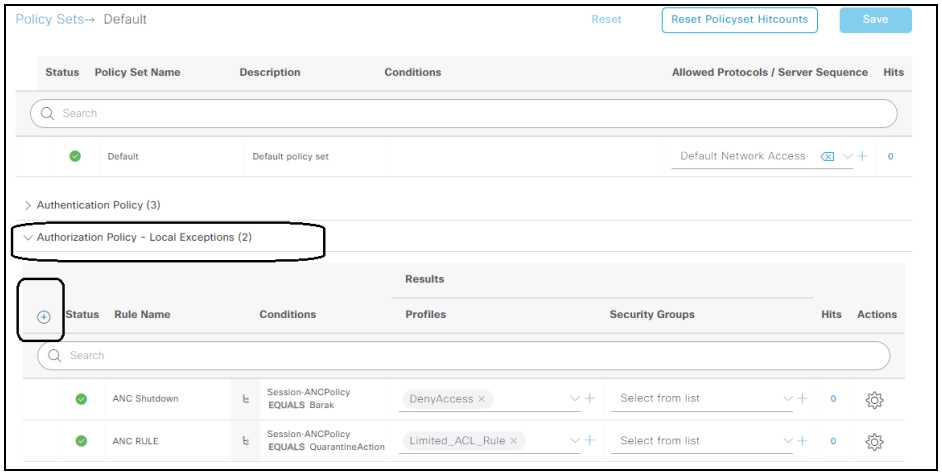



In order to bind this policy to the Policy-Sets, navigate to *Policy > Policy Sets*, and press on the '>' icon:

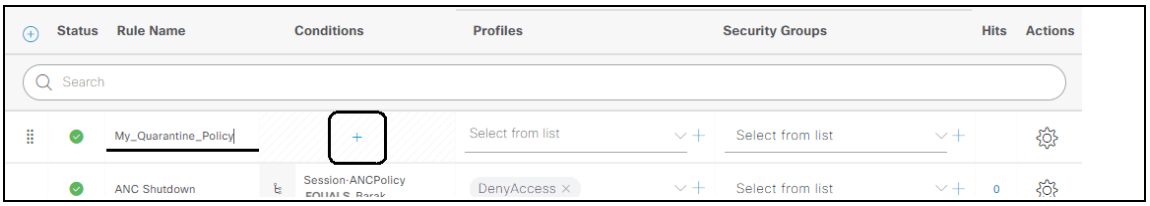


From the alternative selection, expand the '*Authorized Policy – Local Exceptions*'


Then press on the '+' icon as presented below:

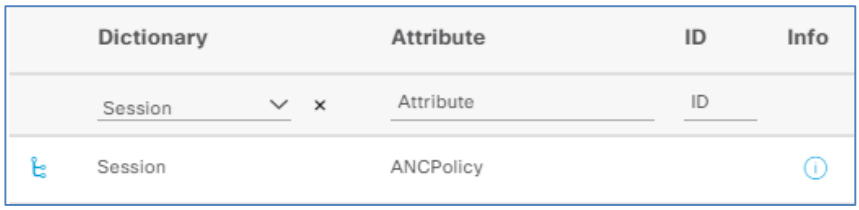



A new Policy will be added. Click on the policy text, and change its name to a logical name. then press on the '+' icon to define the rule of this policy:



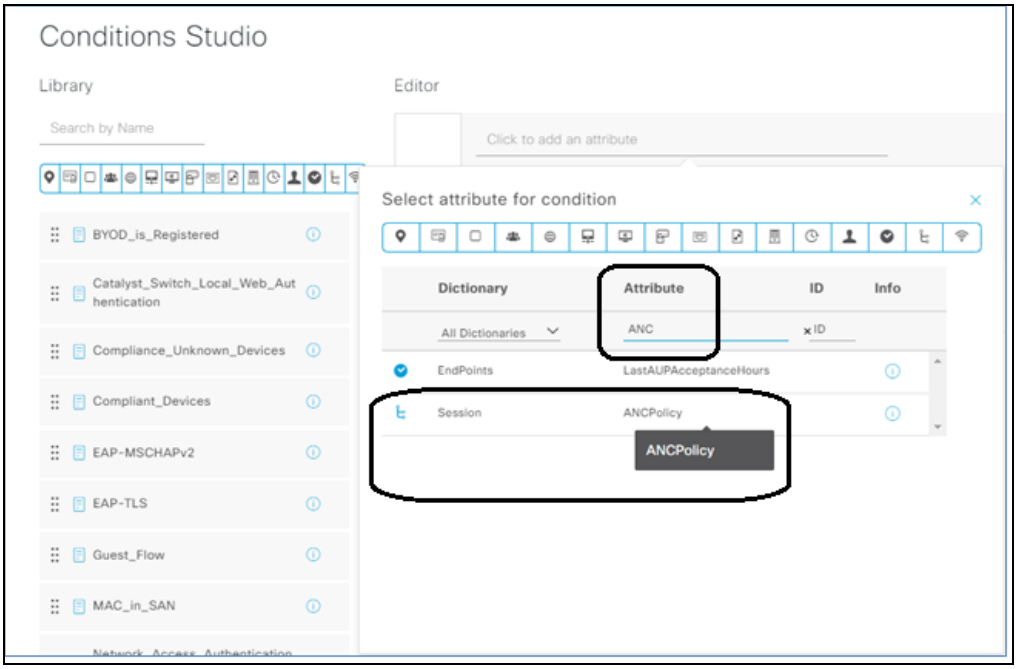
At this point a condition page will be opened.

Search for a session with Attribute name ANCPolicy

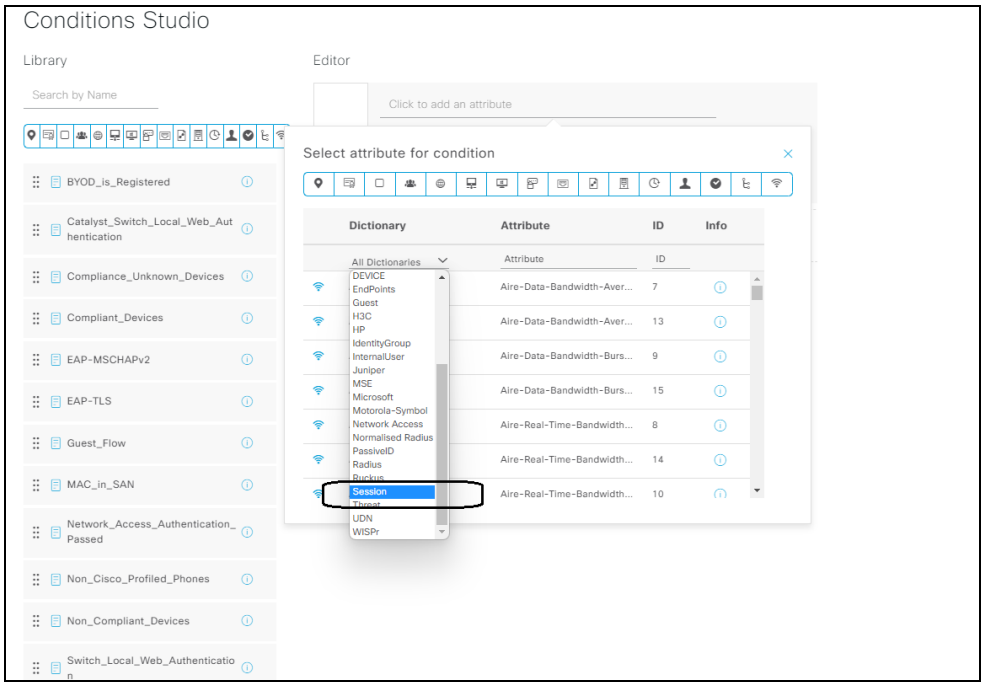



It is possible to search a session by either typing 'ANC' in the Attribute, or, choose 'session' from the Dictionary list:

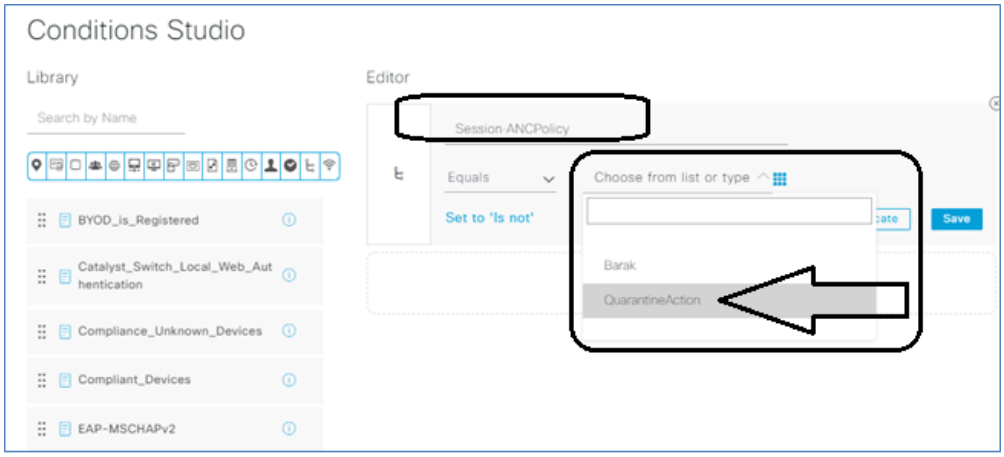
Using the Attribute > 'ANC' search:




Using 'Dictionary' dropdown list to select the 'session'. And then select the 'ANCPolicy':



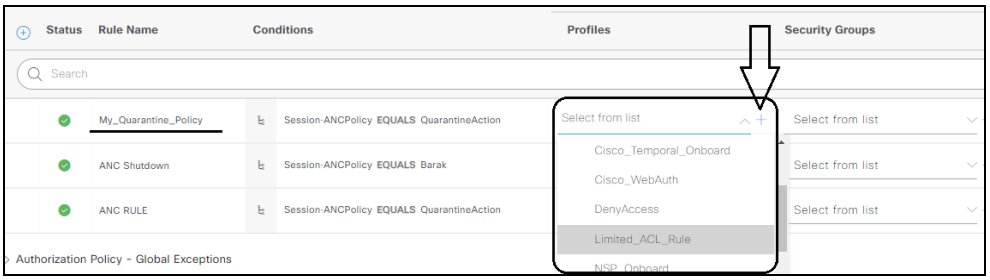

As a result of the above, the ANCPolicy will be presented. Select the desired policy from the :



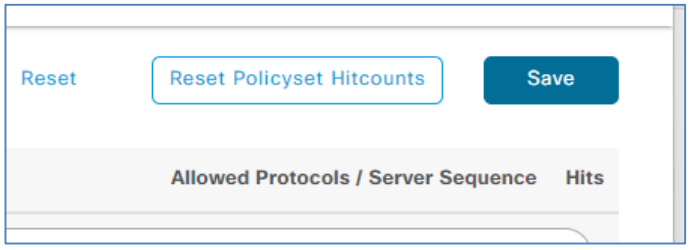

When the desired condition was selected, save the choice by pressing the 'Use' button.

As a result, a new condition will be added the policy.

Press on the '+' icon to select the desired action that will be performed once the policy takes action. For example, 'Limited_ACL_rule':




Then save the action:



# Troubleshooting

| Issue | Proposed steps for solution |
|---|---|
| ISID - Failure to connect to ISE | If you cannot connect, try to<br>• Check your cables<br>• Check ping connectivity toward ISE or backup ISE<br>• Check network firewall and connectivity<br>• Connect into another Cisco ISE node.<br>• Turn Cisco ISE off and on |
| Authentication to ISE fails | • Confirm the issue is not relevant to connectivity by sending pings. If there is no ping reply, it means that Cisco ISE or its network is down.<br>• Check if credentials and certifications has been changed at either iSID or ISE.<br>• Turn Cisco ISE on and off again.<br>If there is no change, contact Cisco ISE support. |
| No asset information is passing from ISID to ISE | If iSID information fails to be reflected in Cisco ISE,<br>• Check if DNS details have been changed<br>• Check if certificate or credentials have been changed.<br>• Check ping connectivity from iSID machine to Cisco ISE<br>• Try to update manually and check if data arrives to ISE machine.<br>If there is no change, contact Radiflow Support. |
| Passing MAC details using ANC fails | ANC is Тupported by enabling the PxGrid, if MAC details are not being presented,<br>• Check ping connectivity from iSID machine to Cisco ISE<br>• Check if PxGrid is enabled.<br>If there is no change, contact Radiflow Support. |

For further ISE troubleshooting please refer to Monitoring and Troubleshooting Service in Cisco ISE guide