Troubleshoot Wired Dot1x Issues in ISE 3.2 and Windows

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Introduction

This document describes how to configure a basic 802.1X PEAP authentication for Identity Services Engine (ISE) 3.2 and Windows Native supplicant.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- Protected Extensible Authentication Protocol (PEAP)
- PEAP 802.1x

Components Used

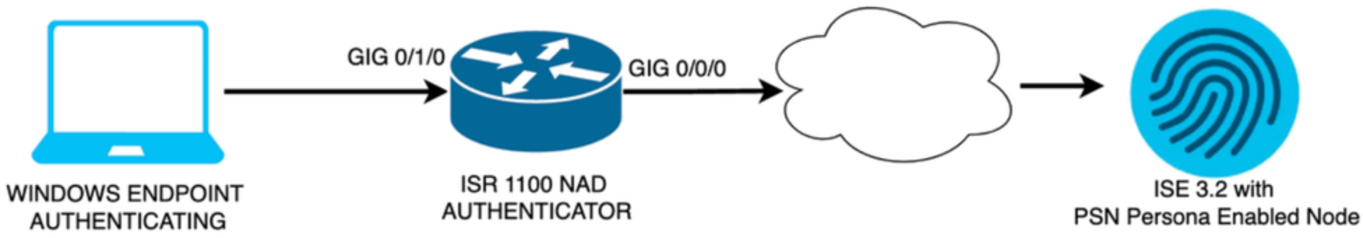
The information in this document is based on these software and hardware versions:

- Cisco Identity Services Engine (ISE) Version
- Cisco C1117 Cisco IOS® XE Software, Version 17.12.02
- Laptop using Windows 10

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Configure

Network Diagram



Network Diagram

Configurations

Perform these steps to configure:

Step 1. Configure ISR 1100 router.

Step 2. Configure Identity Service Engine 3.2.

Step 3. Configure Windows Native Supplicant.

Step 1. Configure ISR 1100 Router

This section explains the basic configuration that at least the NAD must have in order to make dot1x work.

Note: For multi-node ISE deployment, configure the IP of the node that has the PSN persona enabled. This can be enabled if you navigate to ISE under the **Administration > System > Deployment** tab.

```
aaa new-model
aaa session-id common
!
aaa authentication dot1x default group ISE-CLUSTER
aaa authorization network default group ISE-CLUSTER
aaa accounting system default start-stop group ISE-CLUSTER
aaa accounting dot1x default start-stop group ISE-CLUSTER
!
aaa server radius dynamic-author
 client A.B.C.D server-key  <Your shared secret>
!
!
radius server  ISE-PSN-1
 address ipv4 A.B.C.D auth-port 1645 acct-port 1646
 timeout 15
 key <Your shared secret>
!
```

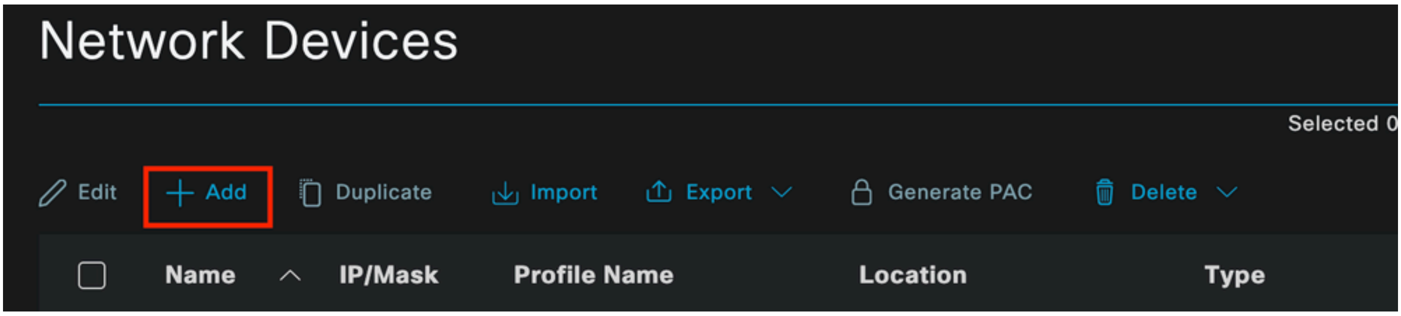
```
!
aaa group server radius ISE-CLUSTER
 server name ISE-PSN-1
!
interface GigabitEthernet0/1/0
 description "Endpoint that supports dot1x"
 switchport access vlan 15
 switchport mode access
 authentication host-mode multi-auth
 authentication order dot1x mab
 authentication priority dot1x mab
 authentication port-control auto
 dot1x pae authenticator
 spanning-tree portfast
```

Step 2. Configure Identity Service Engine 3.2.

2. a. Configure and add the Network Device to use for the authentication.

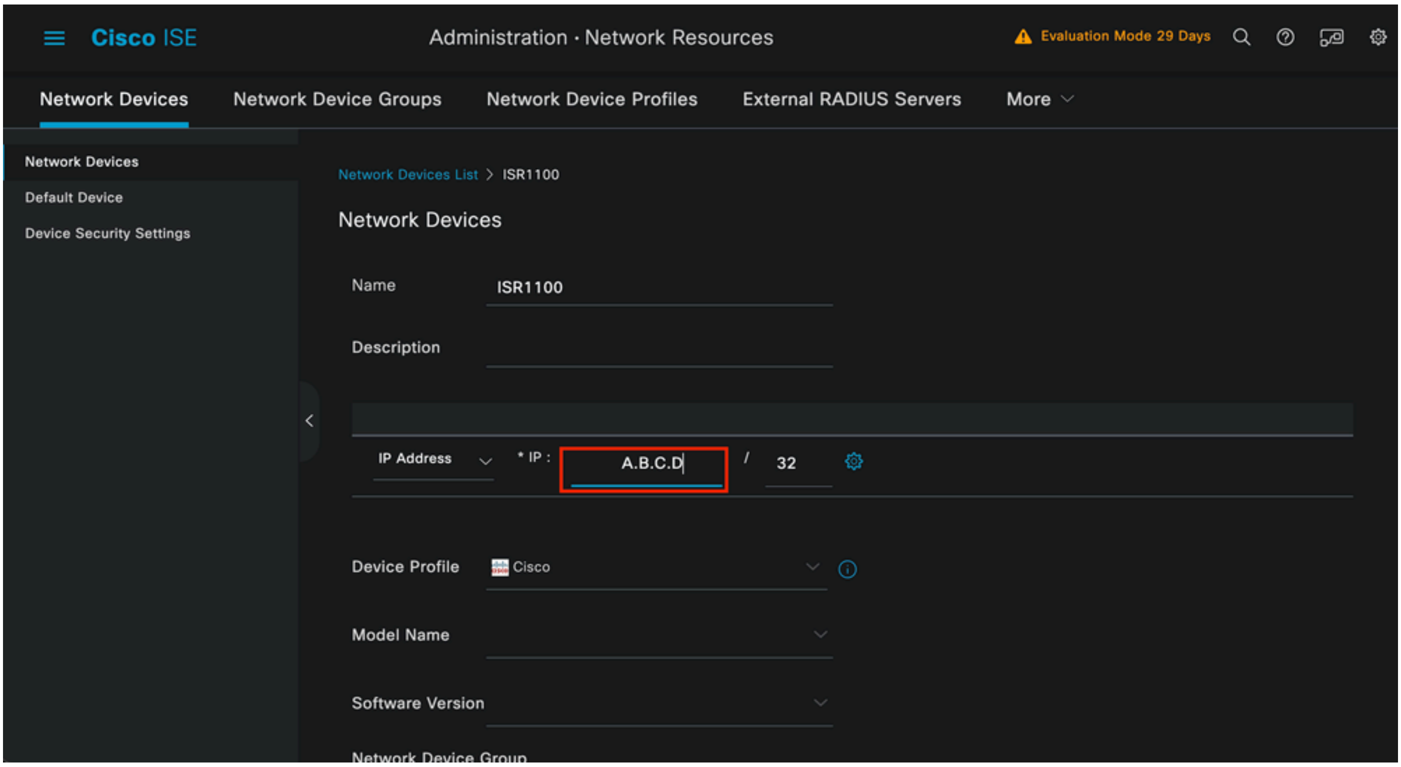
Add the Network Device to ISE **Network Devices** section.

Click the **Add** button to start.



ISE Network Devices

Enter the values, assign a name to the NAD you are creating, and also add the IP that the Network Device uses to contact ISE.



Network Devices

Name: ISR1100

Description:

IP Address * IP : A.B.C.D / 32

Device Profile: Cisco

Model Name:

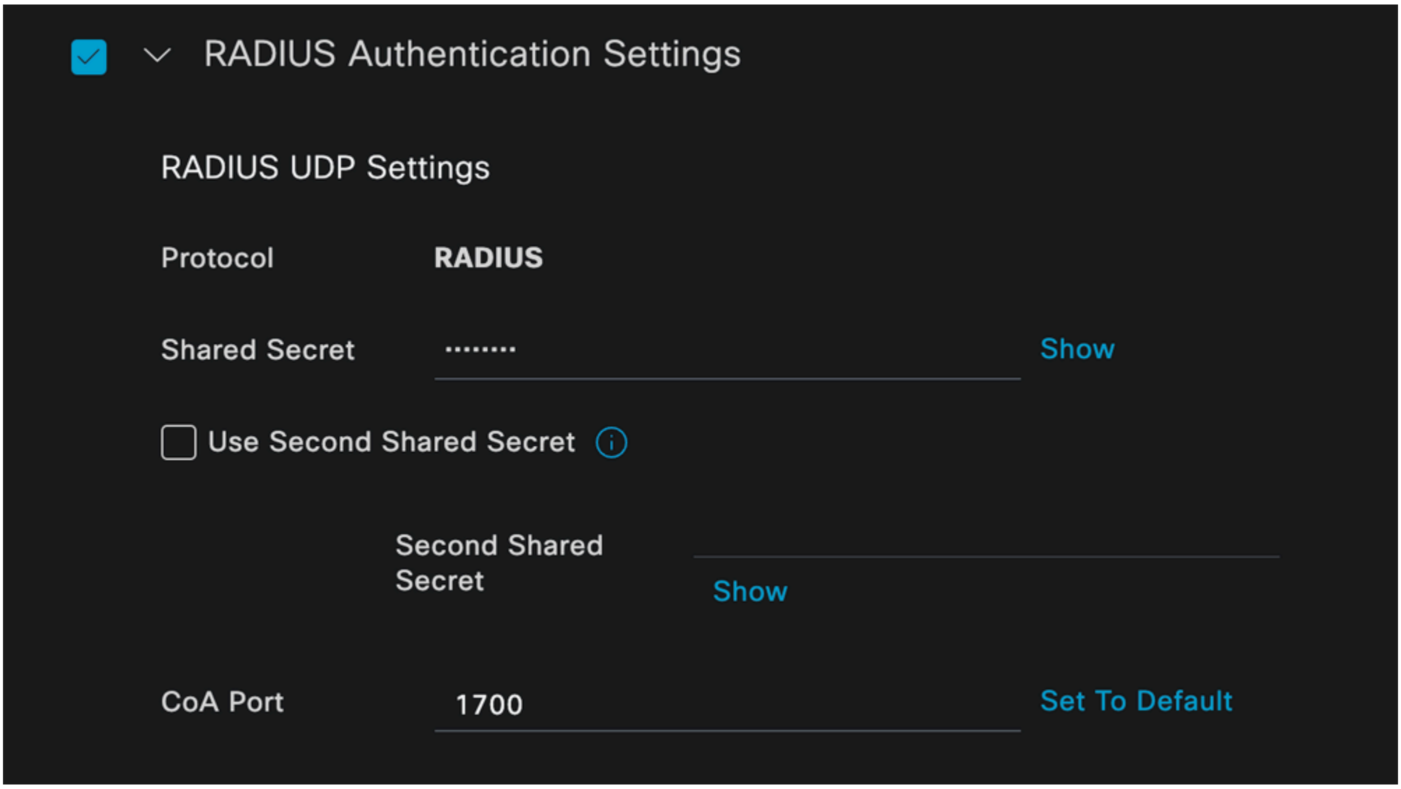
Software Version:

Network Device Group

Network Device Creation Page

On this same page, scroll down to find the **Radius Authentication Settings**. As shown in the next image.

Add the **Shared Secret** that you used under your NAD configuration.



☑ RADIUS Authentication Settings

RADIUS UDP Settings

Protocol: RADIUS

Shared Secret: ········· Show

□ Use Second Shared Secret

Second Shared Secret: Show

CoA Port: 1700 Set To Default

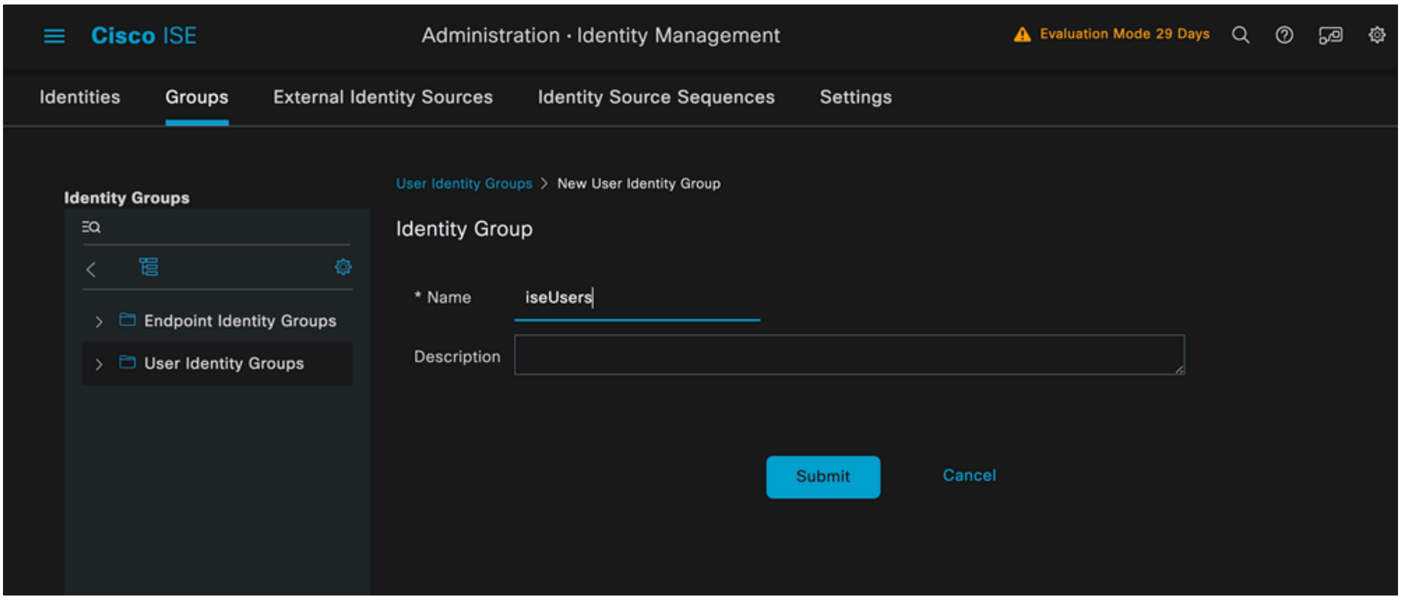
Radius Configuration

Save the changes.

2. b. Configure the identity that is used to authenticate the endpoint.

Note: With the objective of keeping this configuration guide simple ISE local authentication is used.

Navigate to the **Administration > Identity Management > Groups** tab. Create the group and the identity, the group created for this demonstration is **iseUsers.**



Cisco ISE
Administration · Identity Management
Evaluation Mode 29 Days
Identities
Groups
External Identity Sources
Identity Source Sequences
Settings
Identity Groups
Endpoint Identity Groups
User Identity Groups
User Identity Groups > New User Identity Group
Submit
Cancel

Identity Group

* Name: iseUsers

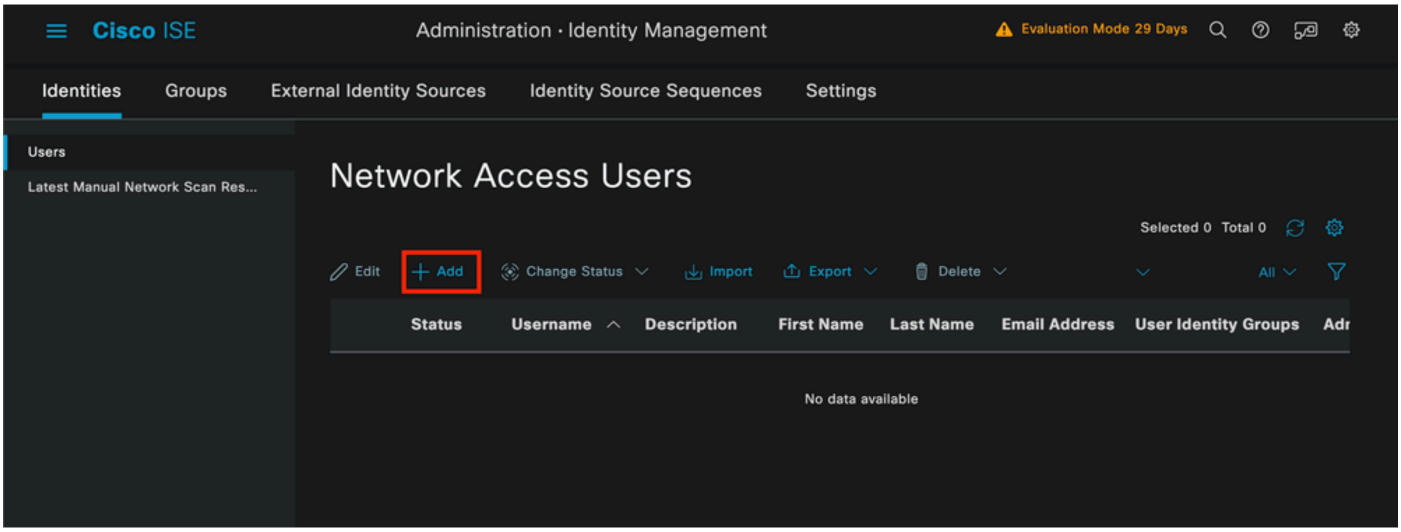
Description:

Identity Group Creation Page

Click the **Submit** button.

Next, navigate to **Administration** > **Identity Management** > **Identity** tab.

Click on **Add**.



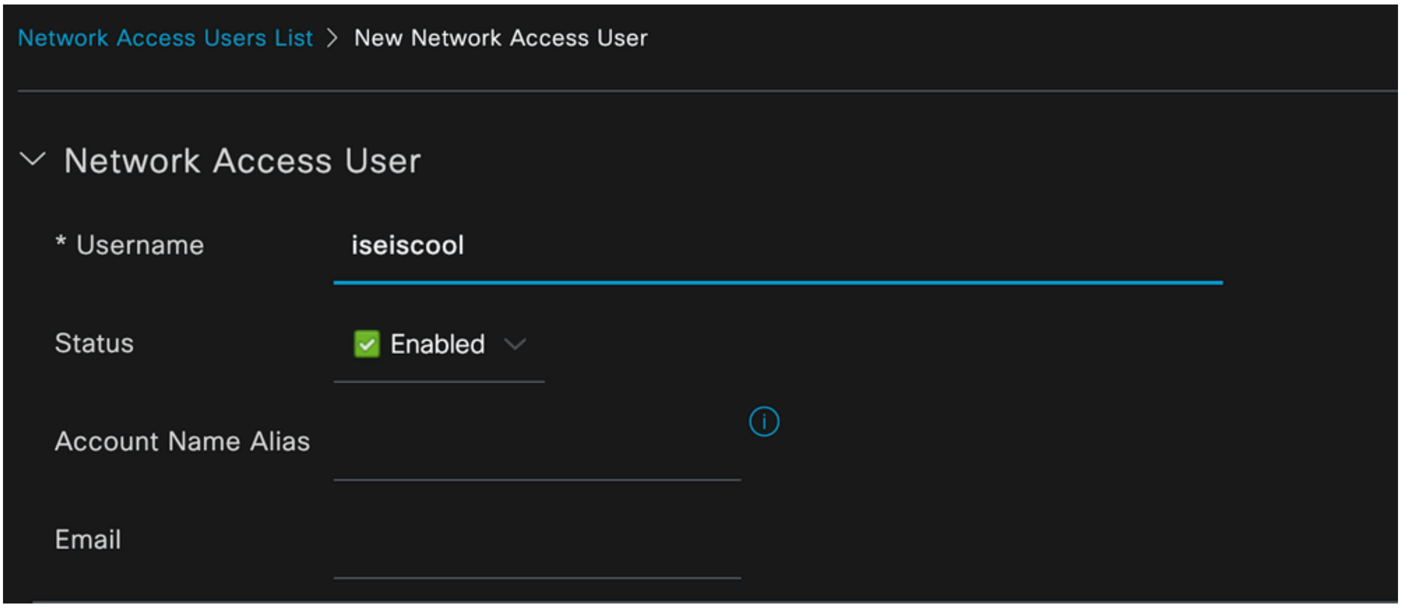
Network Access Users

Status	Username	Description	First Name	Last Name	Email Address	User Identity Groups	Adr

No data available

User Creation Page

As part of the mandatory fields start with the name of the user. The username **iseiscool** is used in this example.



Network Access Users List > New Network Access User

Network Access User

* Username: iseiscool

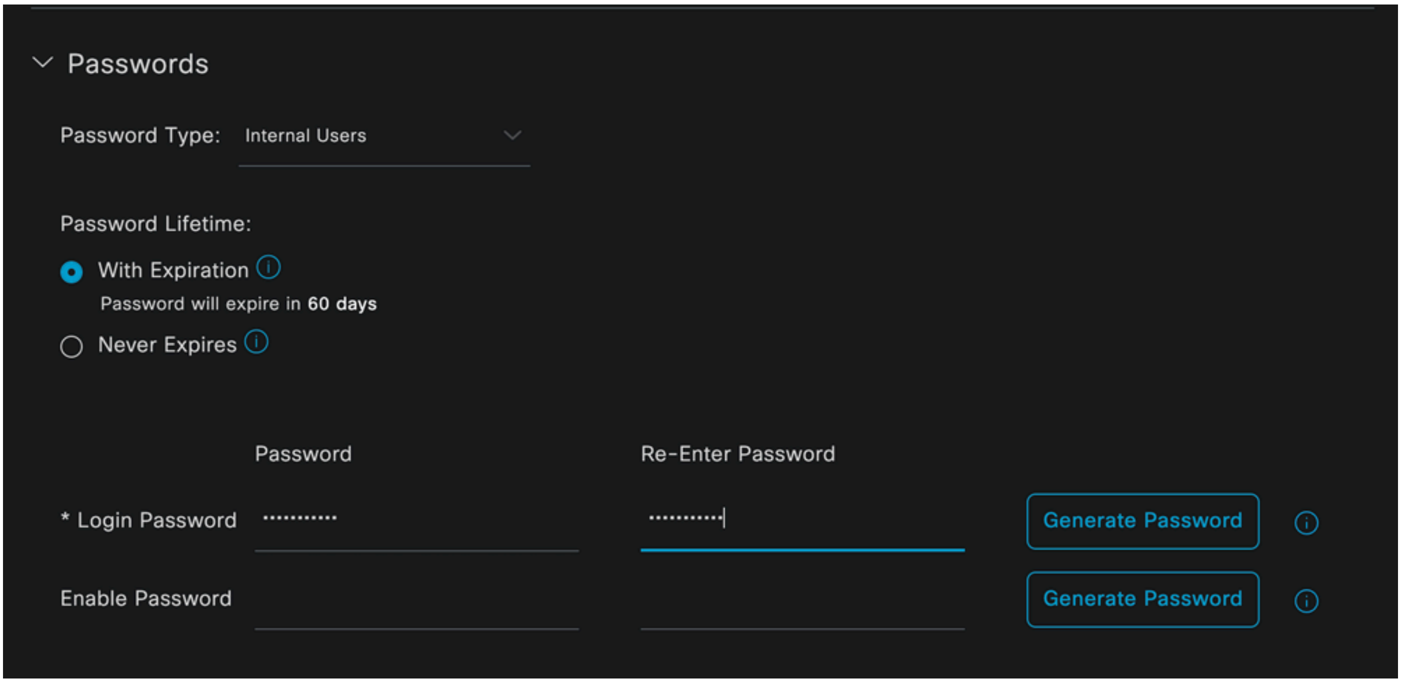
Status: ☑ Enabled

Account Name Alias:

Email:

Name Assigned to the Username

The next step is to assign a password to the username created. **VainillaISE97** is used in this demonstration.



Passwords

Password Type: Internal Users

Password Lifetime:

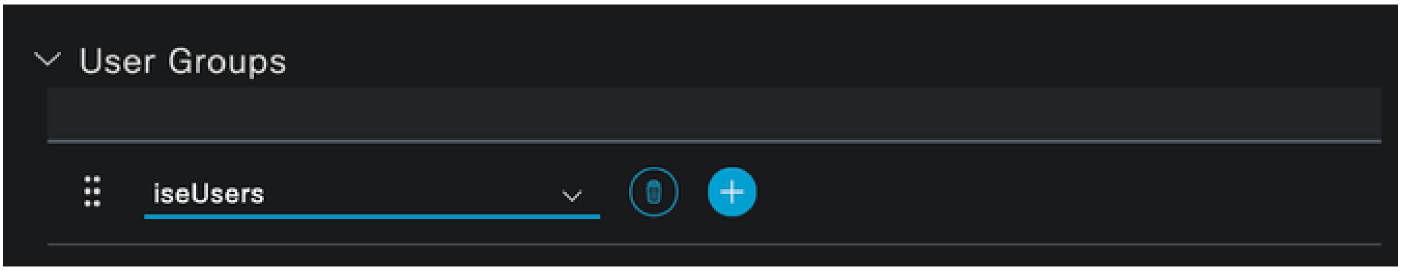
● With Expiration
Password will expire in **60 days**

○ Never Expires

	Password	Re-Enter Password	
* Login Password	···········	···········	Generate Password
Enable Password			Generate Password

Password Creation

Assign the user to the **iseUsers** group.



User Groups

iseUsers

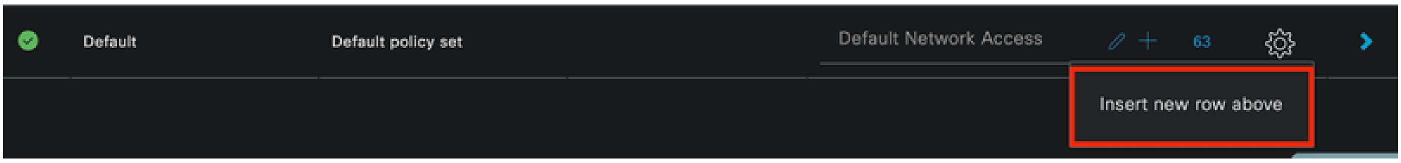
Assignation of User Group

2. c. Configure the Policy Set

Navigate to the **ISE Menu** > **Policy** > **Policy Sets**.

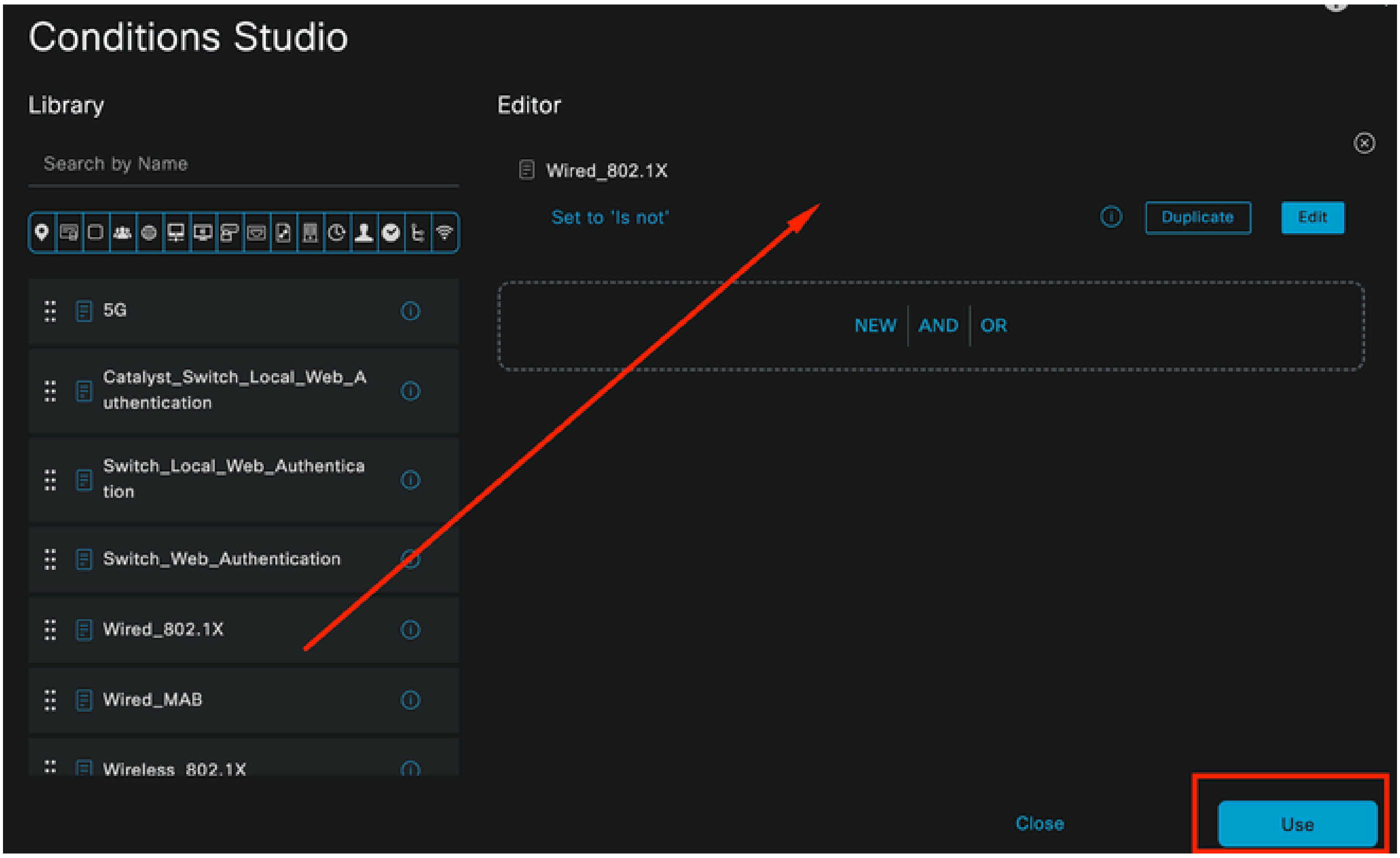
The default policy set can be used. However, in this example a policy set is created and it is called **Wired**. Classifying and differentiating the policy sets helps troubleshooting,

If the add or plus icon is not visible, the gear icon of any policy set can be clicked. Select the gear icon and then select **Insert new row above.**



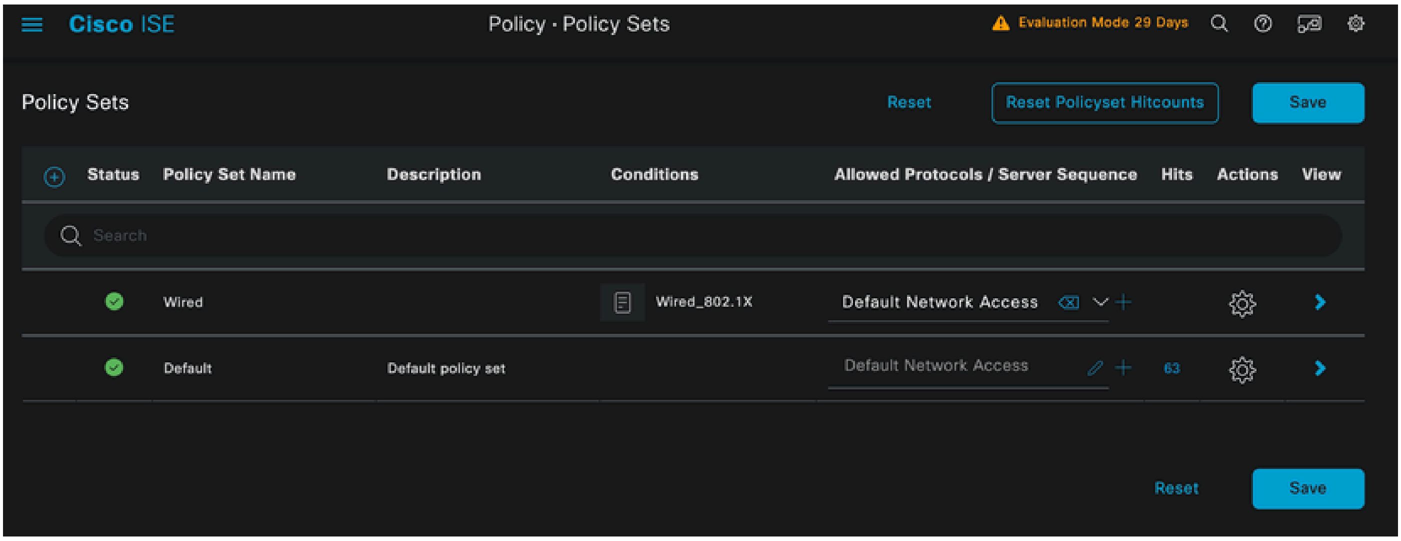
Policy creation

The condition configured in this example is **Wired 8021x** which is a condition preconfigured in ISE fresh deployments. Drag it and then click **Use**.



Condition Studio

Finally, select **Default Network Access** preconfigured allowed protocols service.



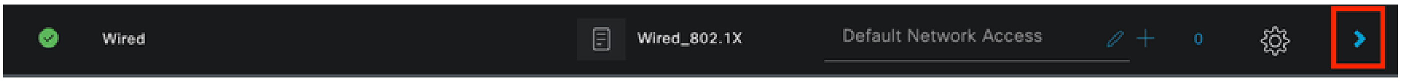
Status	Policy Set Name	Description	Conditions	Allowed Protocols / Server Sequence	Hits	Actions	View
✓	Wired		Wired_802.1X	Default Network Access			
✓	Default	Default policy set		Default Network Access	63		

Policy Set view

Click **Save**.

2. d. Configure the Authentication and Authorization Policies.

Click the arrow that is on the right side of the Policy set that was just created.

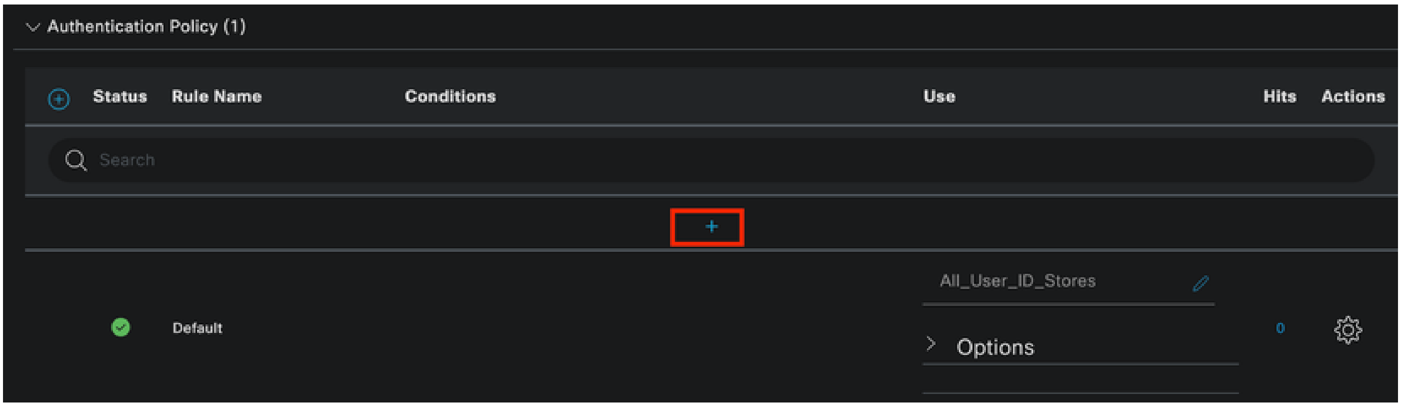


Status	Policy Set Name	Conditions	Allowed Protocols / Server Sequence	Hits
✓	Wired	Wired_802.1X	Default Network Access	0

Wired Policy Set

Expand the Authentication Policy

Click on the + icon.



Status	Rule Name	Conditions	Use	Hits	Actions
✓	Default		All_User_ID_Stores	0	

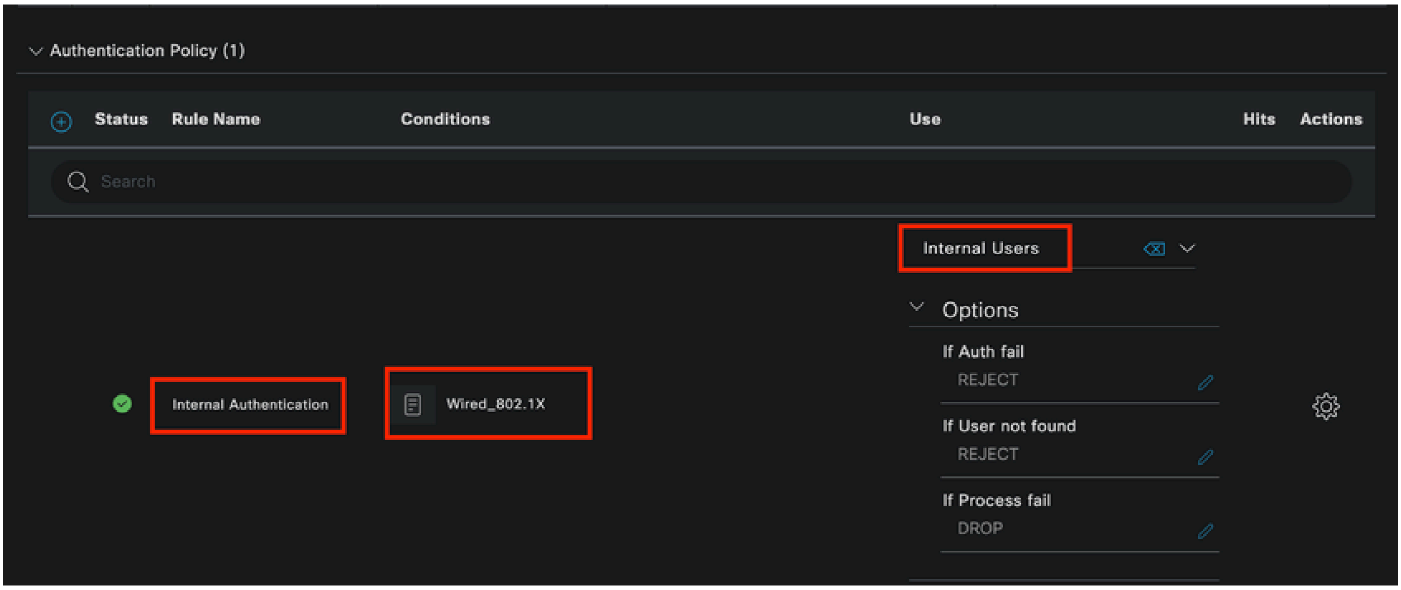
Add Authentication Policy

Assign a name to the Authentication Policy, for this example **Internal Authentication** is used.

Click the + icon on the conditions column for this new Authentication Policy.

The preconfigured condition **Wired Dot1x** ISE comes with can be used.

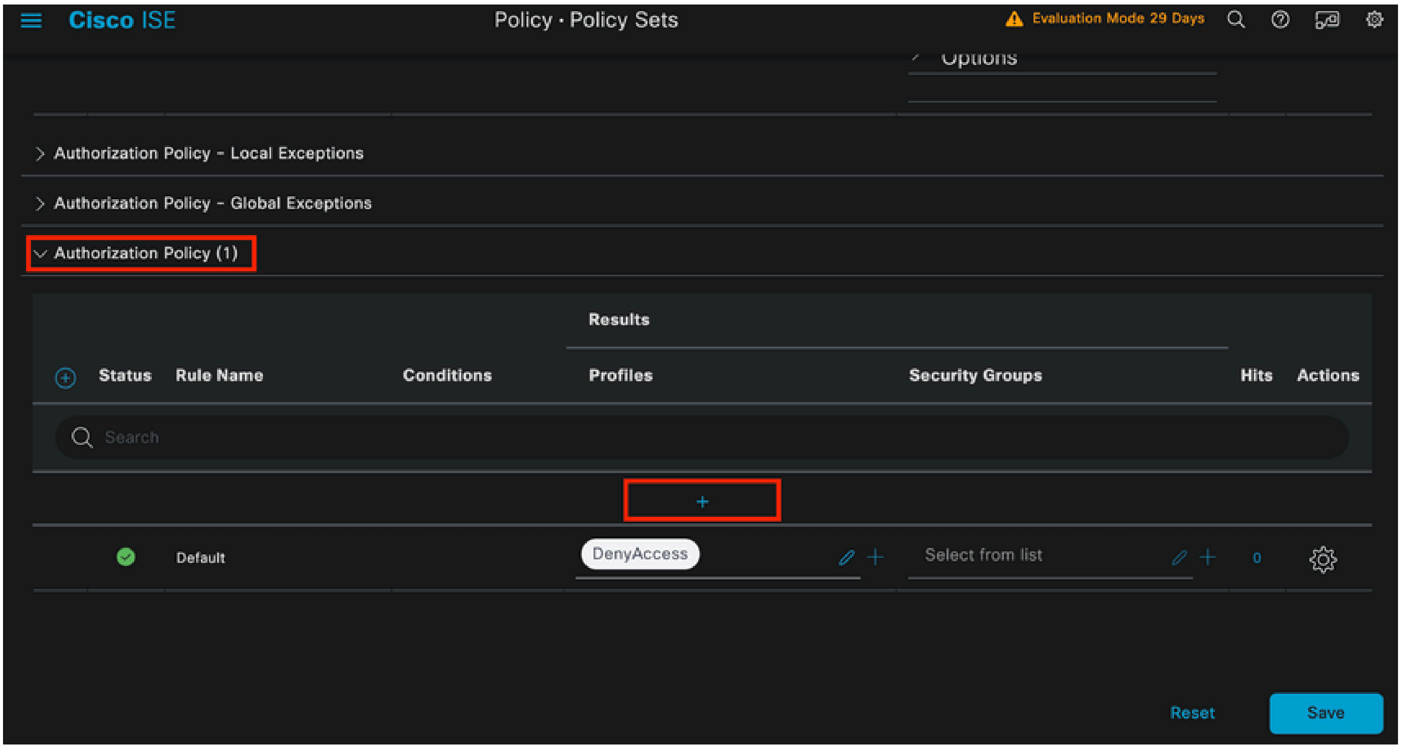
Finally, under the **Use** column select Internal Users from the drop-down list.



Authentiction Policy

Authorization Policy

The **Authorization Policy** section is at the bottom of the page. Expand it and click the **+** icon.



Authorization Policy

Name the **Authorization Policy** you just added, in this configuration example the name **Internal ISE Users** is used.

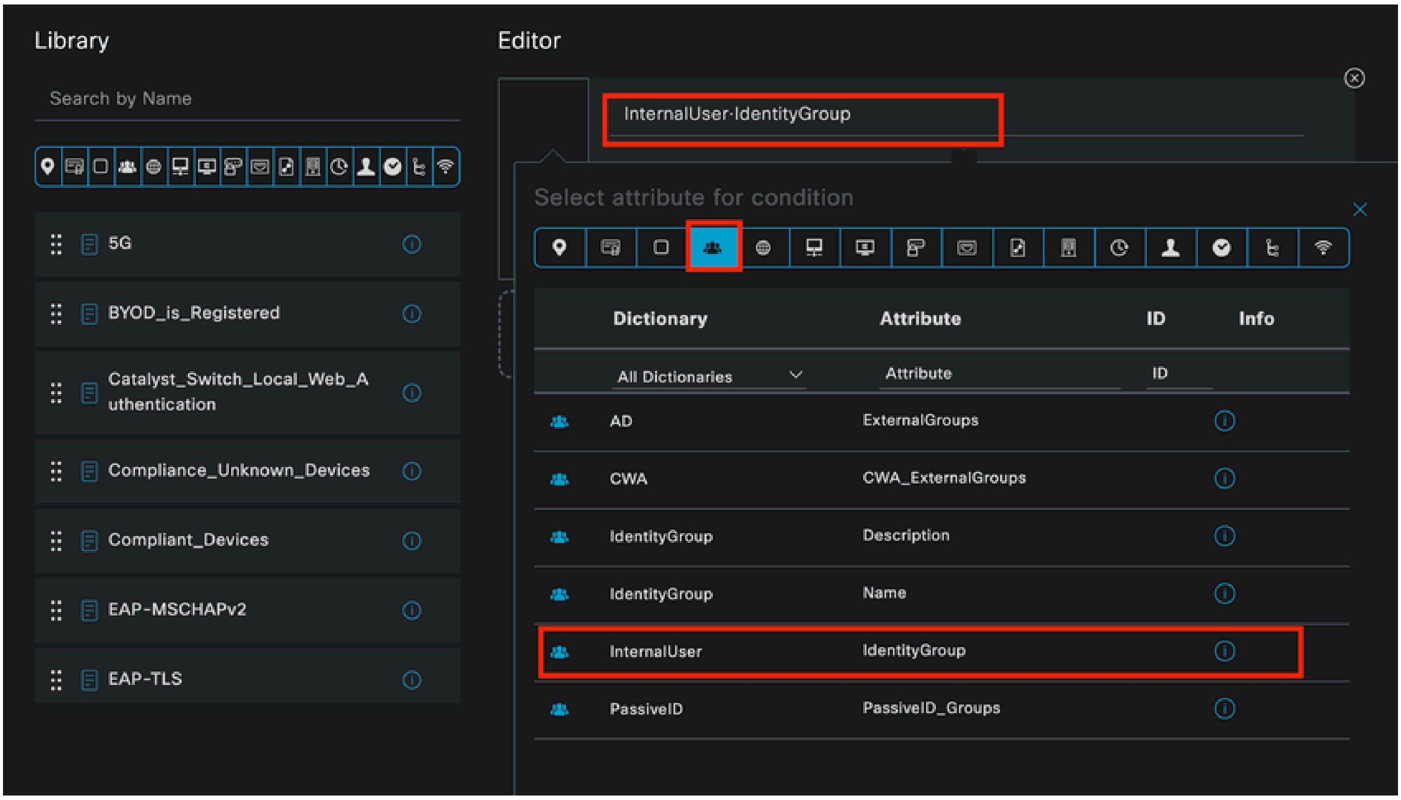
To create a condition for this **Authorization Policy**, click the **+** icon under the **Conditions** column.

The previously created user is part of **IseUsers** group.

Once in the editor, click on the **Click to add an attribute section**.

Select the Identity group icon.

From the dictionary, select the **InternalUser** dictionary that comes with the **Identity Group** attribute.



InternalUser·IdentityGroup

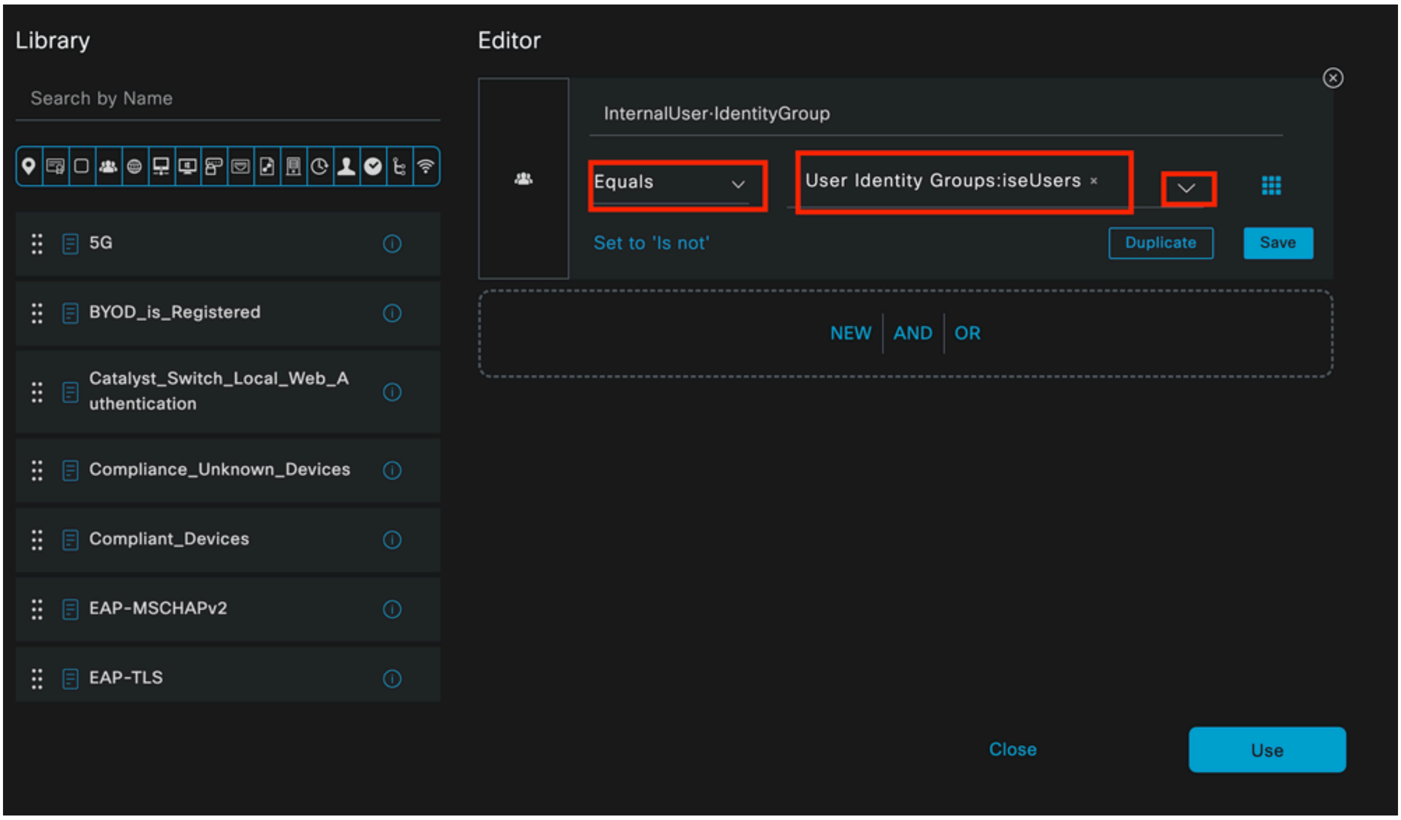
Select attribute for condition

Dictionary	Attribute	ID	Info
All Dictionaries	Attribute	ID	
AD	ExternalGroups		ⓘ
CWA	CWA_ExternalGroups		ⓘ
IdentityGroup	Description		ⓘ
IdentityGroup	Name		ⓘ
InternalUser	IdentityGroup		ⓘ
PassiveID	PassiveID_Groups		ⓘ

Condition Studio for Authorization Policy

Select the **Equals** operator.

From the User Identity Groups drop-down list, select the group **IseUsers**.



InternalUser·IdentityGroup

Equals

User Identity Groups:iseUsers ×

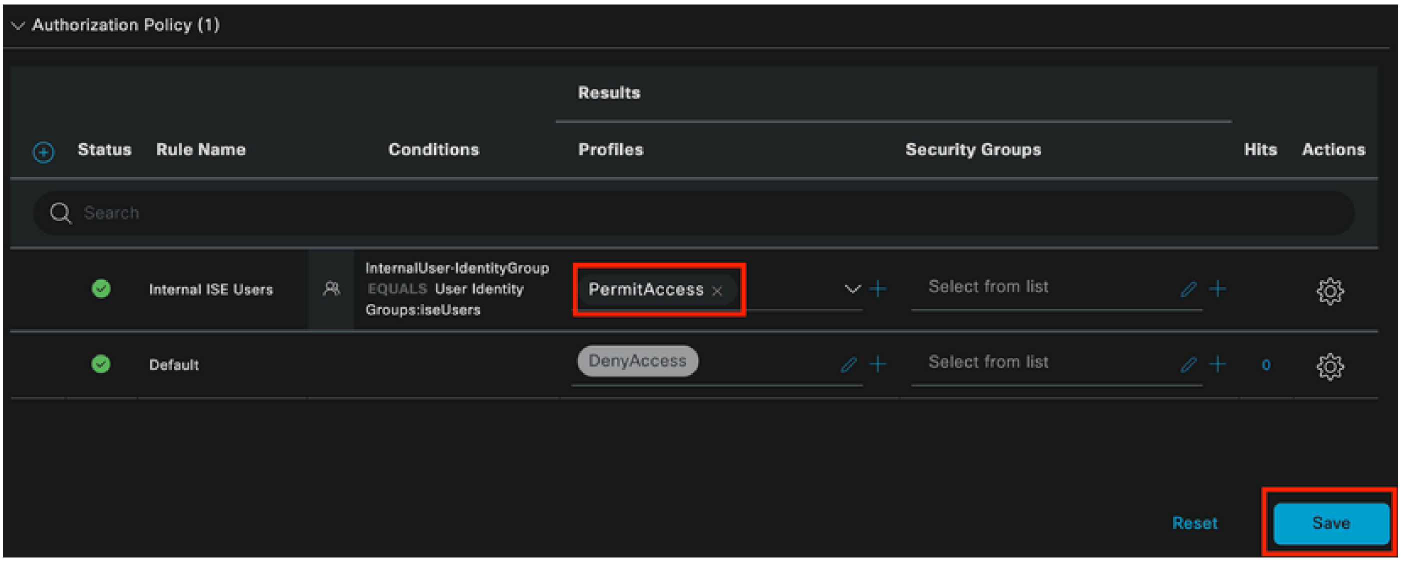
Condition for Authorization Policy Finished

Click **Use**.

Finally, select the **Result Authorization Profile** that receives the authentications part of this Identity group.

Note: Notice that the authentications coming to ISE and are hitting this Wired Dot1x Policy set that are not part of the Users Identity Group **ISEUsers**, now hit the default **Authorization Policy**. This has the profile result **DenyAccess**.

ISE is preconfigured with the **Permit Access** profile. Select it.



Authorization Policy (1)

	Status	Rule Name	Conditions	Results: Profiles	Results: Security Groups	Hits	Actions
	✓	Internal ISE Users	InternalUser-IdentityGroup EQUALS User Identity Groups:iseUsers	PermitAccess	Select from list		⚙
	✓	Default		DenyAccess	Select from list	0	⚙

Authorization Policy Finished

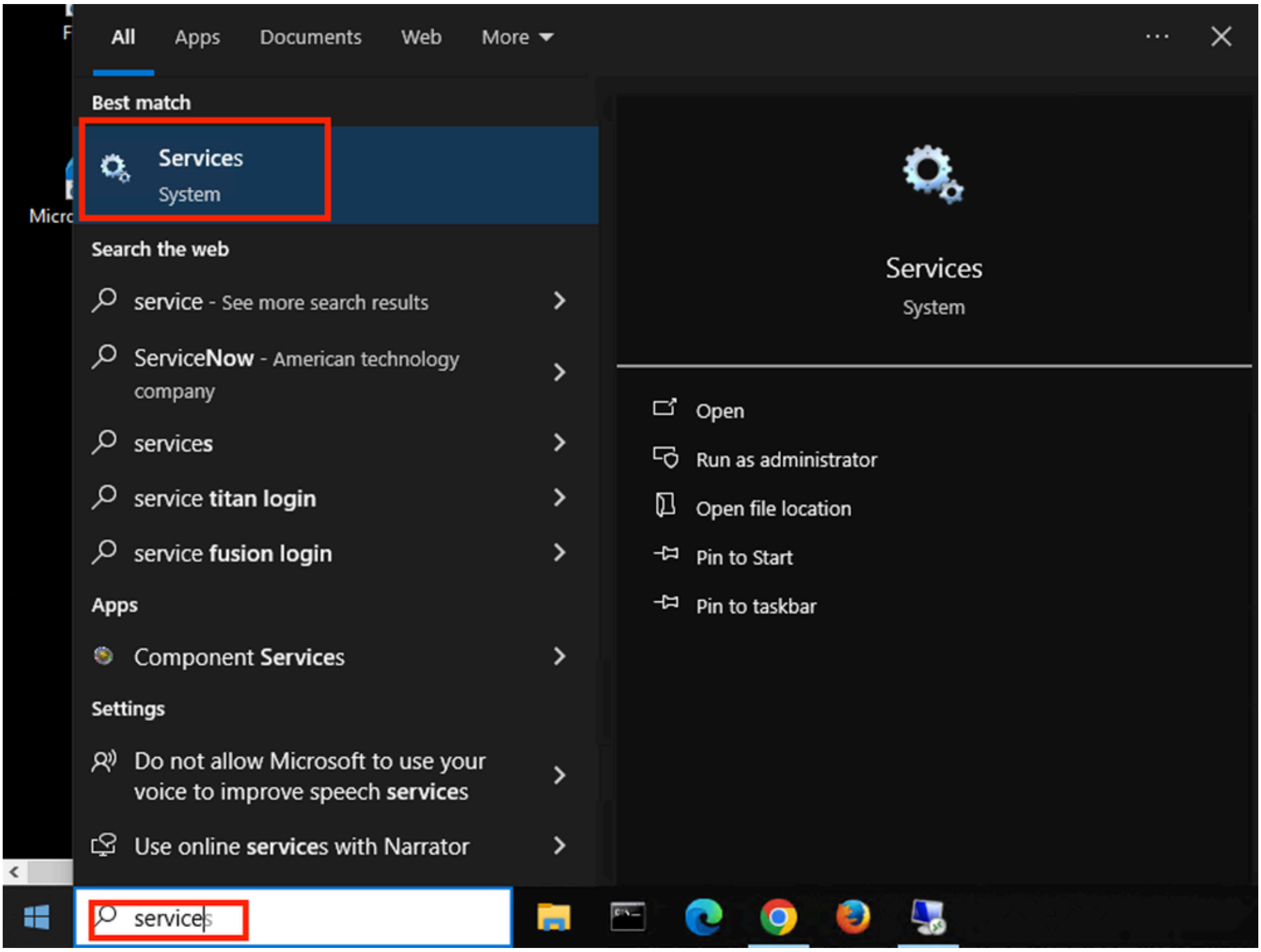
Click **Save**.

The configuration for ISE is complete.

Step 3. Windows Native Supplicant Configuration

3. a. Enable Wired dot1x on Windows.

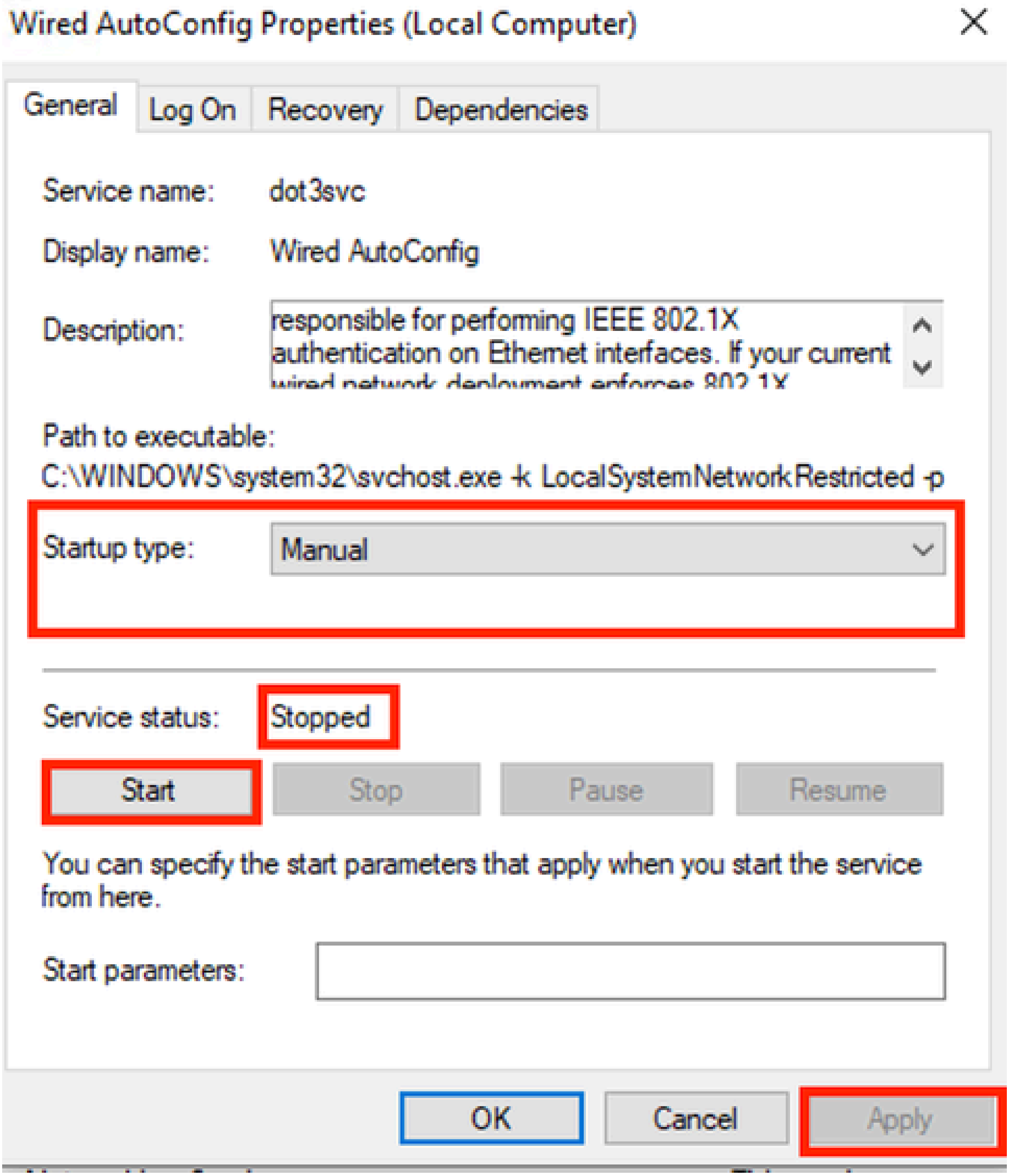
From the Windows Search Bar open **Services**.



Windows Search Bar

At the bottom of the Services list, locate **Wired Autoconfig**.

Right-click on Wired AutoConfig and select **Properties**.



Wired AutoConfig Properties (Local Computer)

Service name: dot3svc

Display name: Wired AutoConfig

Description: responsible for perfoming IEEE 802.1X authentication on Ethemet interfaces. If your current wired network deployment enforces 802.1X

Path to executable:
C:\WINDOWS\system32\svchost.exe -k LocalSystemNetworkRestricted -p

Startup type: Manual

Service status: Stopped

You can specify the start parameters that apply when you start the service from here.

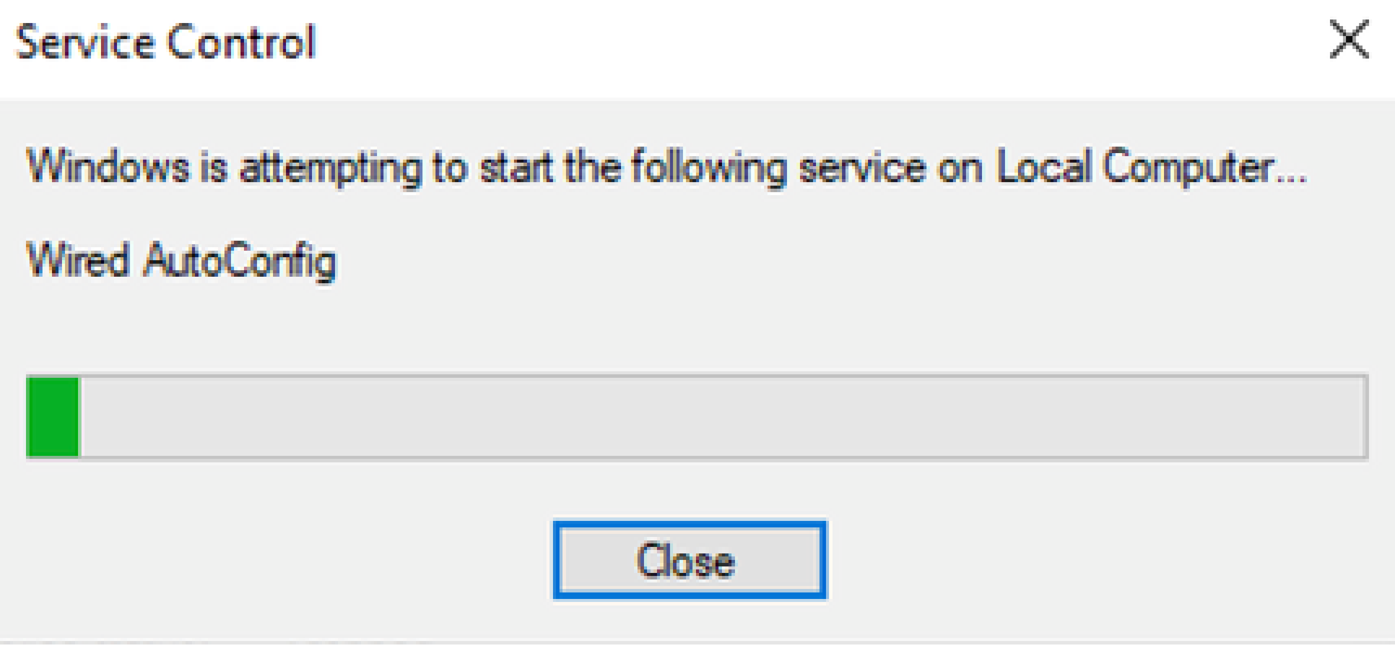
Start parameters:

Properties Window

Note: The Wired AutoConfig (DOT3SVC) service is responsible for performing IEEE 802.1X authentication on Ethernet interfaces.

The **Manual** startup type is selected.

Since the service status is **Stopped**. Click **Start**.



Service Control

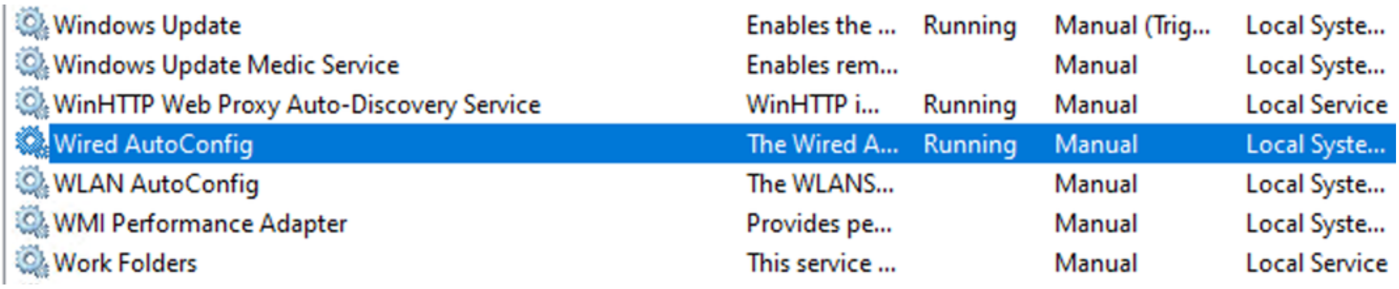
Windows is attempting to start the following service on Local Computer...

Wired AutoConfig

Service Control

Next, click **OK**.

The service is running after this.



Windows Update	Enables the ...	Running	Manual (Trig...	Local Syste...
Windows Update Medic Service	Enables rem...		Manual	Local Syste...
WinHTTP Web Proxy Auto-Discovery Service	WinHTTP i...	Running	Manual	Local Service
Wired AutoConfig	The Wired A...	Running	Manual	Local Syste...
WLAN AutoConfig	The WLANS...		Manual	Local Syste...
WMI Performance Adapter	Provides pe...		Manual	Local Syste...
Work Folders	This service ...		Manual	Local Service

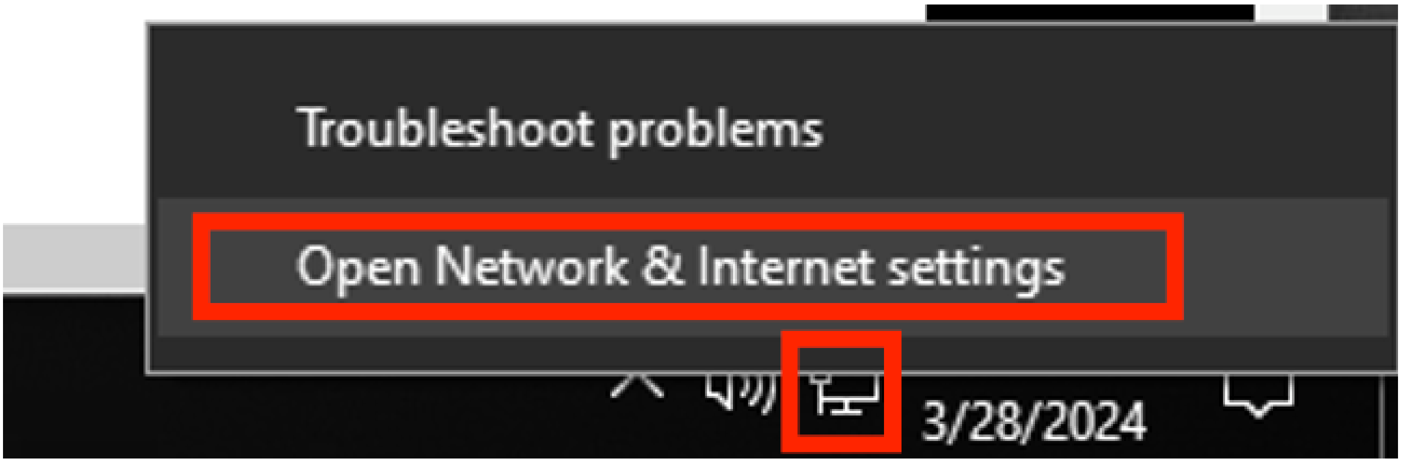
Wired AutoConfig Service

3. b. Configure the Windows laptop interface that is attached to the NAD Authenticator (ISR 1100).

From the task bar, locate the right-side corner, then use the computer icon.

Double-click on the computer icon.

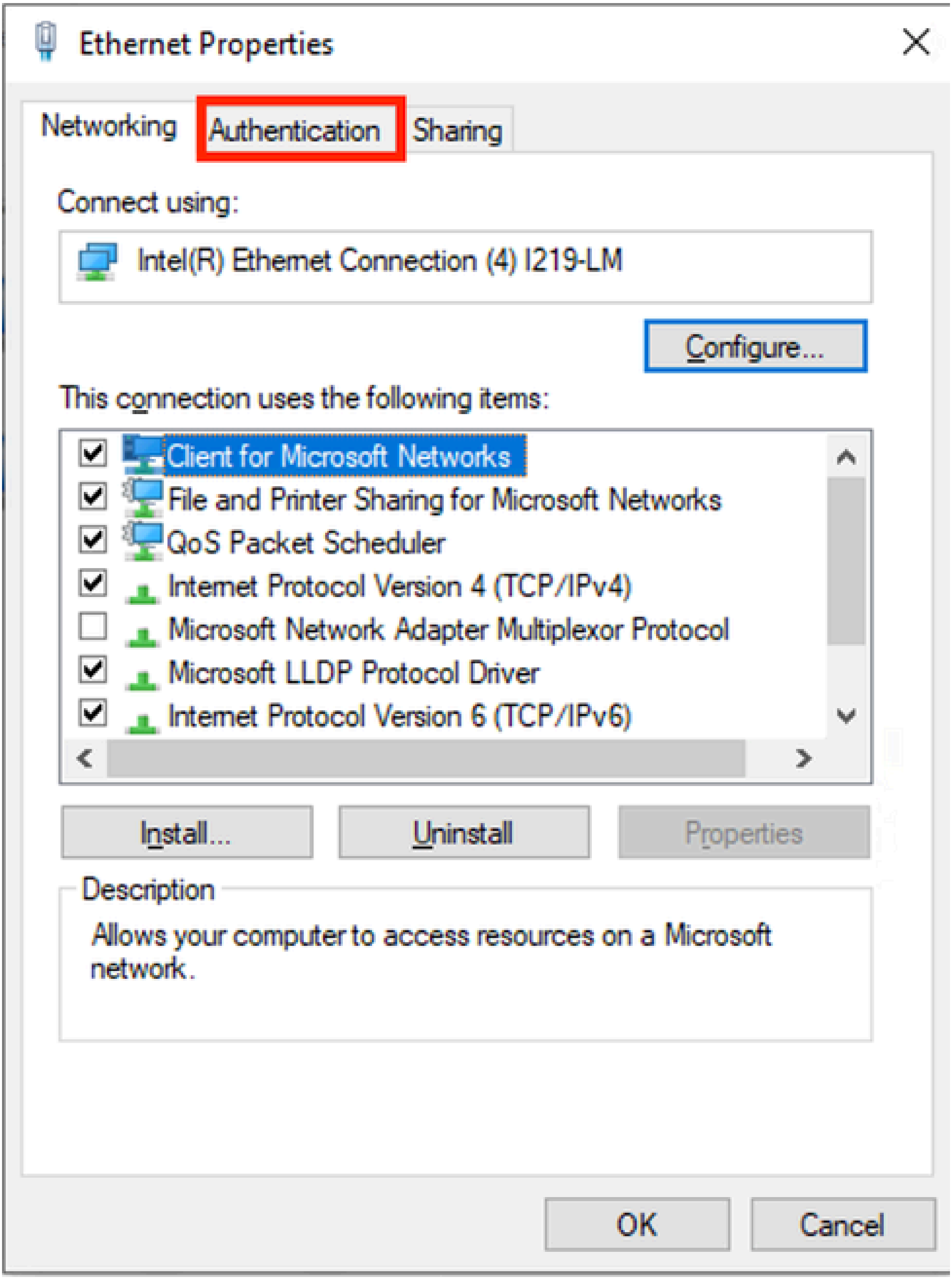
Select **Open Network & Internet Settings**.



Windows Task Bar

Once the **Network Connections** window is opened, right-click on the Ethernet interface which is attached to the ISR Gig 0/1/0. Click on **Properties** option.

Click the **Authentication** tab.



Connect using:

Intel(R) Ethernet Connection (4) I219-LM

This connection uses the following items:

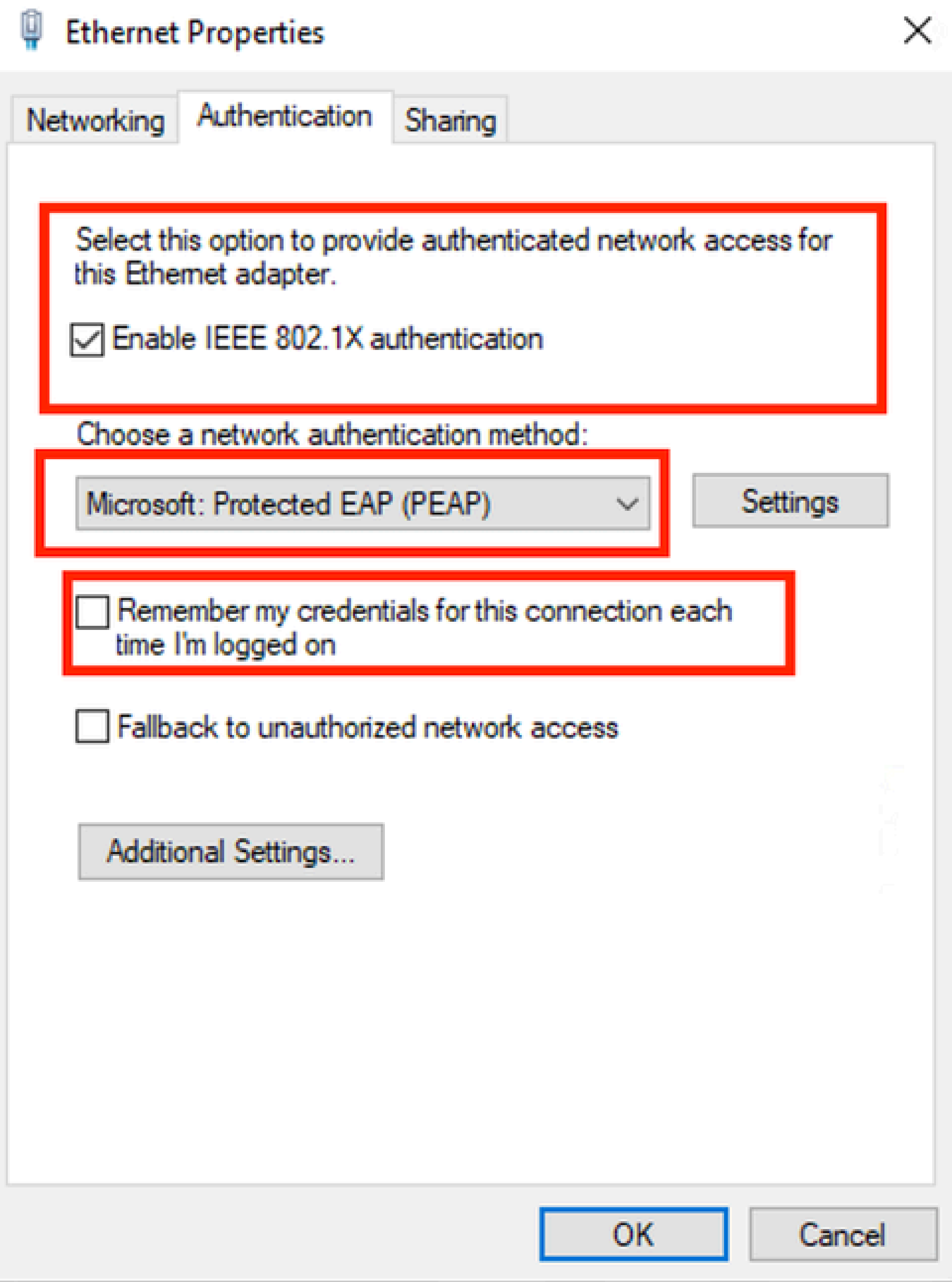
- ☑ Client for Microsoft Networks
- ☑ File and Printer Sharing for Microsoft Networks
- ☑ QoS Packet Scheduler
- ☑ Internet Protocol Version 4 (TCP/IPv4)
- ☐ Microsoft Network Adapter Multiplexor Protocol
- ☑ Microsoft LLDP Protocol Driver
- ☑ Internet Protocol Version 6 (TCP/IPv6)

Description

Allows your computer to access resources on a Microsoft network.

Interface Ethernet Properties

Select the checkbox **Enable IEEE 802.1X authentication**.



Select this option to provide authenticated network access for this Ethernet adapter.

☑ Enable IEEE 802.1X authentication

Choose a network authentication method:

Microsoft: Protected EAP (PEAP)

□ Remember my credentials for this connection each time I'm logged on

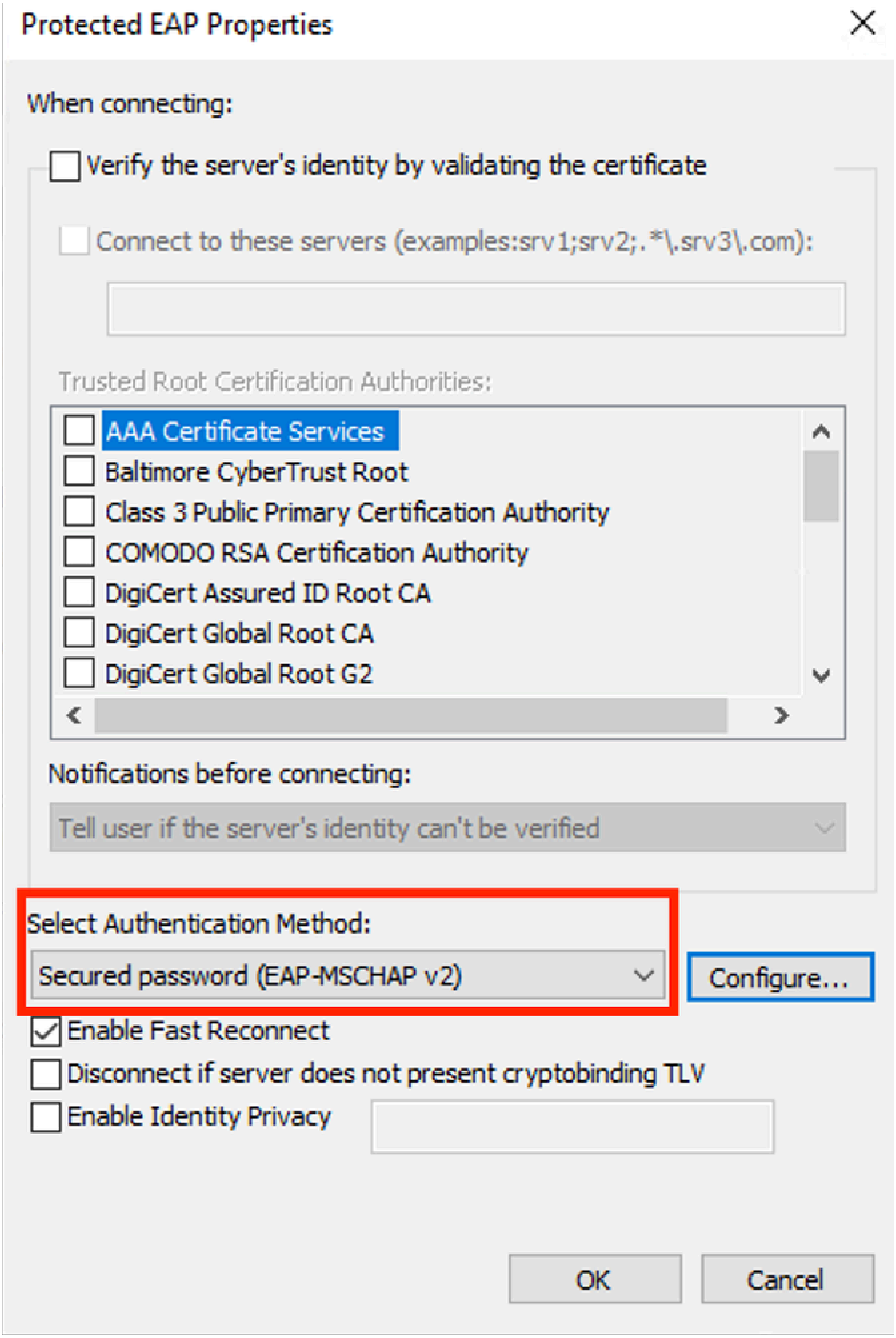
□ Fallback to unauthorized network access

Authentication Ethernet Properties

Select **Protected EAP (PEAP)**.

Uncheck the option **Remember my credentials for this connection each time I'm logged on**.

Click **Settings.**



Protected EAP Properties

When connecting:

□ Verify the server's identity by validating the certificate

□ Connect to these servers (examples:srv1;srv2;.*\.srv3\.com):

Trusted Root Certification Authorities:

- □ AAA Certificate Services
- □ Baltimore CyberTrust Root
- □ Class 3 Public Primary Certification Authority
- □ COMODO RSA Certification Authority
- □ DigiCert Assured ID Root CA
- □ DigiCert Global Root CA
- □ DigiCert Global Root G2

Notifications before connecting:

Tell user if the server's identity can't be verified

Select Authentication Method:

Secured password (EAP-MSCHAP v2)

☑ Enable Fast Reconnect

□ Disconnect if server does not present cryptobinding TLV

□ Enable Identity Privacy

PEAP Properties

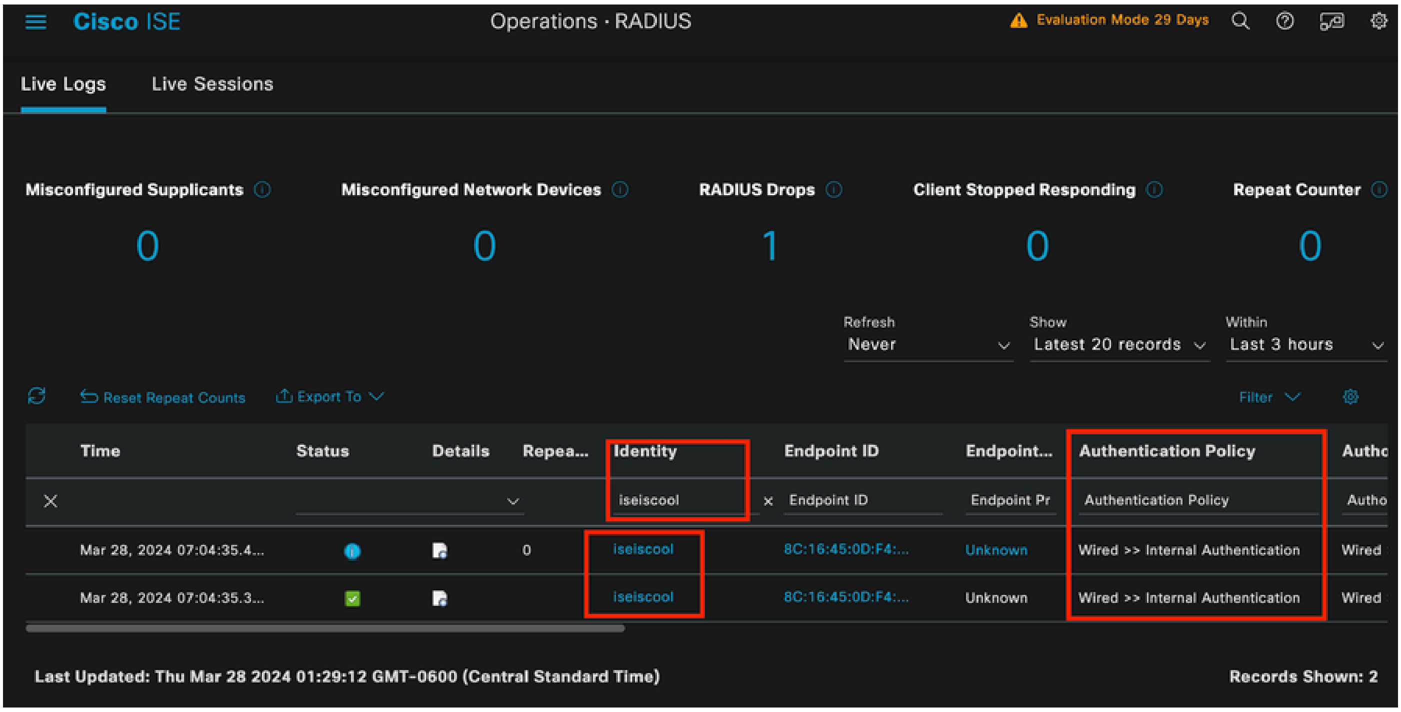
```
            Interface:  GigabitEthernet0/1/0

               IIF-ID:  0x08767C0D

          MAC Address:  8c16.450d.f42b

         IPv6 Address:  Unknown

         IPv4 Address:  Unknown

            User-Name:  iseiscool <--------- The username configured for Windows Native Supplicant

               Status:  Authorized <--------- An indication that this session was authorized by the PSN

               Domain:  DATA

       Oper host mode:  multi-auth

     Oper control dir:  both

      Session timeout:  N/A

    Common Session ID:  22781F0A0000000C83E28461

      Acct Session ID:  0x00000003

               Handle:  0xc6000002

       Current Policy:  POLICY_Gi0/1/0




Local Policies:

        Service Template: DEFAULT_LINKSEC_POLICY_SHOULD_SECURE (priority 150)

      Security Policy:  Should Secure



Server Policies:




Method status list:

       Method           State

        dot1x           Authc Success <--------- An indication that dot1x is used for this authenticati
```

```
Router#
```

ISE Logs

Navigate to **Operations** > **Radius** > **Live logs** tab.

Filter by the username identity, in this example the username **iseiscool** is used.



Misconfigured Supplicants	Misconfigured Network Devices	RADIUS Drops	Client Stopped Responding	Repeat Counter
0	0	1	0	0

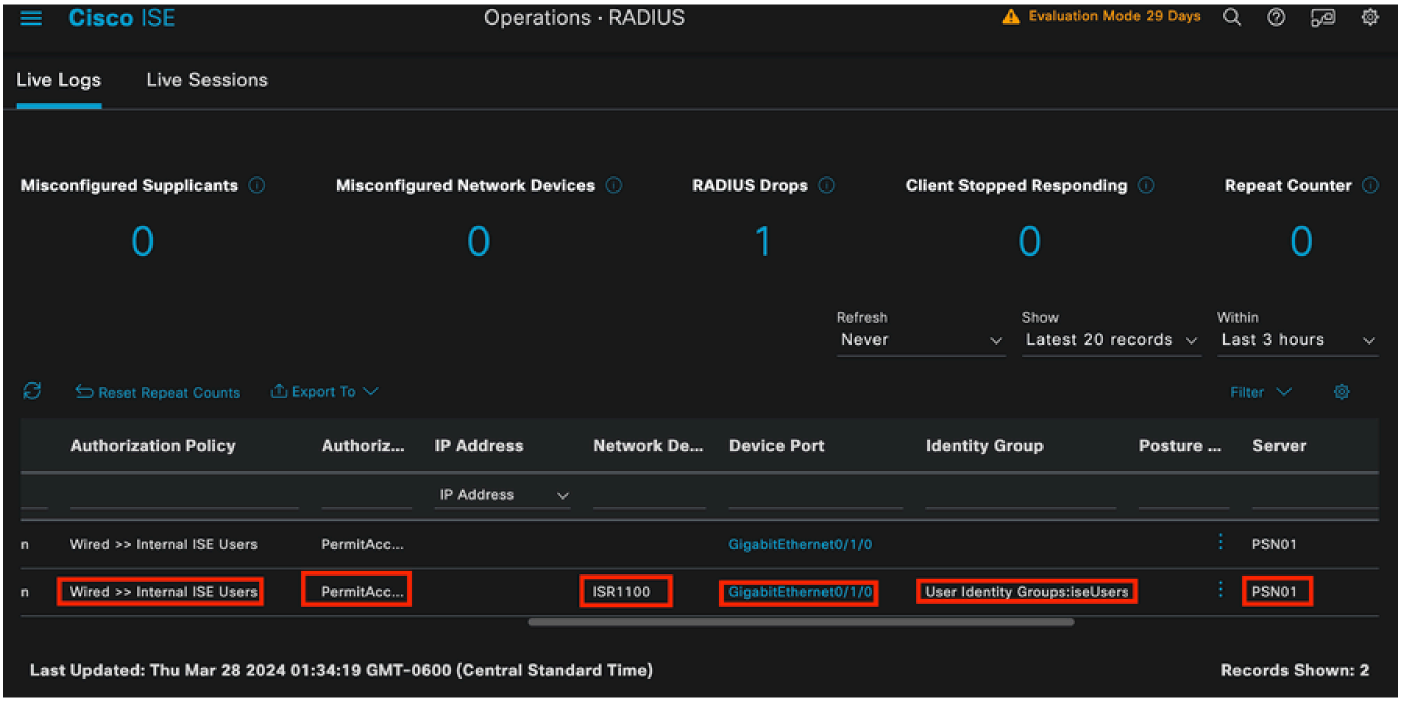
Refresh: Never
Show: Latest 20 records
Within: Last 3 hours

Time	Status	Details	Repea...	Identity	Endpoint ID	Endpoint...	Authentication Policy	Autho
				iseiscool	Endpoint ID	Endpoint Pr	Authentication Policy	Autho
Mar 28, 2024 07:04:35.4...	ⓘ	🗎	0	iseiscool	8C:16:45:0D:F4:...	Unknown	Wired >> Internal Authentication	Wired
Mar 28, 2024 07:04:35.3...	☑	🗎		iseiscool	8C:16:45:0D:F4:...	Unknown	Wired >> Internal Authentication	Wired

Last Updated: Thu Mar 28 2024 01:29:12 GMT-0600 (Central Standard Time)

Records Shown: 2

ISE Livelogs



Misconfigured Supplicants	Misconfigured Network Devices	RADIUS Drops	Client Stopped Responding	Repeat Counter
0	0	1	0	0

Refresh: Never
Show: Latest 20 records
Within: Last 3 hours

	Authorization Policy	Authoriz...	IP Address	Network De...	Device Port	Identity Group	Posture ...	Server
			IP Address					
n	Wired >> Internal ISE Users	PermitAcc...			GigabitEthernet0/1/0		⋮	PSN01
n	Wired >> Internal ISE Users	PermitAcc...		ISR1100	GigabitEthernet0/1/0	User Identity Groups:iseUsers	⋮	PSN01

Last Updated: Thu Mar 28 2024 01:34:19 GMT-0600 (Central Standard Time)

Records Shown: 2

ISE Livelogs

Notice that from this quick view, live logs provide key information:

- Timestamp of the authentication.
- Identity used.
- Endpoint mac address.
- Policy set and Authentication Policy that was hit.
- Policy set and Authorization Policy that was hit.
- Authorization Profile Result.
- The network device that sends the Radius request to ISE.
- The interface where the endpoint is attached to.
- The Identity Group of the user that was authenticated.
- The Policy Server Node (PSN) that handled the authentication.

Troubleshoot

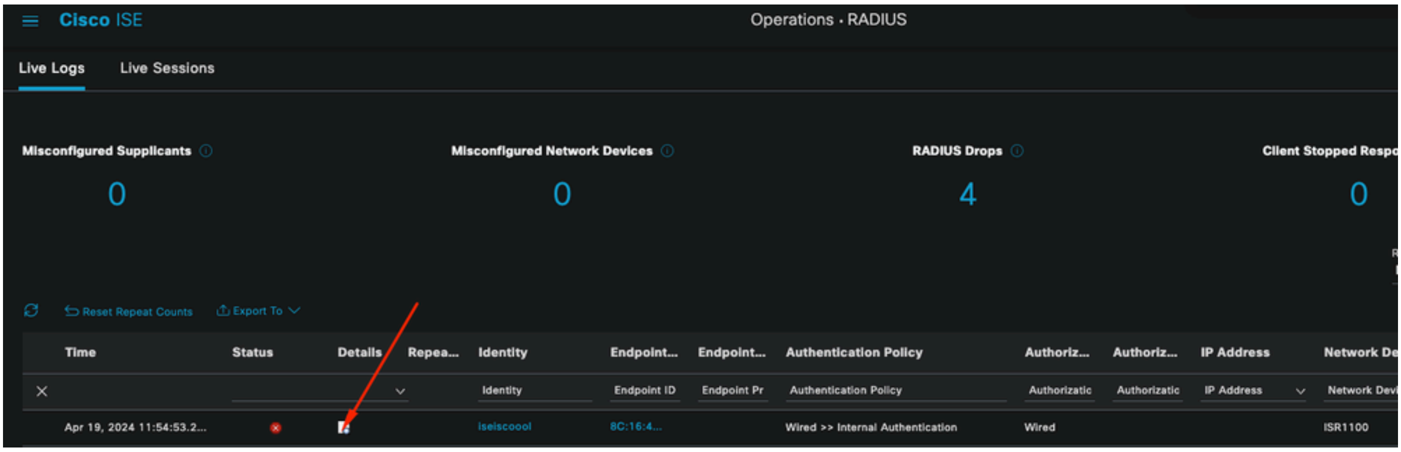
1 - Reading ISE Live Log Details

Navigate to **Operations > Radius > Live logs** tab, filter by **Auth status: Failed** OR by the username used OR by the MAC address OR by the Network Access Device used.

Access the **Operations > Radius > Live logs > Desired authentication > Live log** details.

On the same page, once the authentication is filtered, click on the **Search** Icon.

First Scenario: The user enters their username with a typo.



Misconfigured Supplicants 0

Misconfigured Network Devices 0

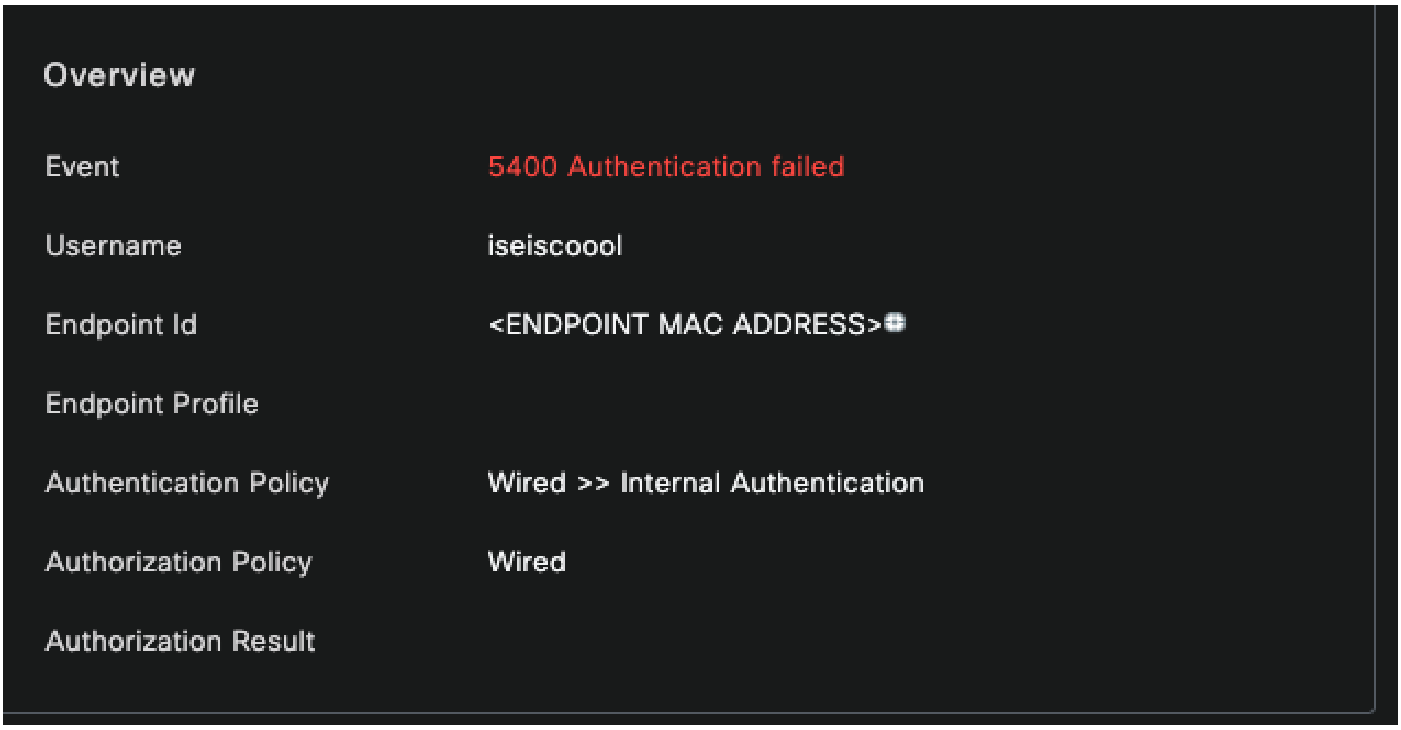
RADIUS Drops 4

Client Stopped Respo 0

Time	Status	Details	Repea...	Identity	Endpoint...	Endpoint...	Authentication Policy	Authoriz...	Authoriz...	IP Address	Network De
				Identity	Endpoint ID	Endpoint Pr	Authentication Policy	Authorizatic	Authorizatic	IP Address	Network Devi
Apr 19, 2024 11:54:53.2...	☒	▨		iseiscoool	8C:16:4...		Wired >> Internal Authentication	Wired			ISR1100

Opening Live Log Details

Once the live log detail is opened you can see that the authentication failed also the username used is listed.

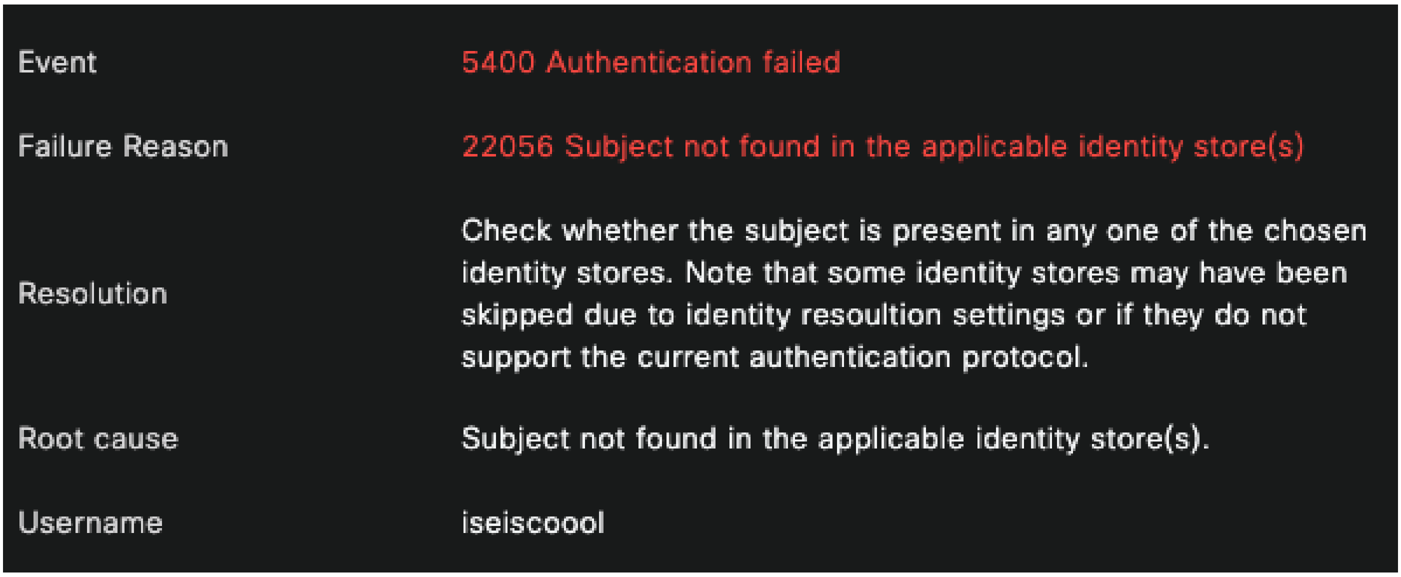


Overview

Event	5400 Authentication failed
Username	iseiscoool
Endpoint Id	<ENDPOINT MAC ADDRESS>
Endpoint Profile	
Authentication Policy	Wired >> Internal Authentication
Authorization Policy	Wired
Authorization Result	

Overview Section

Then on the same live log detail, in the Authentication Details section, it can be found the **Failure Reason**, **Root Cause**, and **Resolution** of the error.

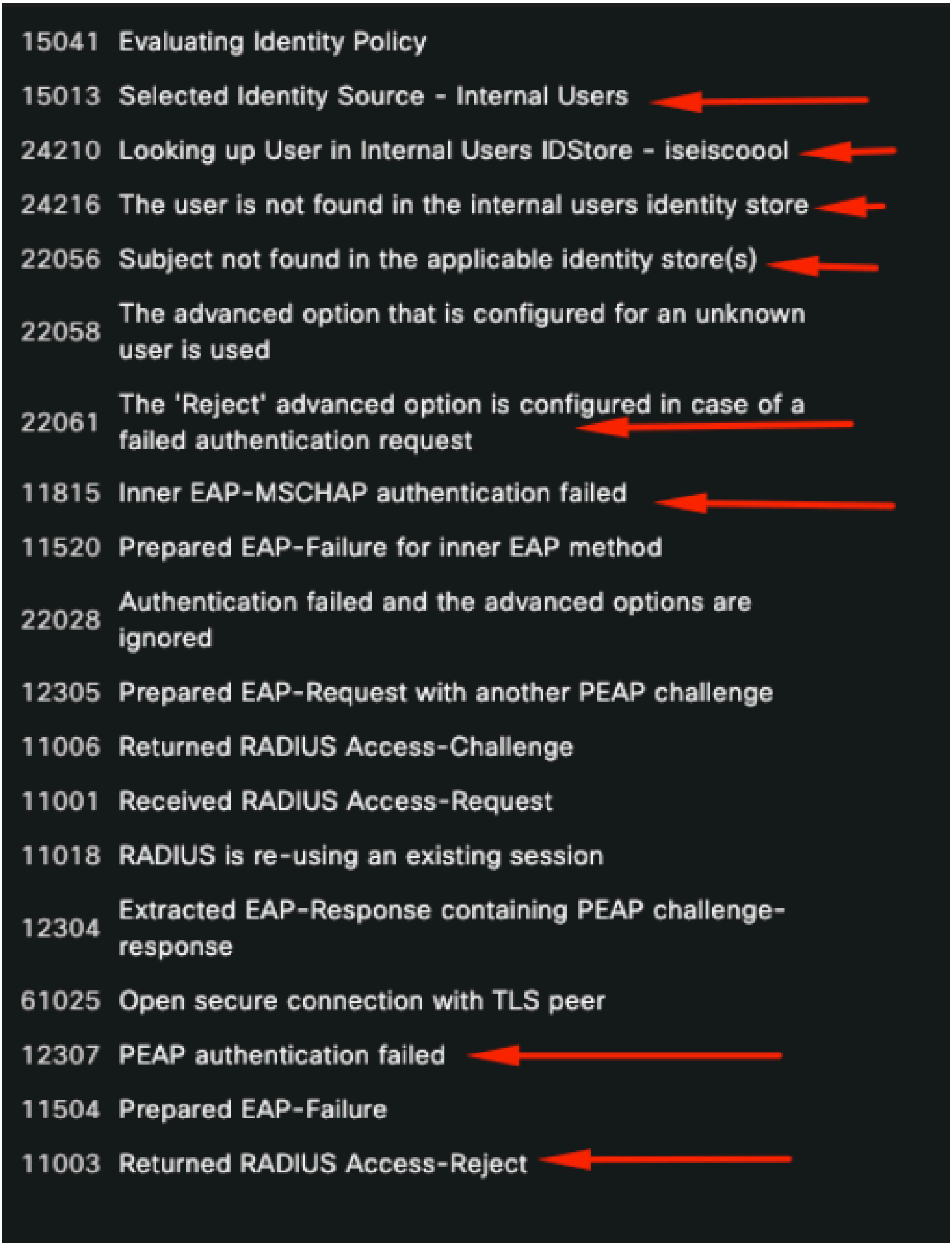


Event	5400 Authentication failed
Failure Reason	22056 Subject not found in the applicable identity store(s)
Resolution	Check whether the subject is present in any one of the chosen identity stores. Note that some identity stores may have been skipped due to identity resoultion settings or if they do not support the current authentication protocol.
Root cause	Subject not found in the applicable identity store(s).
Username	iseiscoool

Authentication Details

In this scenario the reason why the authentication fails is because the username has a typo, however, this same error would be presented, if the user is not created in ISE, or if ISE was not able to validate that the user exist in other identity stores, for example, LDAP or AD.

Steps Section



```
15041  Evaluating Identity Policy
15013  Selected Identity Source - Internal Users
24210  Looking up User in Internal Users IDStore - iseiscoool
24216  The user is not found in the internal users identity store
22056  Subject not found in the applicable identity store(s)
22058  The advanced option that is configured for an unknown
       user is used
22061  The 'Reject' advanced option is configured in case of a
       failed authentication request
11815  Inner EAP-MSCHAP authentication failed
11520  Prepared EAP-Failure for inner EAP method
22028  Authentication failed and the advanced options are
       ignored
12305  Prepared EAP-Request with another PEAP challenge
11006  Returned RADIUS Access-Challenge
11001  Received RADIUS Access-Request
11018  RADIUS is re-using an existing session
12304  Extracted EAP-Response containing PEAP challenge-
       response
61025  Open secure connection with TLS peer
12307  PEAP authentication failed
11504  Prepared EAP-Failure
11003  Returned RADIUS Access-Reject
```

Live Log Details Step Section

The steps section describes in detail the process ISE ran during the RADIUS conversation.

You can find information here like:

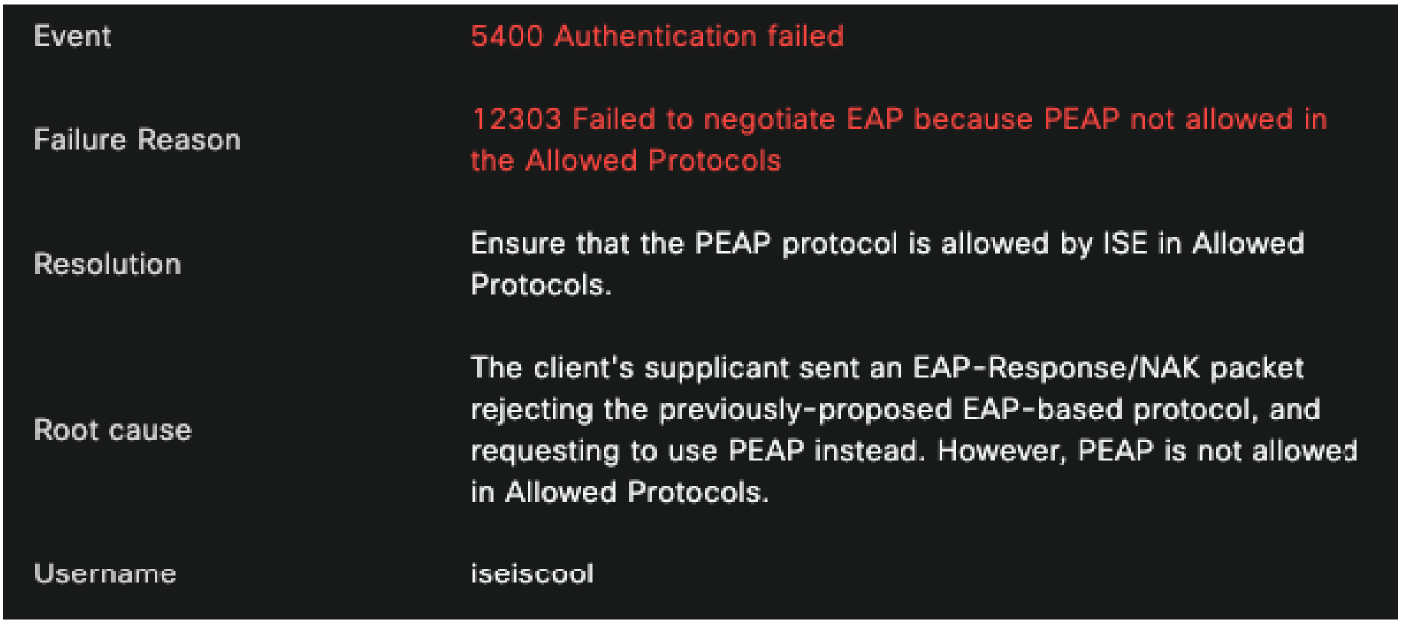
- How the conversation was started.
- SSL handshake process.
- The EAP method negotiated.
- EAP method process.

In this example, it can be seen that ISE just checked in the internal identities for this authentication. The user was not found, and for that reason, ISE sent as a response an Access-Reject.

Second Scenario: The ISE Administrator disabled PEAP from the **Policy Set Allowed** protocols.

2 - Disabled PEAP

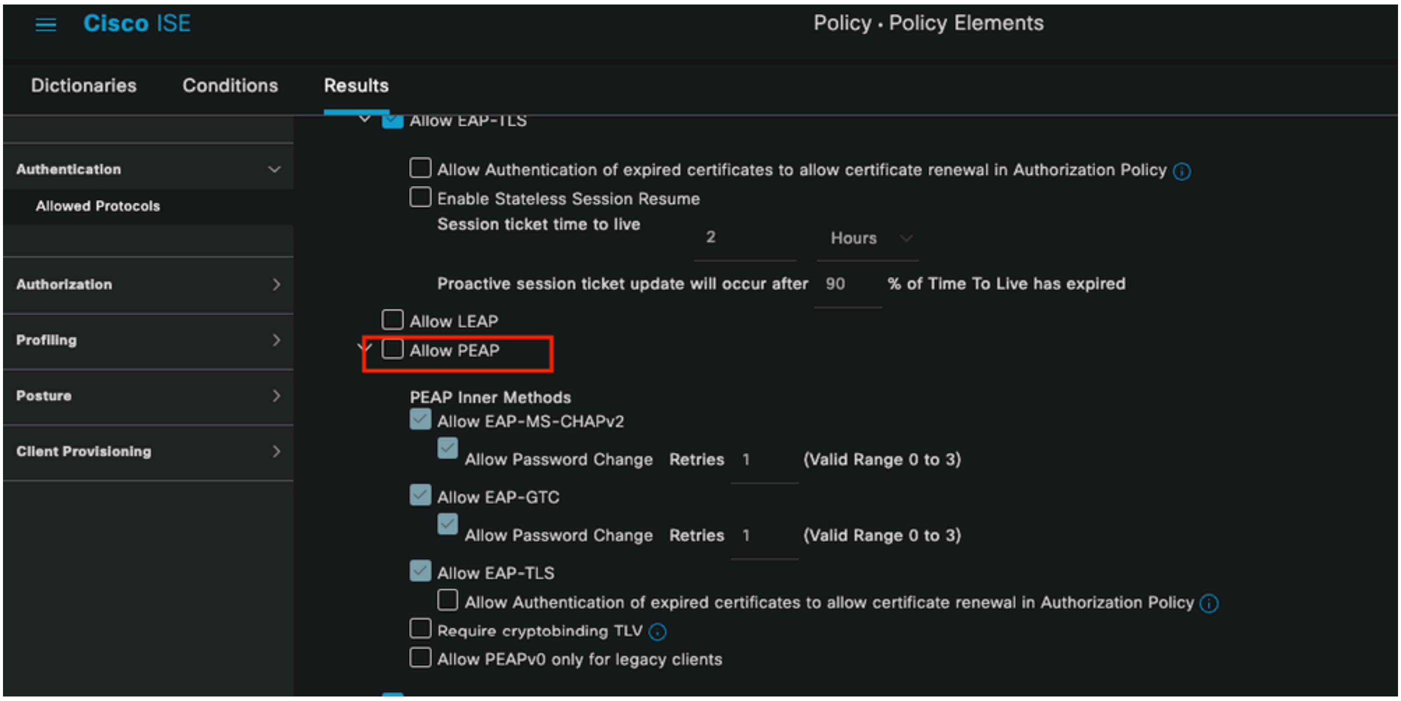
Once the live log detail from the session failing is opened, the error message "PEAP is not allowed in the Allowed Protocols" displays.



Event	5400 Authentication failed
Failure Reason	12303 Failed to negotiate EAP because PEAP not allowed in the Allowed Protocols
Resolution	Ensure that the PEAP protocol is allowed by ISE in Allowed Protocols.
Root cause	The client's supplicant sent an EAP-Response/NAK packet rejecting the previously-proposed EAP-based protocol, and requesting to use PEAP instead. However, PEAP is not allowed in Allowed Protocols.
Username	iseiscool

Live Log Detail Report

This error is easy to resolve, the resolution is to navigate to **Policy** > **Policy Elements** > **Authentication** > **Allowed Protocols**. Verify if the option **Allow PEAP** is disabled.



☑ Allow EAP-TLS

□ Allow Authentication of expired certificates to allow certificate renewal in Authorization Policy

□ Enable Stateless Session Resume

Session ticket time to live 2 Hours

Proactive session ticket update will occur after 90 % of Time To Live has expired

□ Allow LEAP

□ Allow PEAP

PEAP Inner Methods

☑ Allow EAP-MS-CHAPv2

☑ Allow Password Change Retries 1 (Valid Range 0 to 3)

☑ Allow EAP-GTC

☑ Allow Password Change Retries 1 (Valid Range 0 to 3)

☑ Allow EAP-TLS

□ Allow Authentication of expired certificates to allow certificate renewal in Authorization Policy

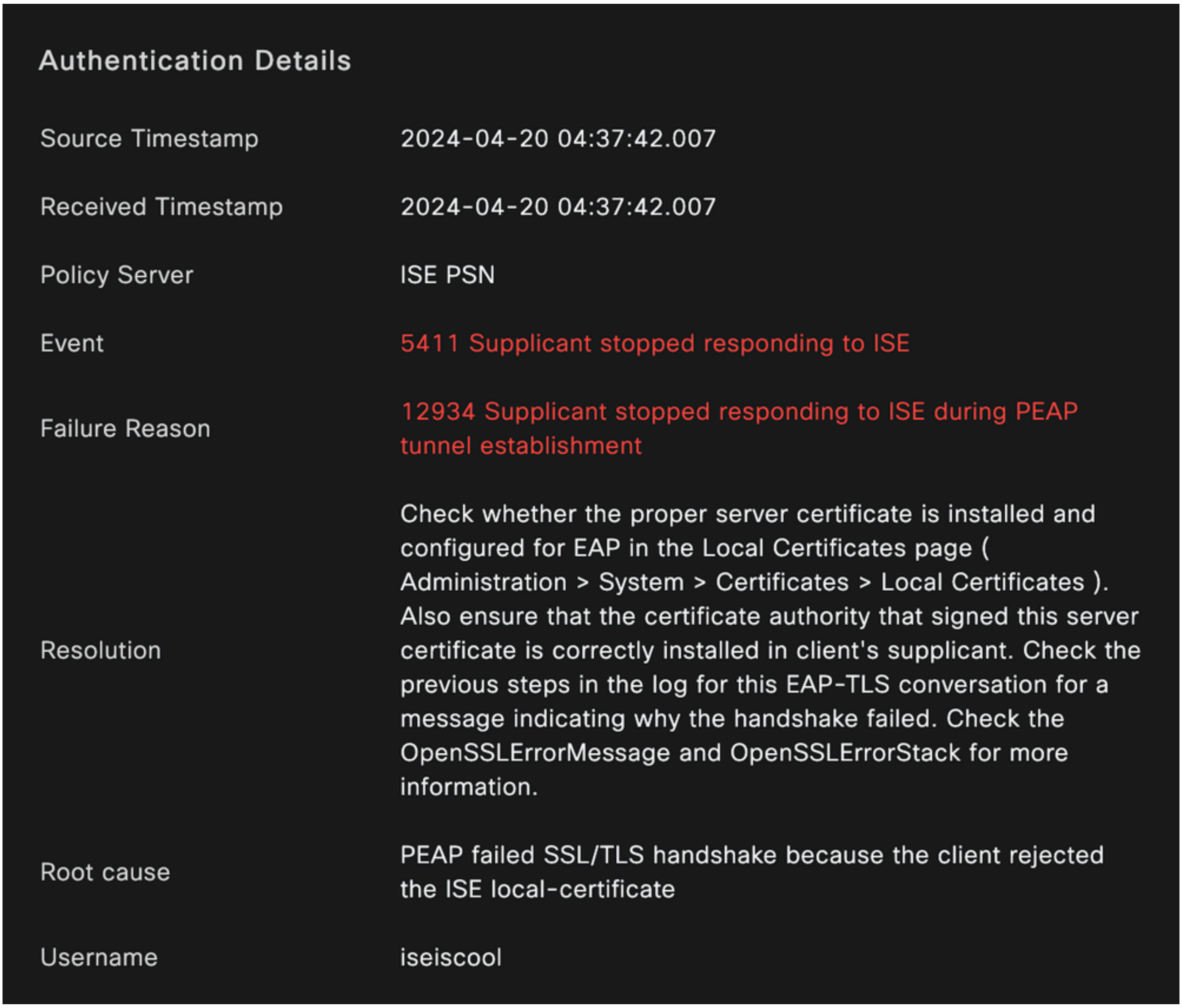
□ Require cryptobinding TLV

□ Allow PEAPv0 only for legacy clients

Allowed Portocols Section

Third Scenario: The Authentication fails because the endpoint does not trust the ISE certificate.

Navigate to the live log details. Find the record for the authentication that fails and check the live log details.



Authentication Details

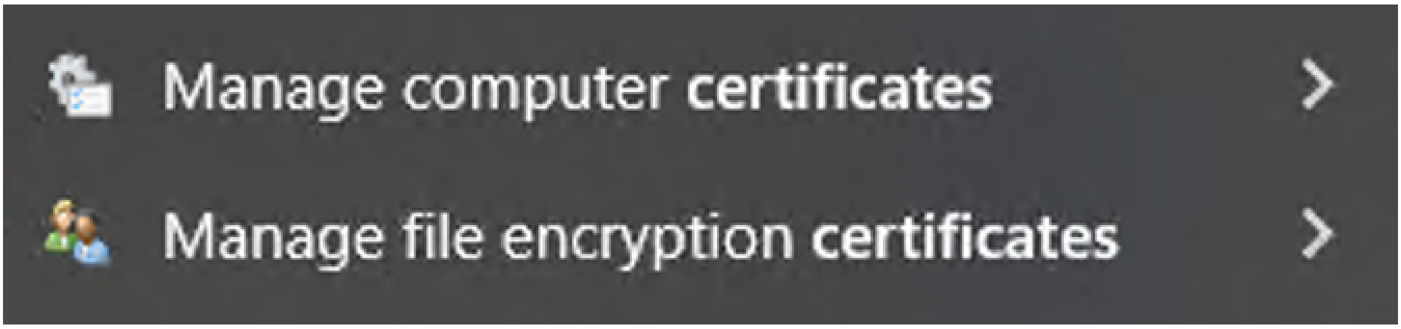
Source Timestamp	2024-04-20 04:37:42.007
Received Timestamp	2024-04-20 04:37:42.007
Policy Server	ISE PSN
Event	5411 Supplicant stopped responding to ISE
Failure Reason	12934 Supplicant stopped responding to ISE during PEAP tunnel establishment
Resolution	Check whether the proper server certificate is installed and configured for EAP in the Local Certificates page (Administration > System > Certificates > Local Certificates). Also ensure that the certificate authority that signed this server certificate is correctly installed in client's supplicant. Check the previous steps in the log for this EAP-TLS conversation for a message indicating why the handshake failed. Check the OpenSSLErrorMessage and OpenSSLErrorStack for more information.
Root cause	PEAP failed SSL/TLS handshake because the client rejected the ISE local-certificate
Username	iseiscool

Live Log Detail

The endpoint is rejecting the certificate used for the PEAP tunnel establishment.

To solve this issue, in the Windows endpoint where you have the issue verify that the CA chain that signed the ISE certificate is in the Windows section **Manage User Certificates > Trusted Root Certification Authorities** OR **Manage Computer Certificates > Trusted Root Certification Authorities.**

You can access this configuration section on your Windows device by searching them in the Windows search bar.

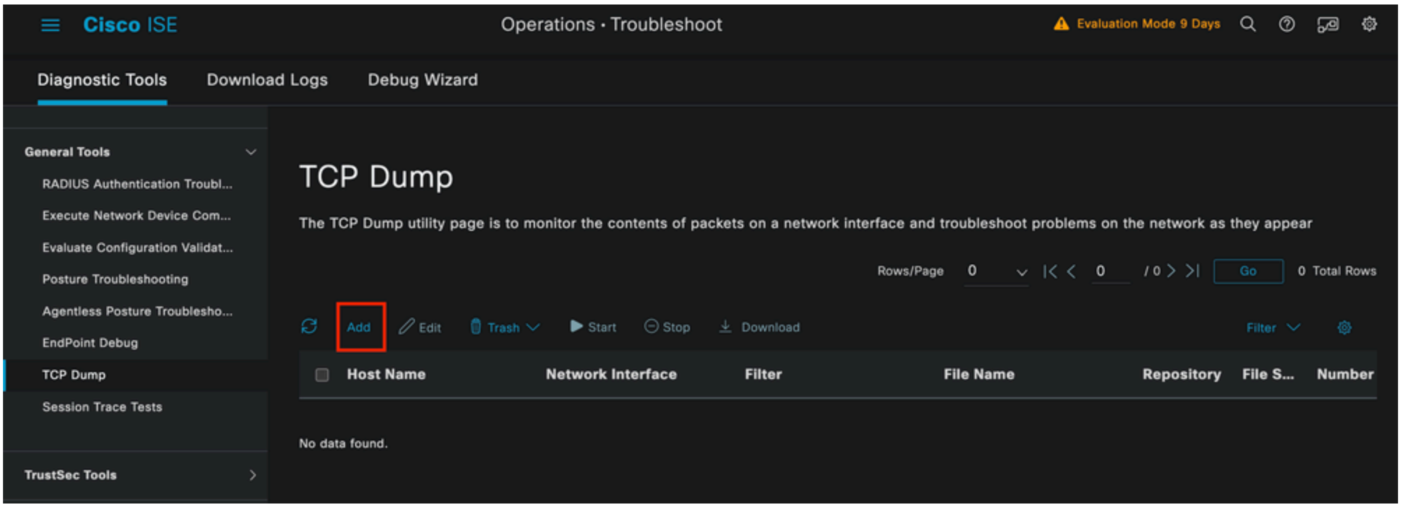

Manage computer certificates
Manage file encryption certificates

Windows Search Bar Results

3 - ISE TCP Dump Tool (Packet Capture)

Packet capture analysis is essential when troubleshooting. Directly from ISE packet captures can be taken on all the nodes and any interface of the nodes.

In order to access this tool, navigate to **Operations > Diagnostic Tools > General Tools > TCP Dump**.



TCP Dump

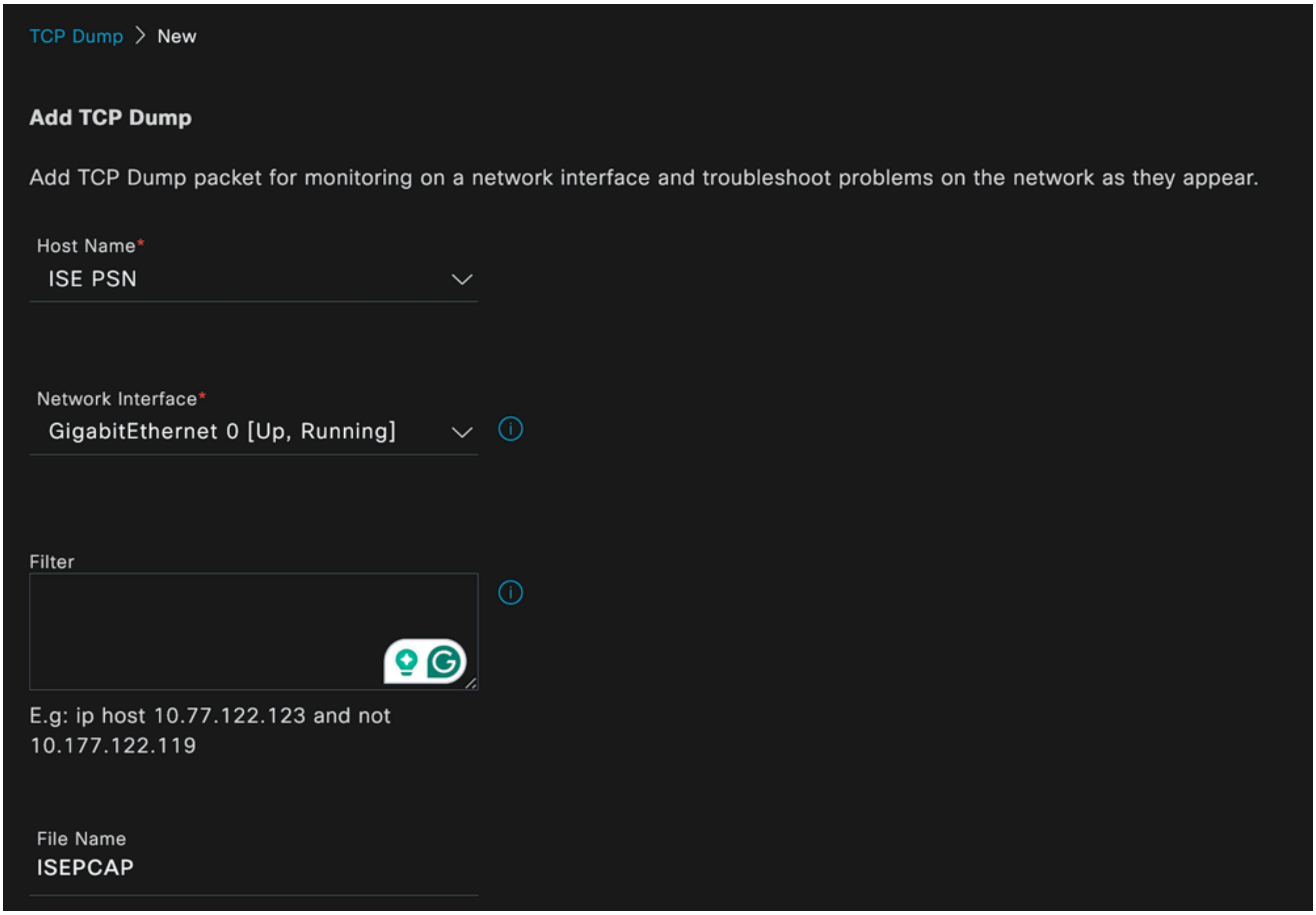
The TCP Dump utility page is to monitor the contents of packets on a network interface and troubleshoot problems on the network as they appear

	Host Name	Network Interface	Filter	File Name	Repository	File S...	Number

No data found.

TCP Dump Section

Click the **Add** button, to start configuring a pcap.



Add TCP Dump

Add TCP Dump packet for monitoring on a network interface and troubleshoot problems on the network as they appear.

Host Name*
ISE PSN

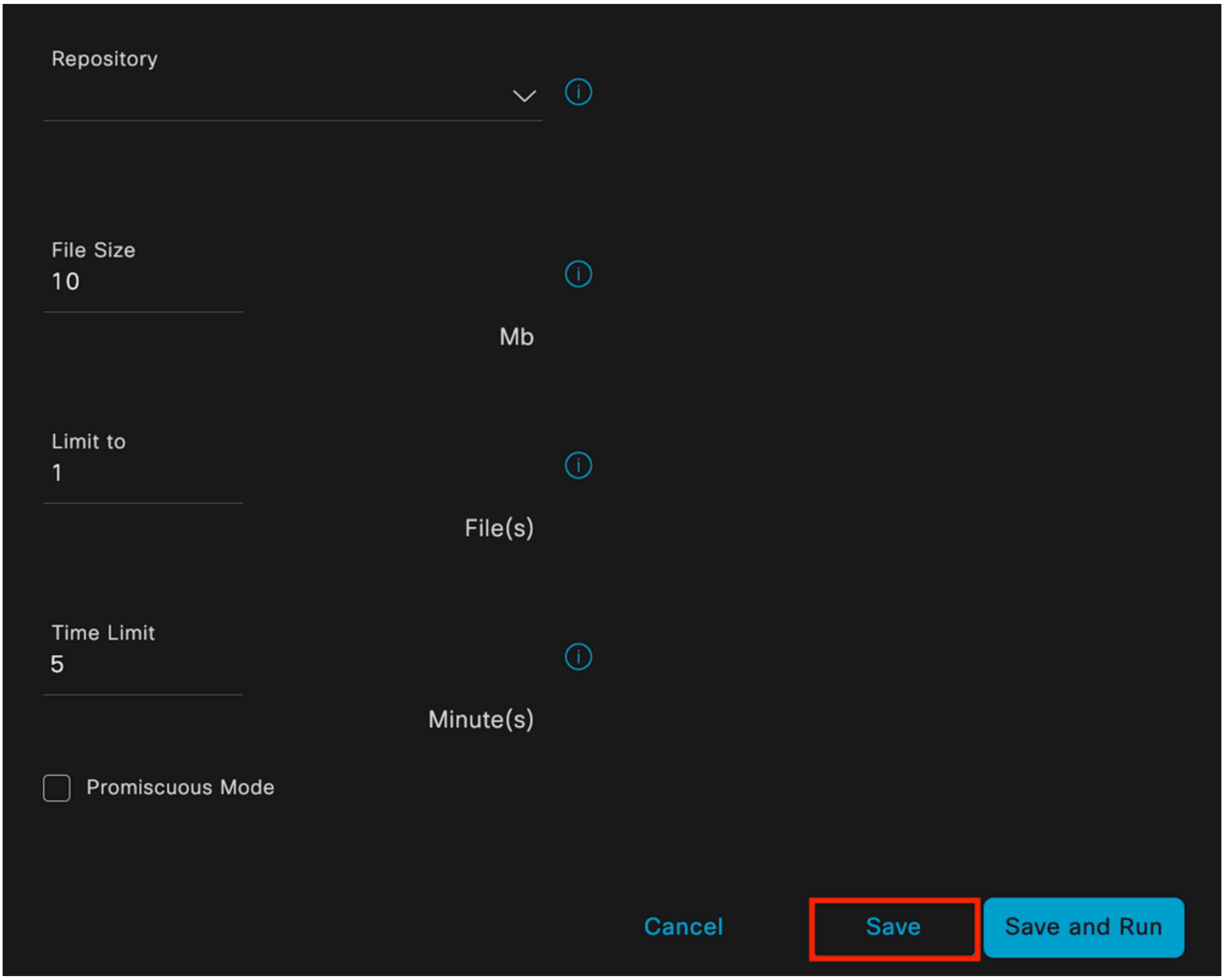
Network Interface*
GigabitEthernet 0 [Up, Running]

Filter

E.g: ip host 10.77.122.123 and not 10.177.122.119

File Name
ISEPCAP

TCP Dump Creation



Repository

File Size
10
Mb

Limit to
1
File(s)

Time Limit
5
Minute(s)

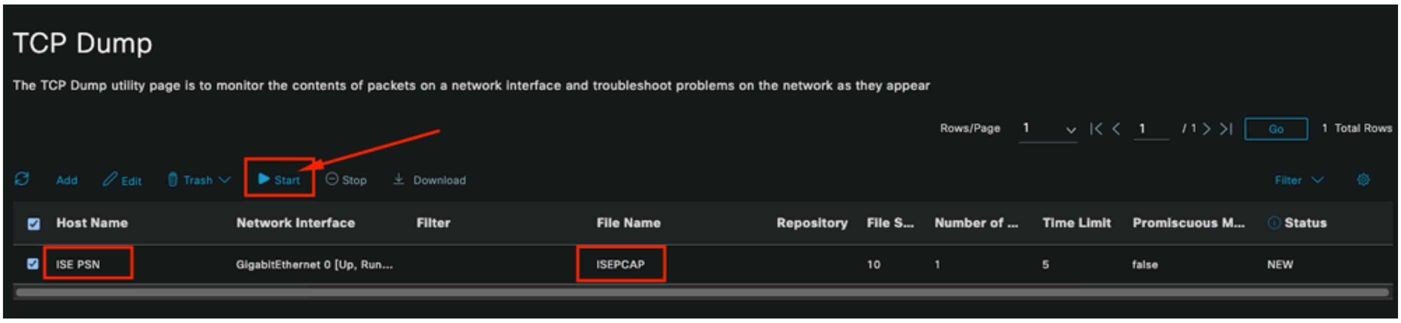
□ Promiscuous Mode

TCP Dump Section

To create a pcap in ISE, this is the data you must enter:

- Select the node in which you need to take the pcap.
- Select the ISE node interface that is used for the pcap.
- In case you need to capture certain traffic, use the filters, ISE provides you some examples.
- Name the pcap. In this scenario we used ISEPCAP.
- Select the repository, if no repository is selected, then the capture is saved on ISE local disk and can be downloaded from the GUI.
- Additionally if necessary, modify the pcap file size.
- If necessary use more than 1 file, so if the pcap exceeds the file size a new file is created subsequently.
- Extend the time capturing traffic for the pcap if required.

Finally, click the **Save** button.



TCP Dump

The TCP Dump utility page is to monitor the contents of packets on a network interface and troubleshoot problems on the network as they appear

☑	Host Name	Network Interface	Filter	File Name	Repository	File S...	Number of ...	Time Limit	Promiscuous M...	Status
☑	ISE PSN	GigabitEthernet 0 [Up, Run...		ISEPCAP		10	1	5	false	NEW

TCP Dump Section

Then, when ready select the pcap, and click the **Start** button.

Once you click **Start** the **Status** column is changed to RUNNING state.

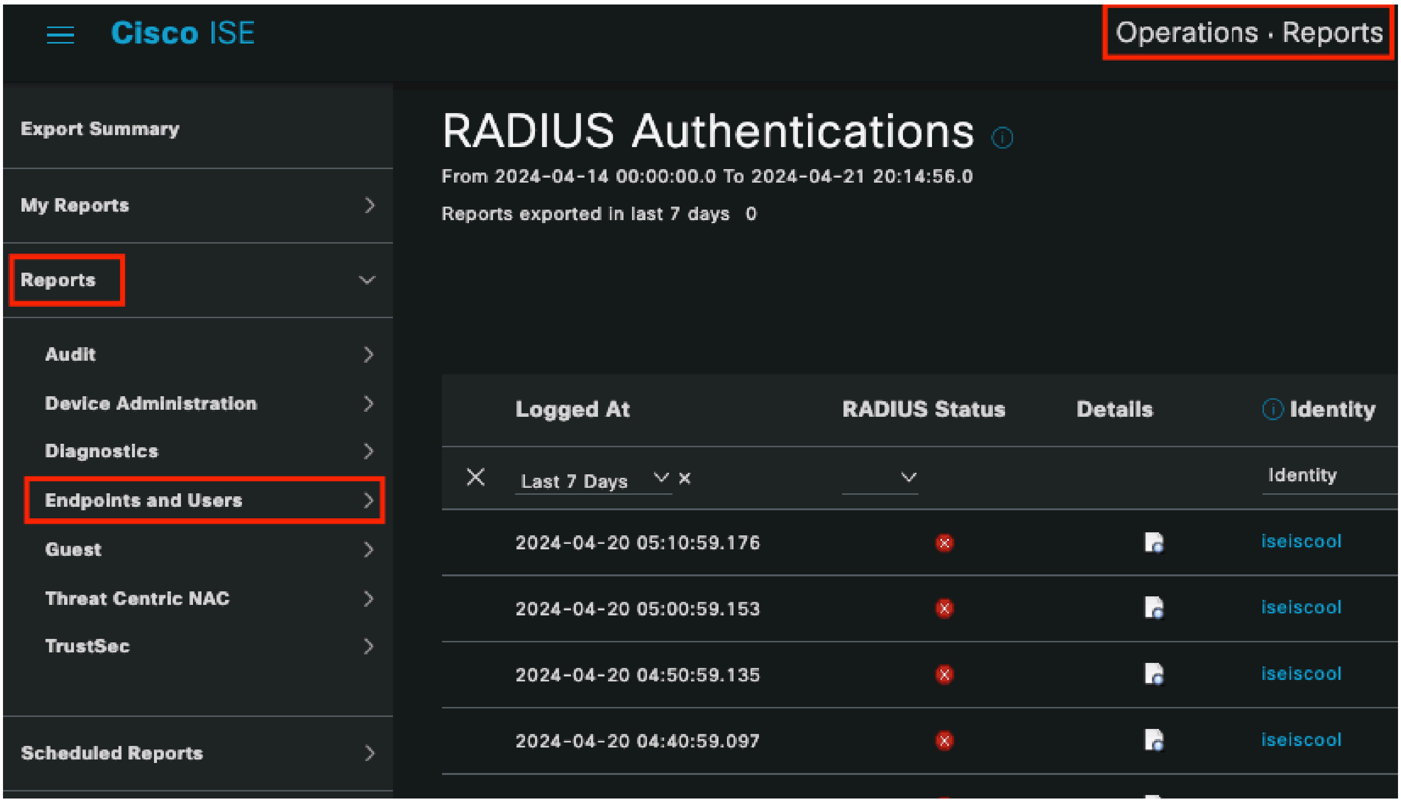
Note: While the PCAP is in RUNNING state, replicate the failing scenario or the behavior you need to capture. Once completed, the details of the RADIUS, conversation are visible in the PCAP.

Once the data you need is captured while the PCAP is running, finish the pcap collection. Select it again and click **Stop**.

3 - 1 ISE Reports

In case a deeper analysis is required, ISE offers useful reports to investigate past events.

To find them, navigate to **Operations > Reports > Reports > Endpoints and Users**



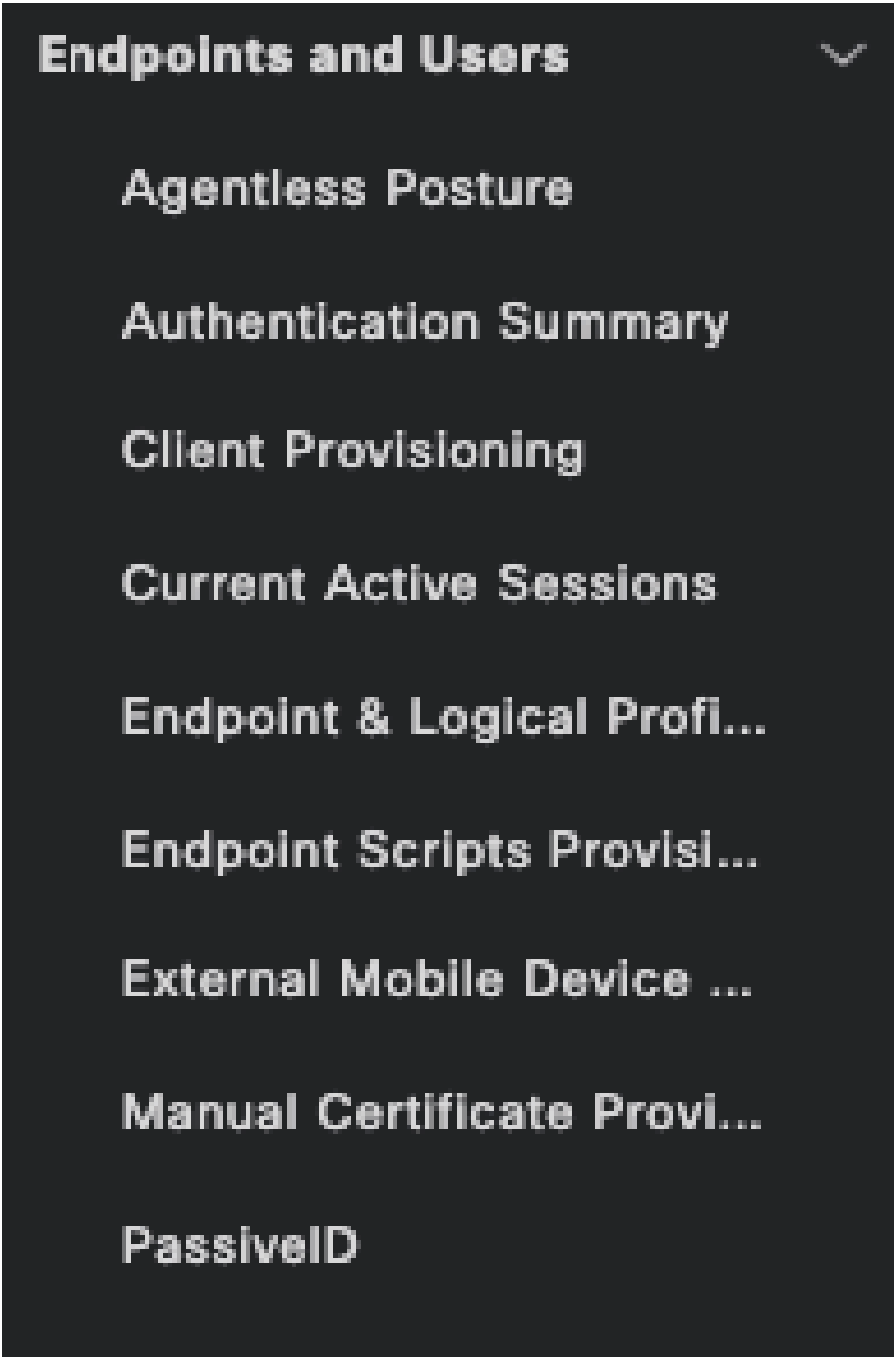
RADIUS Authentications

From 2024-04-14 00:00:00.0 To 2024-04-21 20:14:56.0

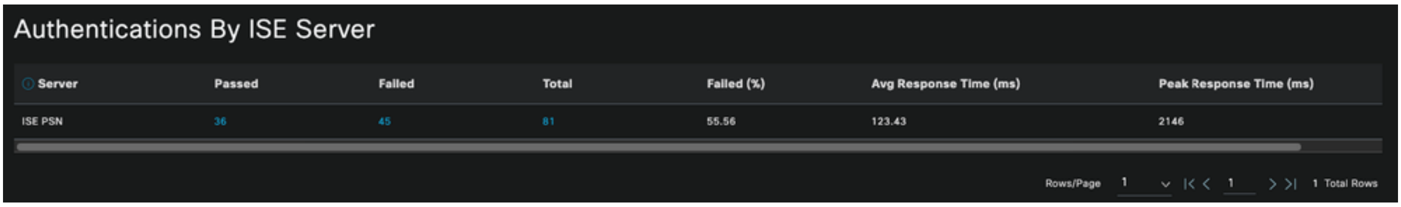
Reports exported in last 7 days 0

Logged At	RADIUS Status	Details	Identity
Last 7 Days			Identity
2024-04-20 05:10:59.176	☒	🗎	iseiscool
2024-04-20 05:00:59.153	☒	🗎	iseiscool
2024-04-20 04:50:59.135	☒	🗎	iseiscool
2024-04-20 04:40:59.097	☒	🗎	iseiscool

ISE Reports Section


Endpoints and Users
Agentless Posture
Authentication Summary
Client Provisioning
Current Active Sessions
Endpoint & Logical Profi...
Endpoint Scripts Provisi...
External Mobile Device ...
Manual Certificate Provi...
PassiveID

: In the deployment used for this document, only one PSN was used; however, for larger deployments, this data is useful to see if load balancing is needed.



Authentications By ISE Server

Server	Passed	Failed	Total	Failed (%)	Avg Response Time (ms)	Peak Response Time (ms)
ISE PSN	36	45	81	55.56	123.43	2146

Rows/Page 1 | 1 | 1 Total Rows

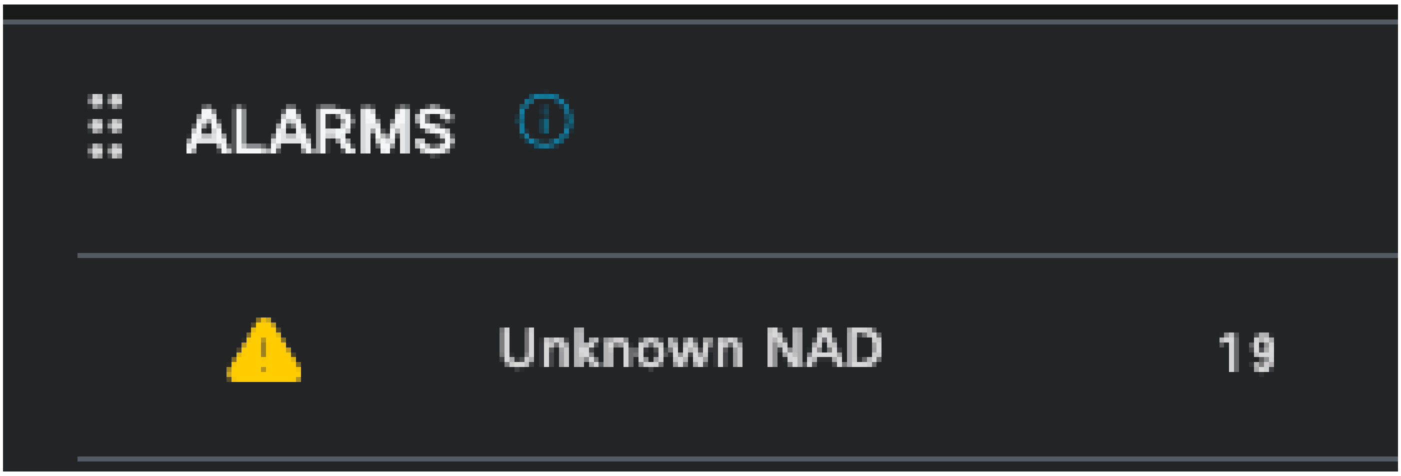
Authentications by ISE Server

4 - ISE Alarms

Under the ISE **Dashboard**, the Alarms section displays the deployment issues.

Here are several ISE alarms that help with troubleshooting.

Unknown NAD — This alarm is shown when there is a network device authenticating an endpoint and reaching out to ISE. But, ISE does not trust it, and it drops the RADIUS connection. The most common reasons are that the Network device is not created or the IP that the Network Device is using is not the same that ISE has registered.

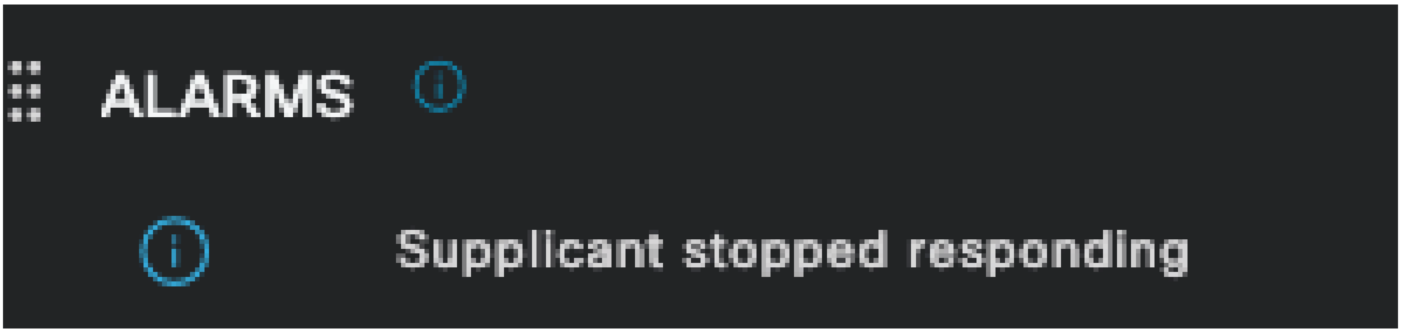


ALARMS

Unknown NAD	19

Unknown NAD

Supplicant Stopped Responding — This alarm occurs when there is an issue with the supplicant communication, most of the time is due to a misconfiguration in the supplicant that has to be checked and investigated on the endpoint side.

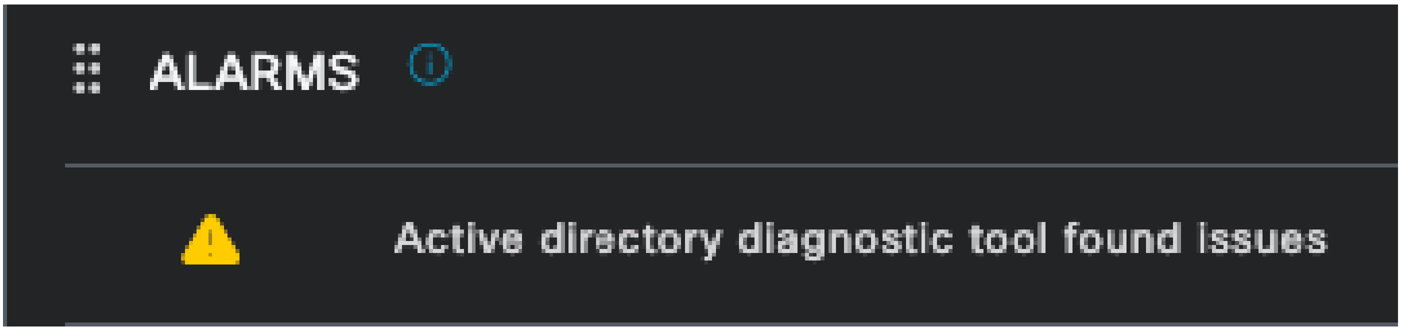


ALARMS

Supplicant stopped responding

Supplicant Stopped Responding

Active directory diagnostic tool found issues — When Active Directory is used to validate the user identity, if it starts having issues with the communication process, or if the connection is broken you would see this alarm. Then you would realize why the authentications that the identity exists on the AD fail.



Active directory diagnostic tool found issues

AD Diagnostics Failed

COA (Change of Authorization) Failed — Multiple flows in ISE use CoA, this alarm informs you if issues were encountered during the CoA port communication to any network device.

COA Failed

Coa Failed

5 - ISE Debug Configuration and Log Collection

To continue with authentication process details, you must enable the next components in **DEBUG** for mab and dot1x issues:

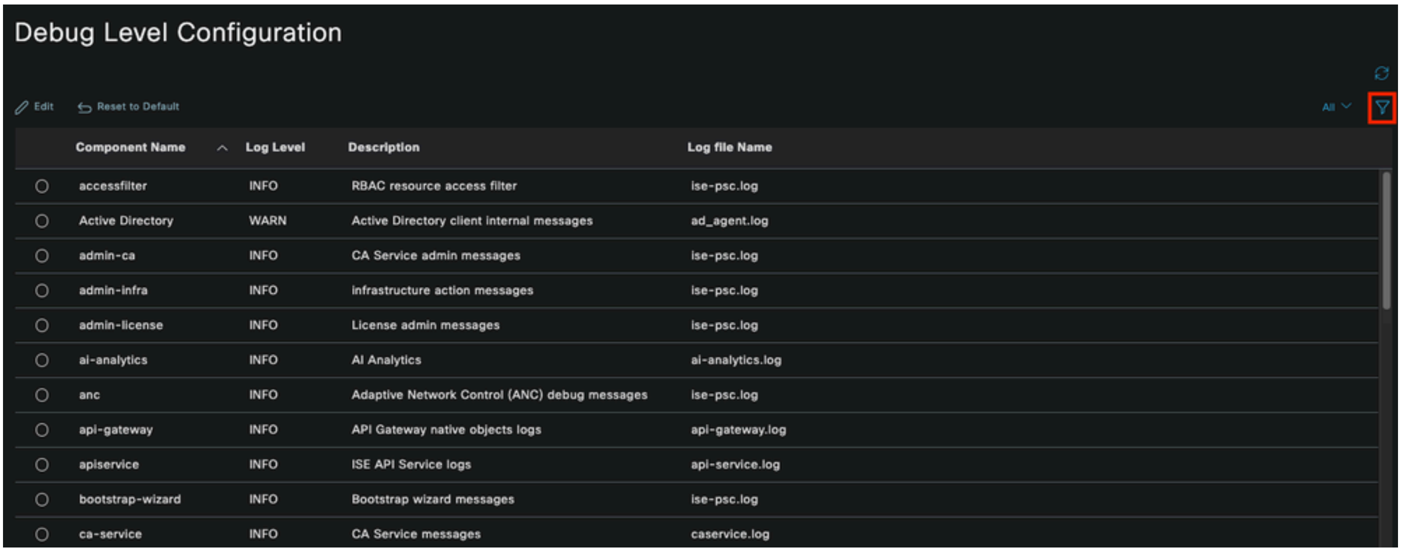
Problem: dot1x/mab

Attributes to be set to debug level.

- runtime-AAA (prrt-server.log)
- nsf (ise-psc.log)
- nsf-session (ise-psc.log)

To enable the components to **DEBUG** level, first it is required to identify which is the PSN that receives the authentication that is failing or needs to be investigated. Yu can get this information from the live logs. After that you must go to the **ISE Menu > Troubleshoot > Debug Wizard > Debug Log Configuration > Select the PSN > Click the Edit Button**.

The next menu is displayed. Click the filter icon:

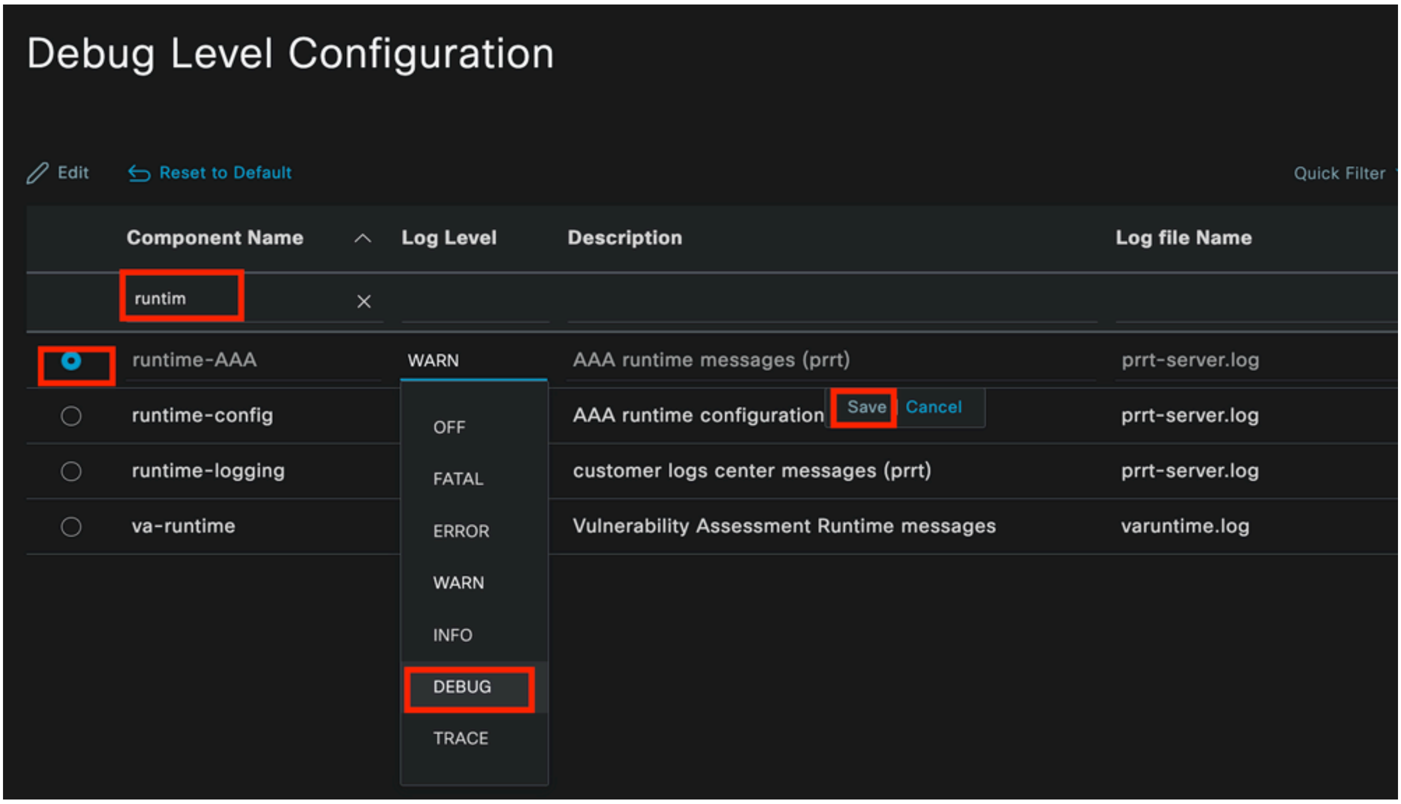


Debug Level Configuration

	Component Name	Log Level	Description	Log file Name
○	accessfilter	INFO	RBAC resource access filter	ise-psc.log
○	Active Directory	WARN	Active Directory client internal messages	ad_agent.log
○	admin-ca	INFO	CA Service admin messages	ise-psc.log
○	admin-infra	INFO	infrastructure action messages	ise-psc.log
○	admin-license	INFO	License admin messages	ise-psc.log
○	ai-analytics	INFO	AI Analytics	ai-analytics.log
○	anc	INFO	Adaptive Network Control (ANC) debug messages	ise-psc.log
○	api-gateway	INFO	API Gateway native objects logs	api-gateway.log
○	apiservice	INFO	ISE API Service logs	api-service.log
○	bootstrap-wizard	INFO	Bootstrap wizard messages	ise-psc.log
○	ca-service	INFO	CA Service messages	caservice.log

Debug Log Configuration

In the **Component Name** column, search for the attributes listed previously. Select each log level and change it to **DEBUG**. Save the changes.

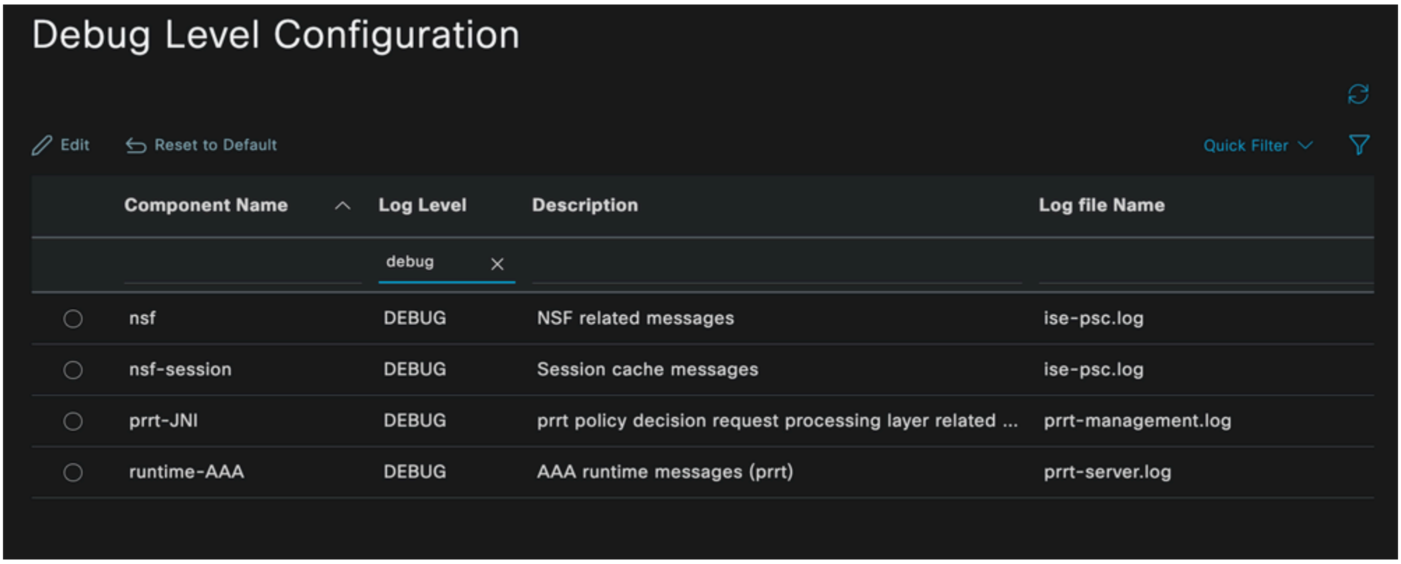


Debug Level Configuration

	Component Name	Log Level	Description	Log file Name
	runtim			
●	runtime-AAA	WARN	AAA runtime messages (prrt)	prrt-server.log
○	runtime-config		AAA runtime configuration	prrt-server.log
○	runtime-logging		customer logs center messages (prrt)	prrt-server.log
○	va-runtime		Vulnerability Assessment Runtime messages	varuntime.log

Runtime AAA Component Set Up

Once you finished configuring each component, filter them with **DEBUG** so you can see if all the components were correctly configured.



Debug Level Configuration

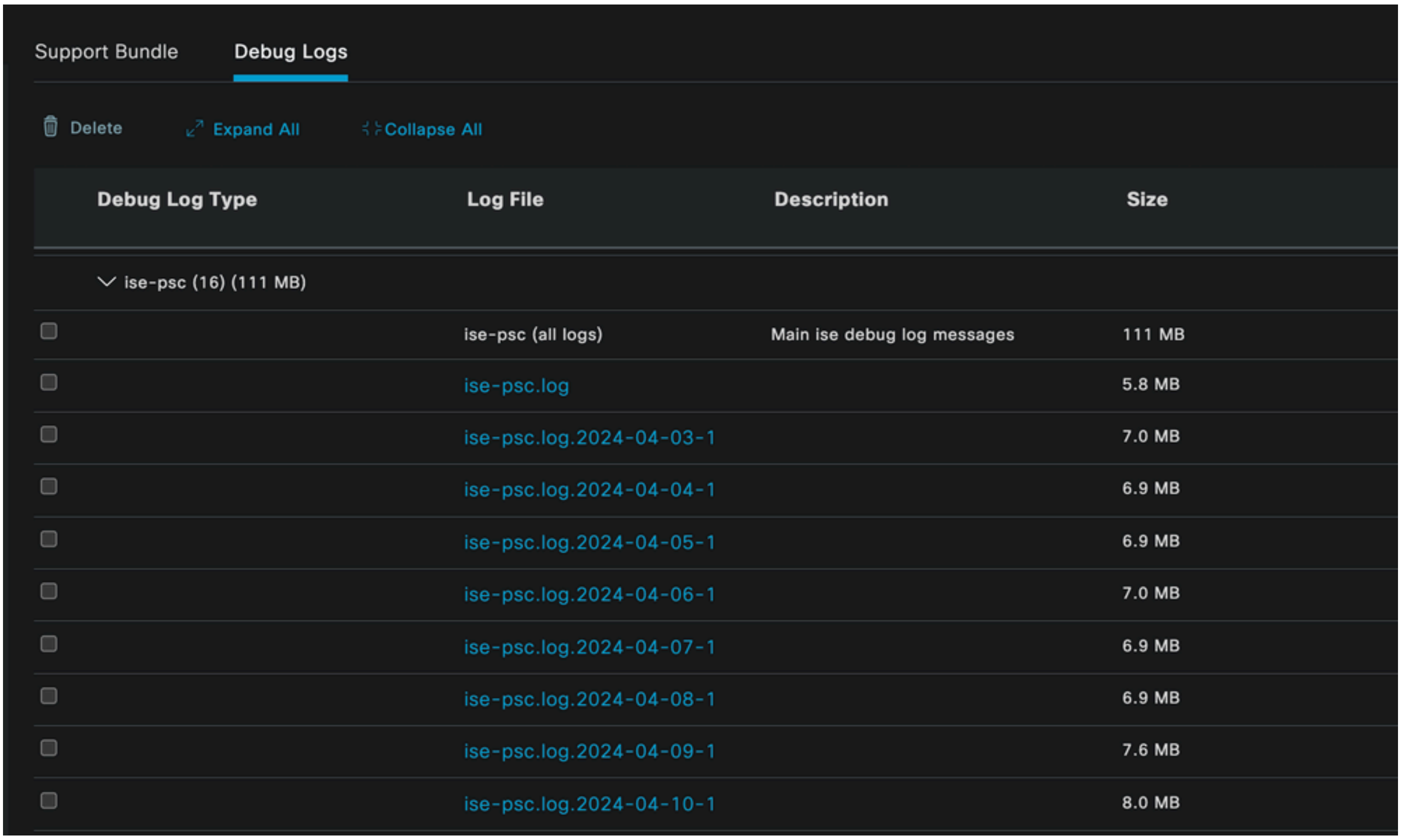
	Component Name	Log Level	Description	Log file Name
		debug ×		
○	nsf	DEBUG	NSF related messages	ise-psc.log
○	nsf-session	DEBUG	Session cache messages	ise-psc.log
○	prrt-JNI	DEBUG	prrt policy decision request processing layer related ...	prrt-management.log
○	runtime-AAA	DEBUG	AAA runtime messages (prrt)	prrt-server.log

Debug Log Configuration

In case there is the need to immediately analyze the logs, you can download them by navigating to the path **ISE Menu** > **Operations** > **Troubleshoot** > **Download Logs** > **Appliance node list** > **PSN** and enabled the **DEBUGS** > **Debug Logs**.

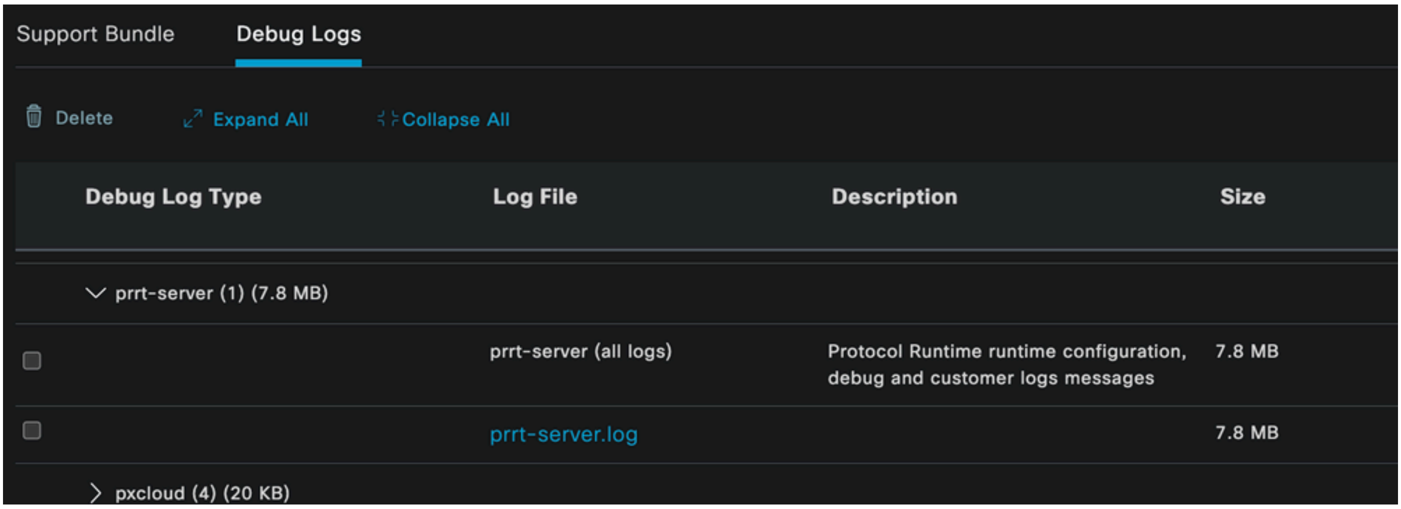
In this case, you must download for dot1x and mab issues in the **prrt-server.log** and **ise-psc.log**. The log that you must download is the one with the date of your last test.

Just click the log file shown in this image and download it (Displayed in blue text.)



	Debug Log Type	Log File	Description	Size
	˅ ise-psc (16) (111 MB)			
□		ise-psc (all logs)	Main ise debug log messages	111 MB
□		ise-psc.log		5.8 MB
□		ise-psc.log.2024-04-03-1		7.0 MB
□		ise-psc.log.2024-04-04-1		6.9 MB
□		ise-psc.log.2024-04-05-1		6.9 MB
□		ise-psc.log.2024-04-06-1		7.0 MB
□		ise-psc.log.2024-04-07-1		6.9 MB
□		ise-psc.log.2024-04-08-1		6.9 MB
□		ise-psc.log.2024-04-09-1		7.6 MB
□		ise-psc.log.2024-04-10-1		8.0 MB

Debug Logs From the PSN Node



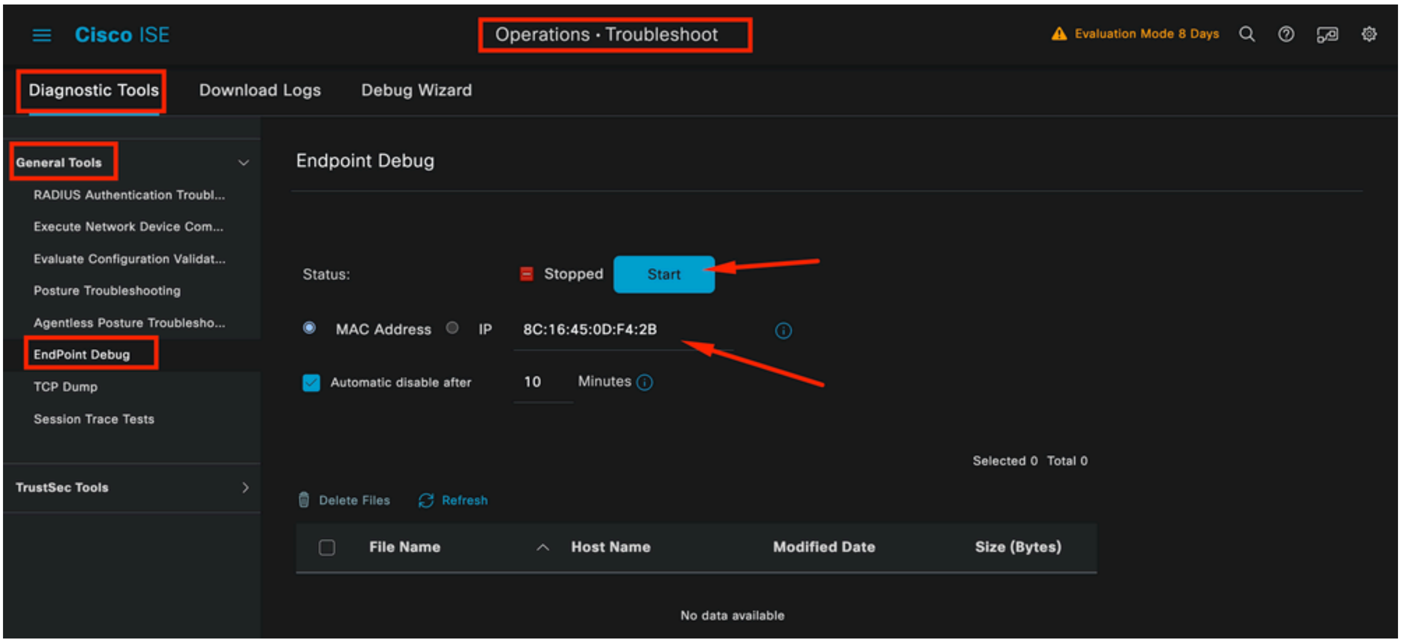
	Debug Log Type	Log File	Description	Size
	∨ prrt-server (1) (7.8 MB)			
□		prrt-server (all logs)	Protocol Runtime runtime configuration, debug and customer logs messages	7.8 MB
□		prrt-server.log		7.8 MB
	> pxcloud (4) (20 KB)			

Debug Logs Section

6 - ISE per Endpoint Debug

There is also another option to get **DEBUG** logs, per endpoint debug logs based on mac address or IP. You can use the **Endpoint Debug** ISE tool.

Navigate to the **ISE Menu** > **Operations** > **Troubleshoot** > **Diagnostic Tools** > **General Tools** > **Endpoint Debug**.



Status: Stopped

● MAC Address ○ IP 8C:16:45:0D:F4:2B

☑ Automatic disable after 10 Minutes

Selected 0 Total 0

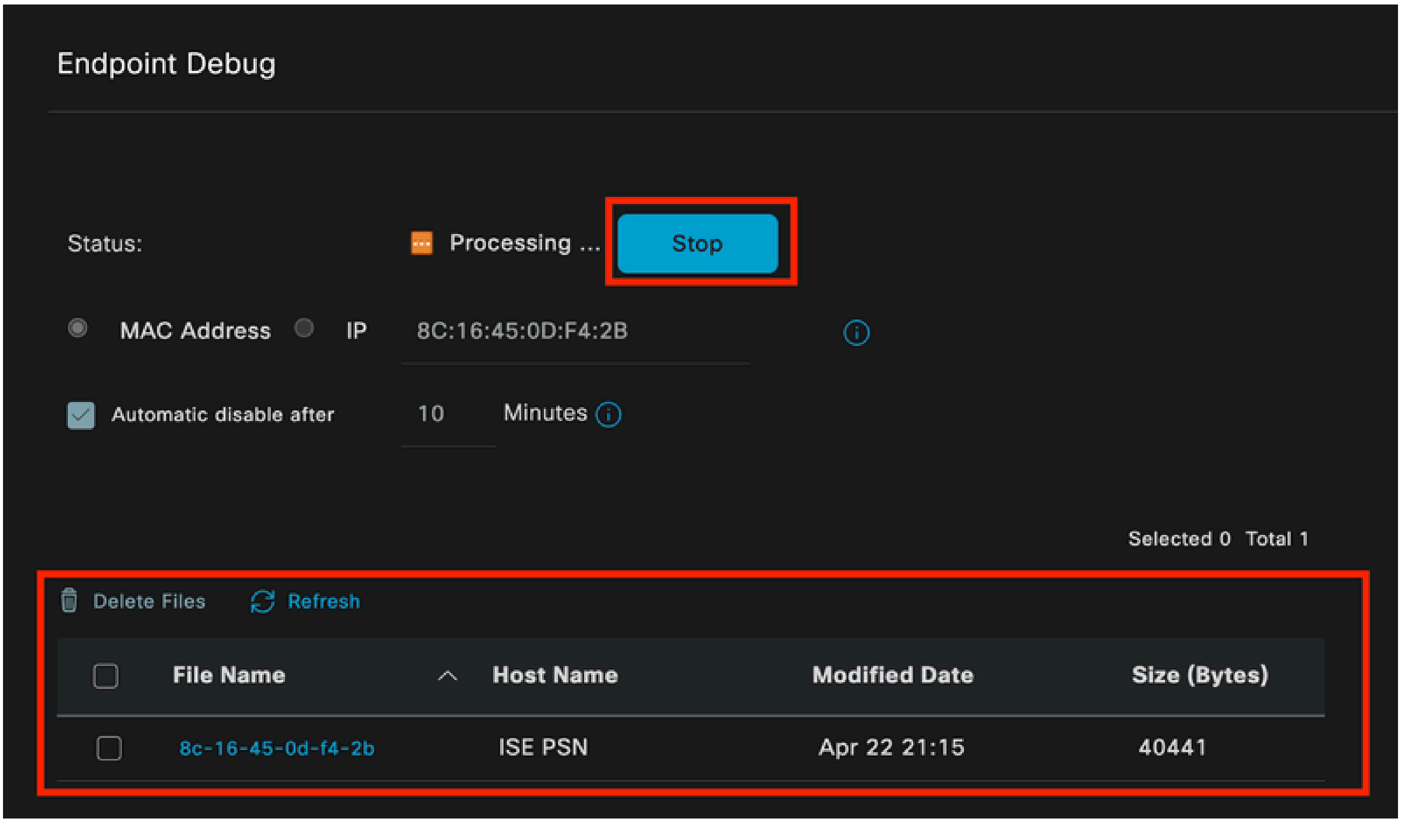
□	File Name	Host Name	Modified Date	Size (Bytes)

No data available

Endpoint Debug

Then enter the desired endpoint information to start capturing logs. Click **Start**.

Then click **Continue** in the warning message.



Endpoint Debug

Status: Processing ...

● MAC Address ○ IP 8C:16:45:0D:F4:2B

☑ Automatic disable after 10 Minutes

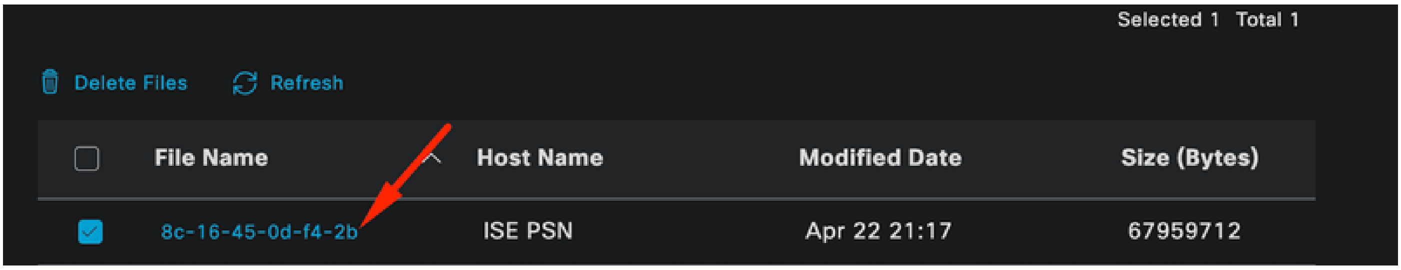
Selected 0 Total 1

□	File Name	Host Name	Modified Date	Size (Bytes)
□	8c-16-45-0d-f4-2b	ISE PSN	Apr 22 21:15	40441

Endpoint Debug

Once the information has been captured, click **Stop**.

Click the file name shown in blue. in this image.



Selected 1 Total 1

□	File Name	Host Name	Modified Date	Size (Bytes)
☑	8c-16-45-0d-f4-2b	ISE PSN	Apr 22 21:17	67959712

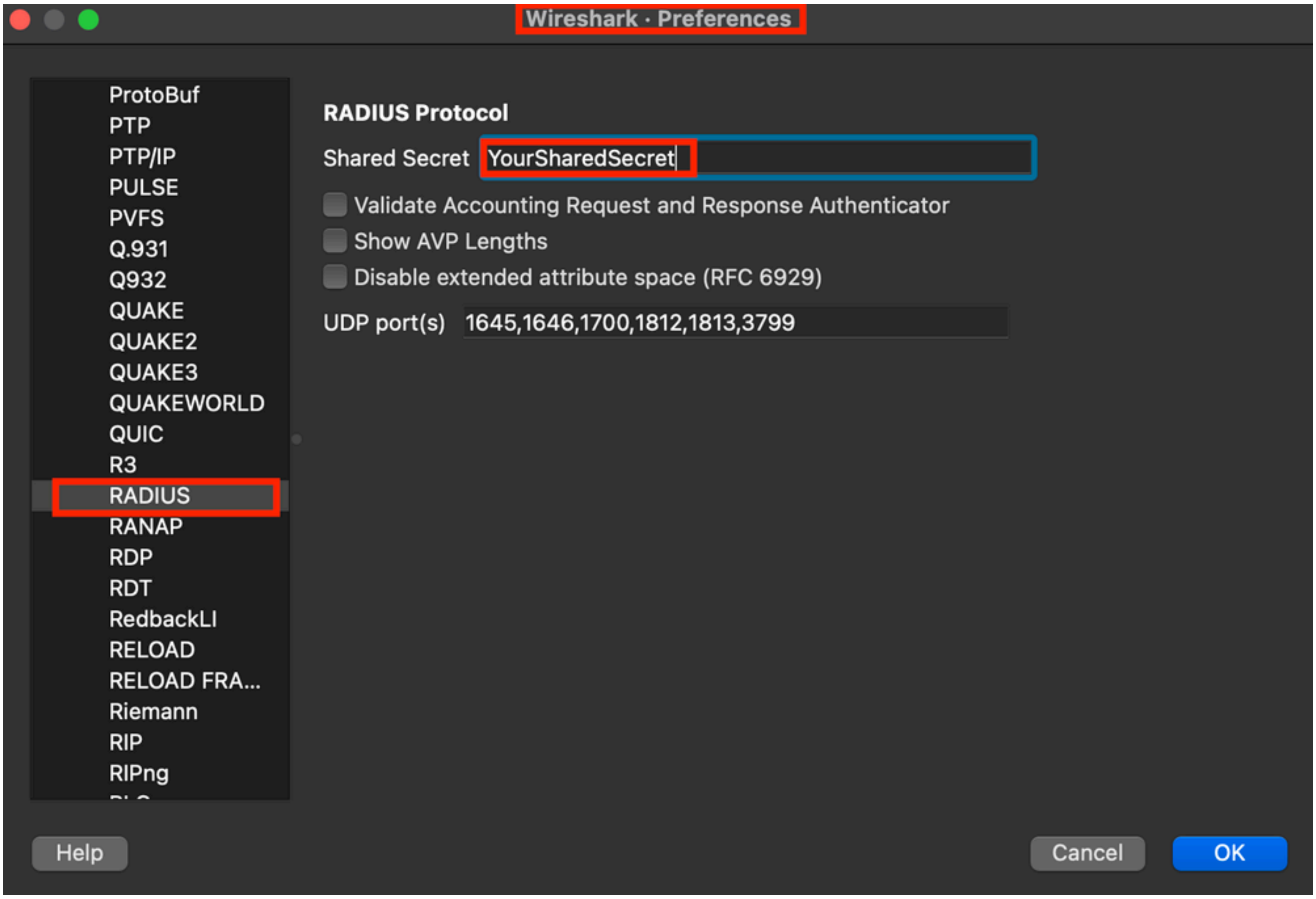
Endpoint Debug

You must be able to see the authentication logs with **DEBUG** logs without enabling them directly from Debug Log Configuration.

Note: Since some things could be omitted in the Endpoint Debug output, you would get a more complete log file generating it with the Debug Log Configuration and downloading all the required logs from any file that you need. As explained in the previous ISE Debug Configuration and Log Collection section.

7 - Decrypt RADIUS Packets

Radius packets are not encrypted except for the user password field. However, you need to verify the password sent. You can see the packet the user sent by navigating to **Wireshark > Preferences > Protocols > RADIUS** and then add the RADIUS Shared Key used by ISE and the Network Device. After that the RADIUS packets are displayed decrypted.



RADIUS Protocol

Shared Secret YourSharedSecret

□ Validate Accounting Request and Response Authenticator

□ Show AVP Lengths

□ Disable extended attribute space (RFC 6929)

UDP port(s) 1645,1646,1700,1812,1813,3799

Wireshark Radius Options

8 - Network Device Troubleshooting Commands

The next command helps when troubleshooting issues on the ISR 1100 or Wired NAD device.

8 - 1 To see if the AAA server or ISE is available and reachable from the Network device use **show aaa servers**.

```
Router>show aaa servers

RADIUS: id 1, priority 1, host 10.88.240.80, auth-port 1645, acct-port 1646, hostname
     State: current UP, duration 2876s, previous duration 0s
     Dead: total time 0s, count 0

     Platform State from SMD: current UP, duration 2876s, previous duration 0s
     SMD Platform Dead: total time 0s, count 0

     Platform State from WNCD (1) : current UP, duration 3015s, previous duration 0s
     Platform State from WNCD (2) : current UP, duration 3015s, previous duration 0s
     Platform State from WNCD (3) : current UP, duration 3015s, previous duration 0s
     Platform State from WNCD (4) : current UP, duration 3015s, previous duration 0s
     Platform State from WNCD (5) : current UP, duration 3015s, previous duration 0s
     Platform State from WNCD (6) : current UP, duration 3015s, previous duration 0s
     Platform State from WNCD (7) : current UP, duration 3015s, previous duration 0s
     Platform State from WNCD (8) : current UP, duration 3015s, previous duration 0s

     WNCD Platform Dead: total time 0s, count 0UP

     Quarantined: No
```

```
Authen: request 11, timeouts 0, failover 0, retransmission 0

        Response: accept 1, reject 0, challenge 10
        Response: unexpected 0, server error 0, incorrect 0, time 33ms
        Transaction: success 11, failure 0
        Throttled: transaction 0, timeout 0, failure 0
        Malformed responses: 0
        Bad authenticators: 0
        Dot1x transactions:

        Response: total responses: 11, avg response time: 33ms
        Transaction: timeouts 0, failover 0
        Transaction: total 1, success 1, failure 0

        MAC auth transactions:
        Response: total responses: 0, avg response time: 0ms
        Transaction: timeouts 0, failover 0
        Transaction: total 0, success 0, failure 0

Author: request 0, timeouts 0, failover 0, retransmission 0
        Response: accept 0, reject 0, challenge 0
        Response: unexpected 0, server error 0, incorrect 0, time 0ms
        Transaction: success 0, failure 0

        Throttled: transaction 0, timeout 0, failure 0
        Malformed responses: 0
        Bad authenticators: 0
        MAC author transactions:

        Response: total responses: 0, avg response time: 0ms
        Transaction: timeouts 0, failover 0
        Transaction: total 0, success 0, failure 0

Account: request 6, timeouts 4, failover 0, retransmission 3
        Request: start 1, interim 0, stop 0
        Response: start 1, interim 0, stop 0

        Response: unexpected 0, server error 0, incorrect 0, time 27ms
        Transaction: success 2, failure 1
        Throttled: transaction 0, timeout 0, failure 0
        Malformed responses: 0
        Bad authenticators: 0

Elapsed time since counters last cleared: 47m
Estimated Outstanding Access Transactions: 0
Estimated Outstanding Accounting Transactions: 0
Estimated Throttled Access Transactions: 0
Estimated Throttled Accounting Transactions: 0
Maximum Throttled Transactions: access 0, accounting 0

Consecutive Response Failures: total 0
        SMD Platform : max 0, current 0 total 0
        WNCD Platform: max 0, current 0 total 0
        IOSD Platform : max 0, current 0 total 0

Consecutive Timeouts: total 3
        SMD Platform : max 0, current 0 total 0
        WNCD Platform: max 0, current 0 total 0
        IOSD Platform : max 3, current 0 total 3

Requests per minute past 24 hours:
        high - 0 hours, 47 minutes ago: 4
        low  - 0 hours, 45 minutes ago: 0
```

```
             average: 0

Router>
```

8-2 In order to see the port status, details, ACLs applied to the session, method of authentication, and more helpful information, use the command **show authentication sessions interface <interface where the laptop is attached>** details.

```
Router#show authentication sessions interface gigabitEthernet 0/1/0 details
Interface: GigabitEthernet0/1/0
IIF-ID: 0x01D9BEFB
MAC Address: 8c16.450d.f42b
IPv6 Address: Unknown
IPv4 Address: Unknown
User-Name: iseiscool
Status: Authorized
Domain: DATA
Oper host mode: multi-auth
Oper control dir: both
Session timeout: N/A
Common Session ID: 22781F0A0000000C0777AECD
Acct Session ID: 0x00000003
Handle: 0x0a000002
Current Policy: POLICY_Gi0/1/0


Local Policies:
Service Template: DEFAULT_LINKSEC_POLICY_SHOULD_SECURE (priority 150)
Security Policy: Should Secure

Server Policies:


Method status list:
Method State
dot1x Authc Success

Router#
```

8-3 To verify you have all the required commands for aaa in the global configuration, run **show running-config aaa**.

```
Router#sh run aaa
!
aaa authentication dot1x default group ISE-CLUSTER
aaa authorization network default group ISE-CLUSTER
aaa accounting system default start-stop group ISE-CLUSTER
aaa accounting dot1x default start-stop group ISE-CLUSTER
!
aaa server radius dynamic-author
client <A.B.C.D> server-key Cisc0123
!
!
radius server COHVSRADISE01-NEW
address ipv4 <A.B.C.D> auth-port 1645 acct-port 1646
```

```
timeout 15
key Cisc0123
!
!
aaa group server radius ISE-CLUSTER
server name COHVSRADISE01-NEW
!
!
!
!
aaa new-model
aaa session-id common
!
!

Router#
```

8-4 Another useful command is **test aaa group radius server <A.B.C.D> iseiscool VainillaISE97 legacy**.

```
Router#test aaa group radius server <A.B.C.D> iseiscool VainillaISE97 legacy
User was successfully authenticated.

Router#
```

9 - Network Device Relevant Debugs

- **debug dot1x all** - Displays all dot1x EAP messages
- **debug aaa authentication** - Displays authentication debug information from AAA applications
- **debug aaa authorization** - Displays debug information for AAA authorization
- **debug radius authentication** - Provides detailed information about protocol-level activities just for the authentication
- **debug radius** - Provides detailed information about protocol-level activities

Related Information

- Cisco Technical Support & Downloads