# Downloadable ACL in Catalyst 1300 Switches

## Objective

The objective of this article is to demonstrate how the downloadable Access Control List (DACL) works on Cisco Catalyst 1300 switches with Cisco Identity Service Engine (ISE).

## Applicable Devices | Software Version

- Catalyst 1300 series | 4.1.6.54

### Introduction

Dynamic ACLs are ACLs assigned to a switch port based off a policy or criteria such as user account group membership, time of day, and more. They could be local ACLs that are specified by filter-ID or downloadable ACLs (DACL).

Downloadable ACL are dynamic ACLs that are created and downloaded from the Cisco ISE server. They dynamically apply access control rules based on user identity and device type. DACL has the benefit of allowing you to have one central repository for ACLs, so you don’t need to manually create them on each switch. When a user connects to a switch, they just need to authenticate, and the switch will download the applicable ACLs from the Cisco ISE server.

### Use Cases of Downloadable ACL

1. Different users will receive different ACLs when they connect to a switch (Local ISE Users).
2. Users with limited network connectivity can sign into a central web portal for full network access (Central Web Authentication).
3. Advanced - use of MAC Authentication Bypass (MAB) to allow communication to Windows Active Directory (AD) and some related services while connecting your ISE server to AD and monitoring user authentication. Prior to Windows AD login, the network will only allow access to very limited resources, but the AD authentication will download different ACLs based on Windows groups and allow full network access.
4. Advanced - Users receive different ACLs based on the day of the week, time of day, or some other factor because of policies on the ISE server.

In this article, the first use case will be discussed in detail.

## Table of Contents

- DACL Verification

## Prerequisites

- Ensure your Catalyst 1300 switch is upgraded to the latest firmware (the switch firmware should be 4.1.6 or higher).
- Assign a static IP to the switch for management purposes.

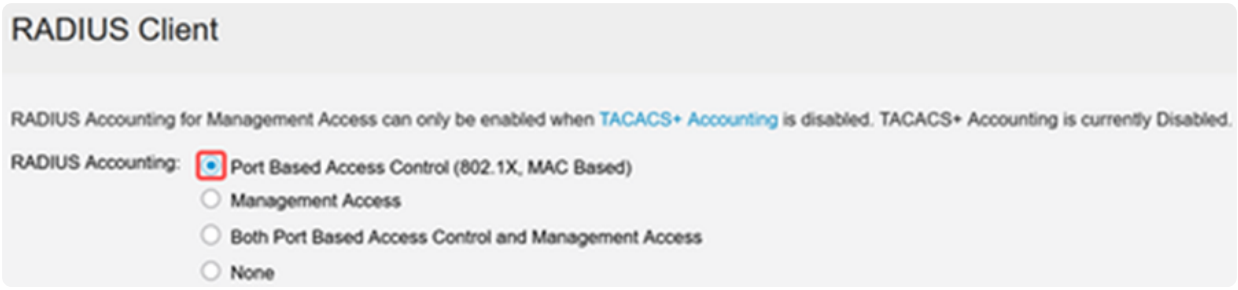
# Configure RADIUS Client

**Step 1**

Login to the Catalyst 1300 switch and navigate to **Security > RADIUS Client** menu.

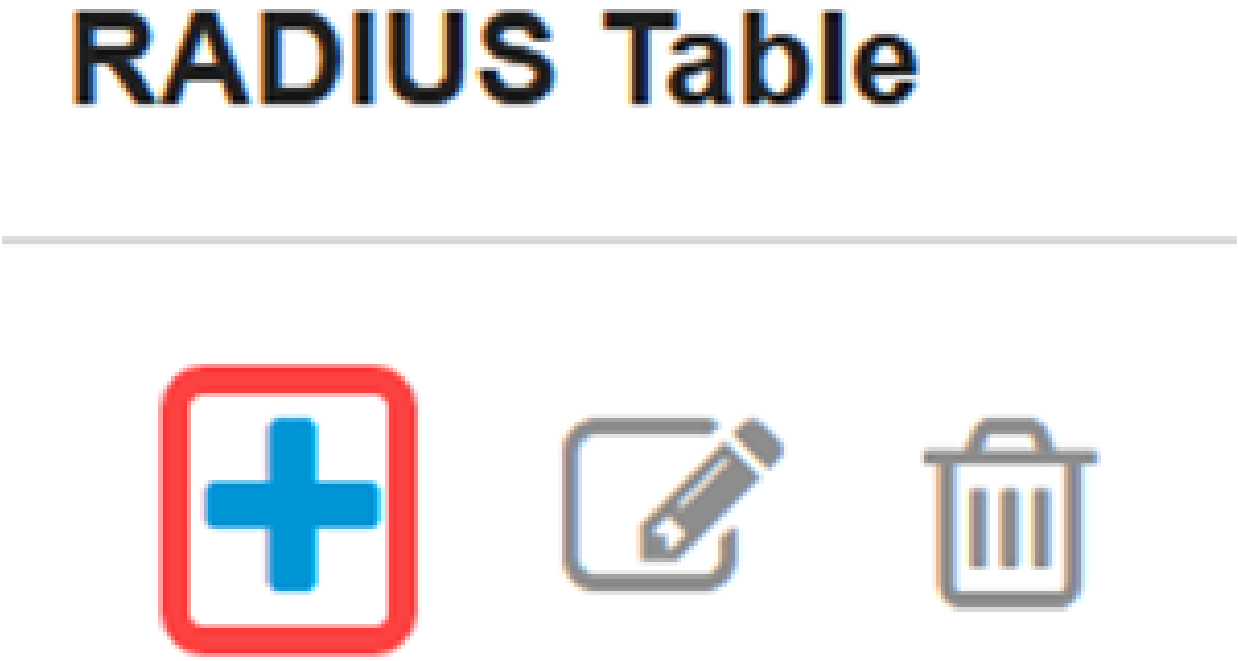

**Step 2**

For *RADIUS Accounting*, select **Port Based Access Control** option.




**Step 3**

Under *RADIUS Table*, click on the **plus icon** to add the Cisco ISE Server.




**Step 4**

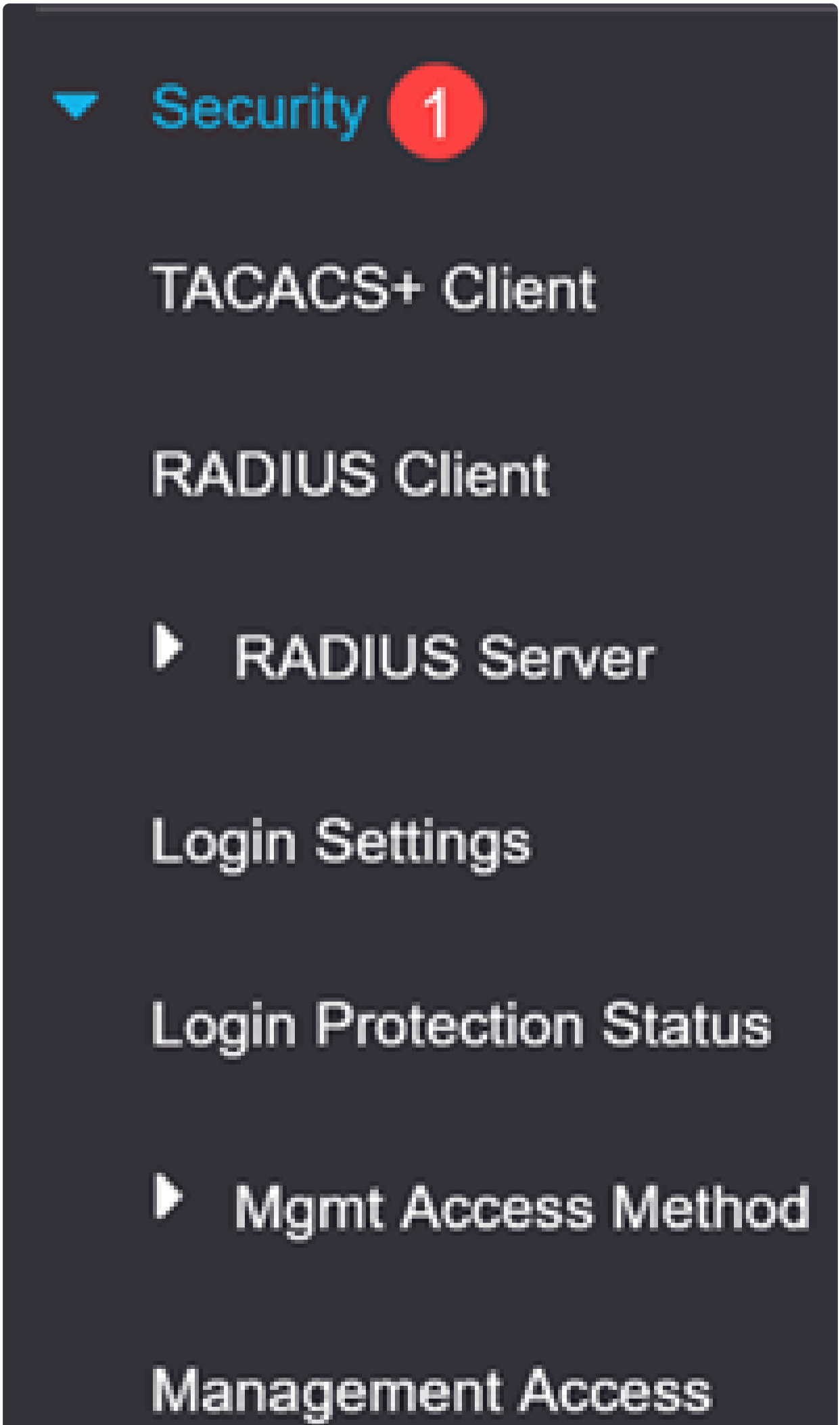
Enter the Cisco ISE Server details and click **Apply**.


> **Note:**
>
> The *Usage Type* must be selected as **802.1x**.

# Configure 802.1x Authentication

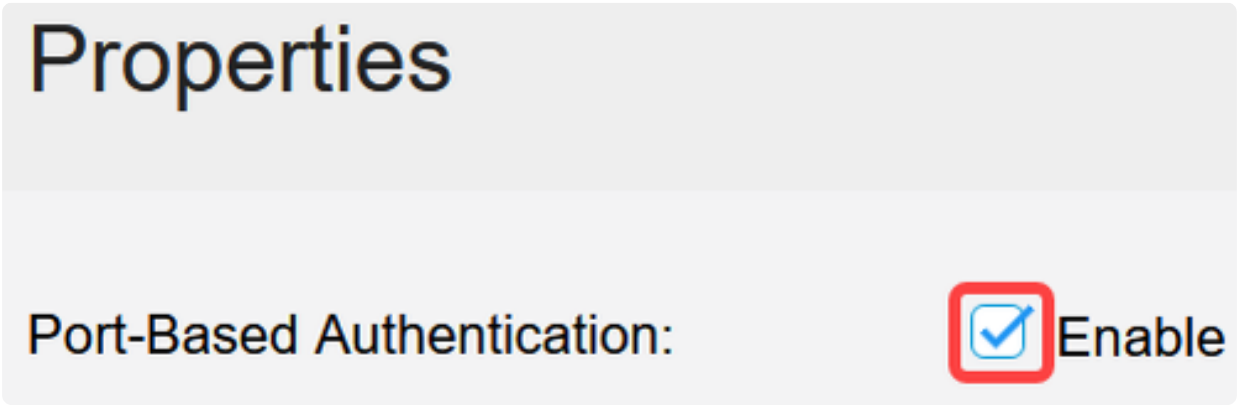
**Step 1**

Navigate to **Security > 802.1X Authentication > Properties** menu.


Security 1
TACACS+ Client
RADIUS Client
RADIUS Server
Login Settings
Login Protection Status
Mgmt Access Method
Management Access

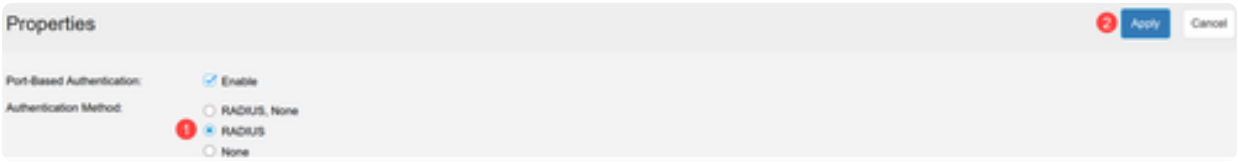
**Step 2**

Click the check box to enable *Port-Based Authentication*.



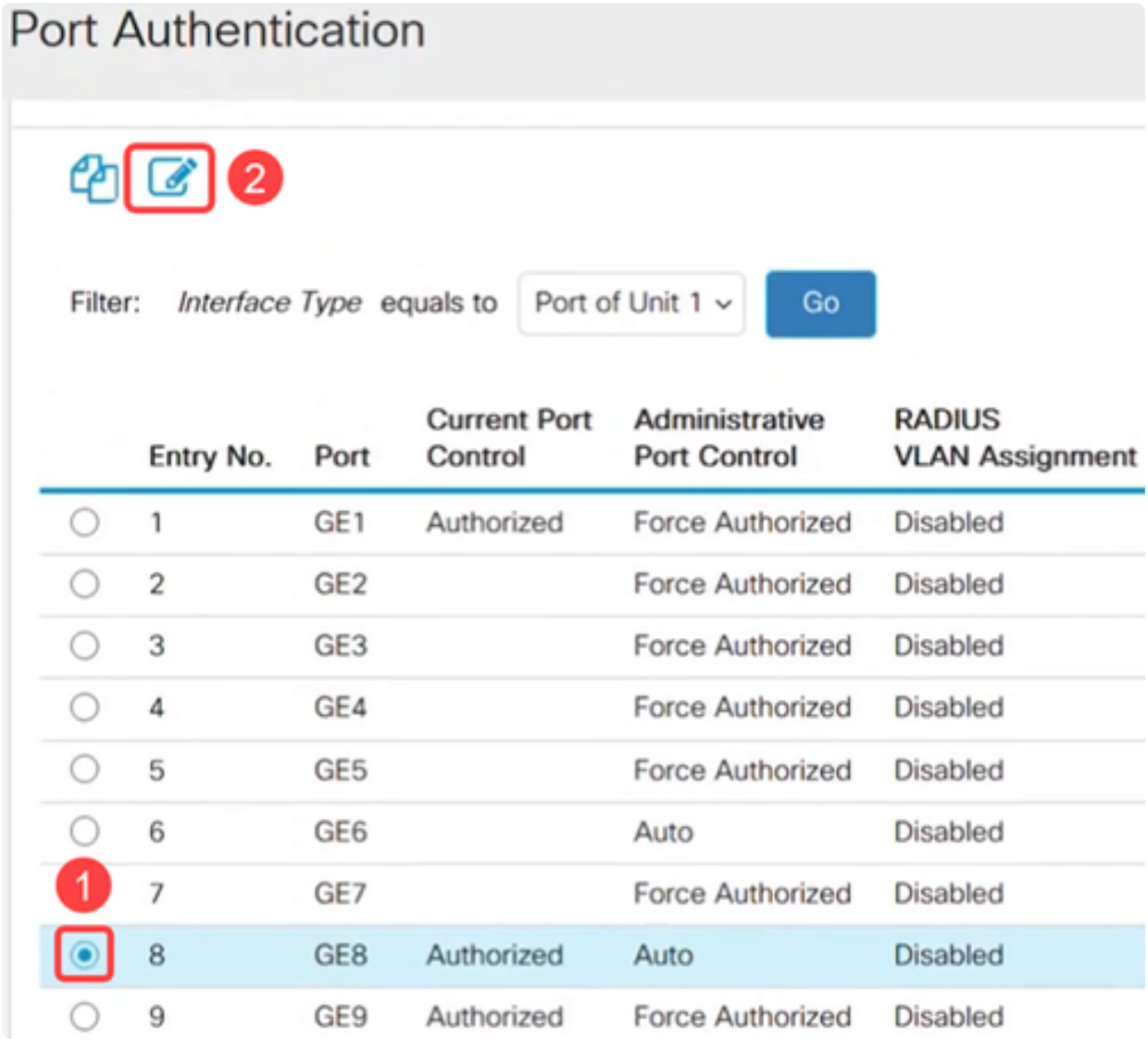

**Step 3**

Under *Authentication Method*, select **RADIUS** and click **Apply**.



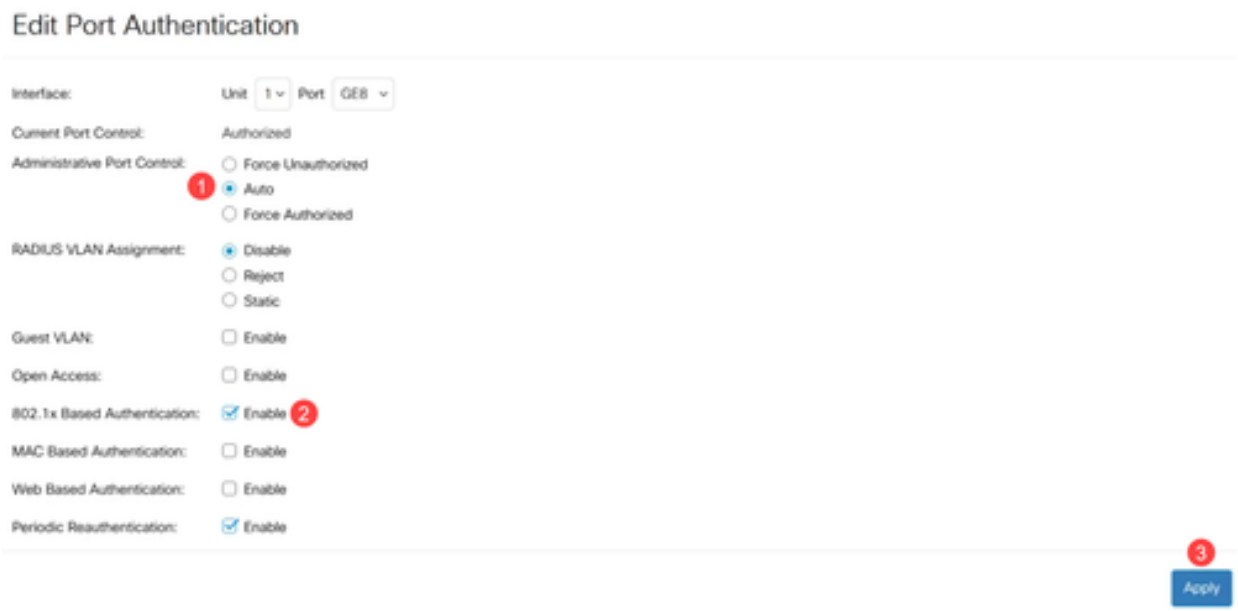

**Step 4**

Go to **Security > 802.1X Authentication** > **Port Authentication** menu. Select the port to which your laptop is connected and click on the **edit** icon. In this example, **GE8** is selected.




**Step 5**

Select the *Administrative Port Control* as **Auto** and enable *802.1x Based Authentication*. Click **Apply**.



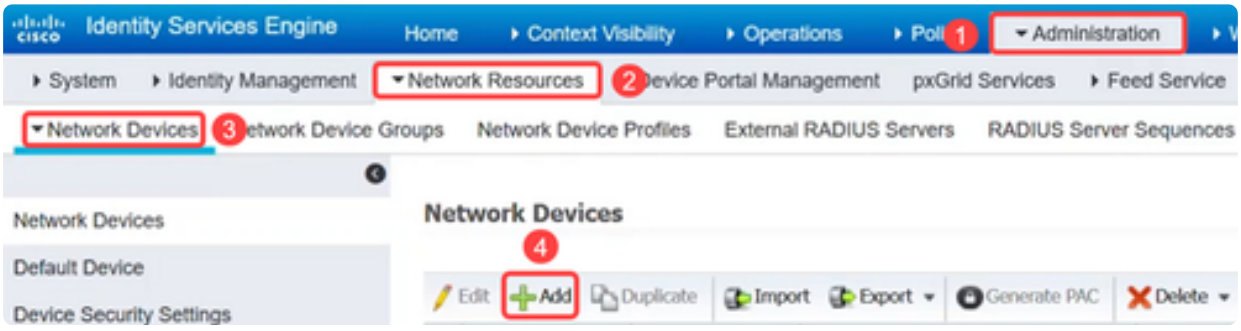

# Cisco ISE Server Configuration for Downloadable ACL

> **Note:**
> ISE configuration is beyond the scope of Cisco Business support. Refer to the **ISE Admin guide** for more information.

The configurations shown in this article are an example for downloadable ACL to work with Cisco Catalyst 1300 series switch.

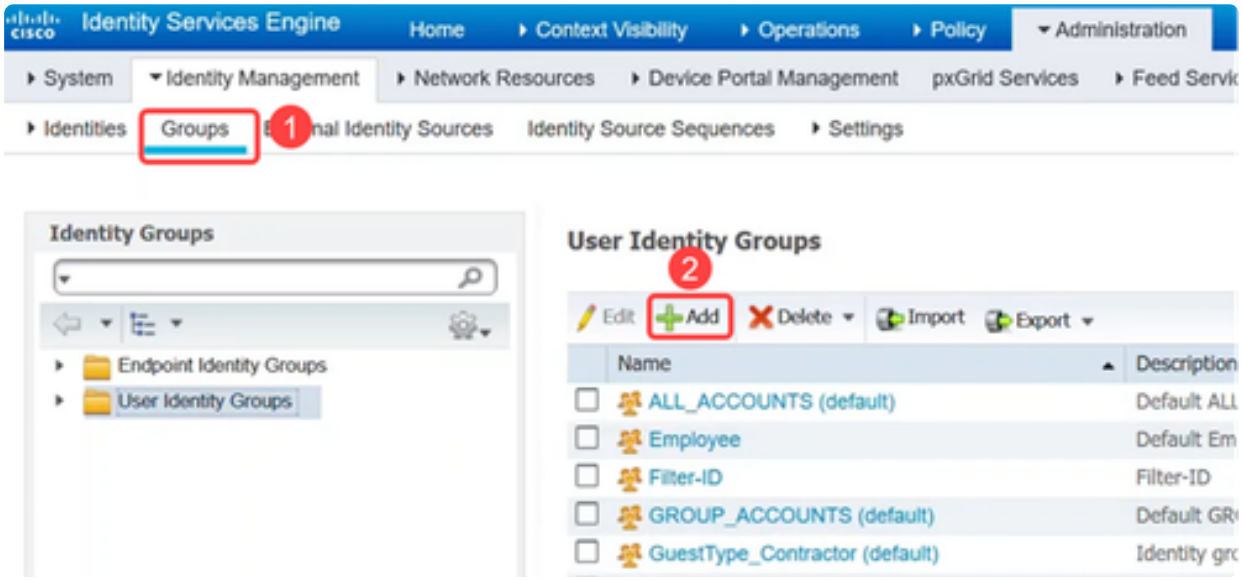
**Step 1**

Login to your Cisco ISE server and navigate to **Administration** > **Network Resources** > **Network Devices** and add the Catalyst switch device.



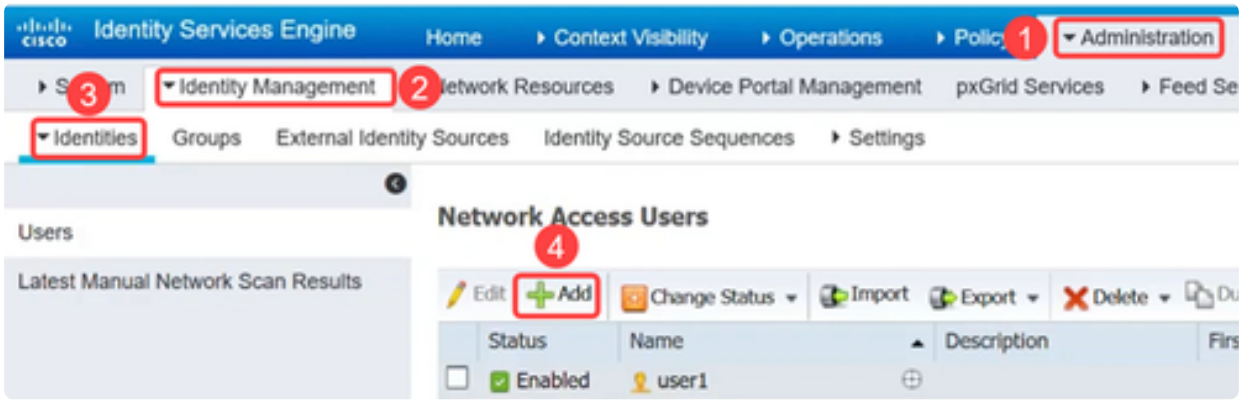

**Step 2**

To create *User Identity Groups*, navigate to the **Groups** tab and add the User Identity Groups.



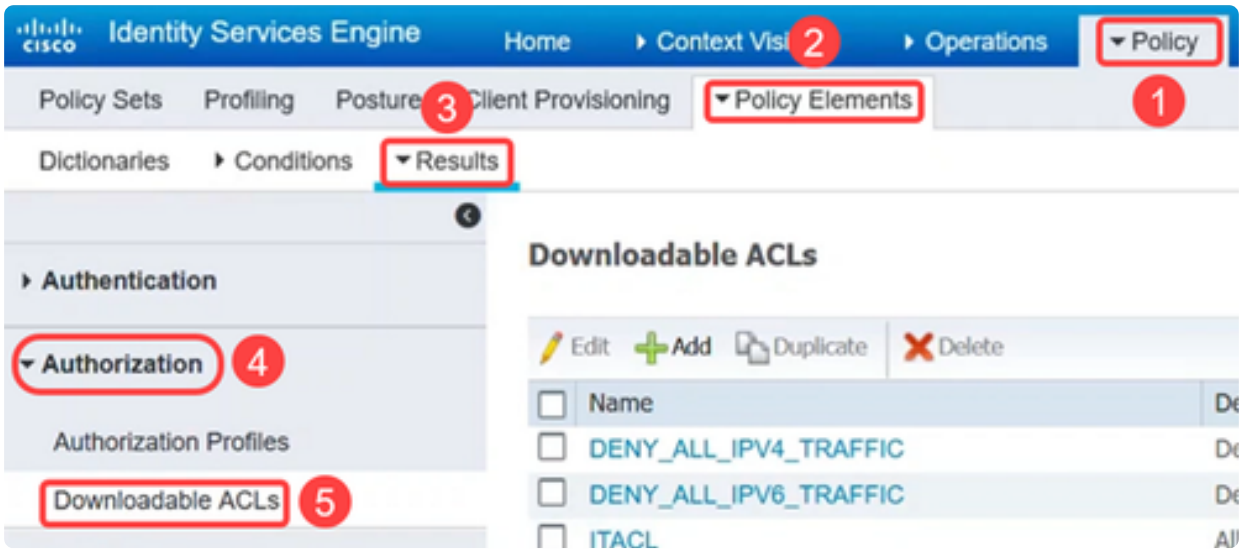

**Step 3**

Go to the **Administration > Identity Management > Identities** menu to define the users and to map the users to the groups.



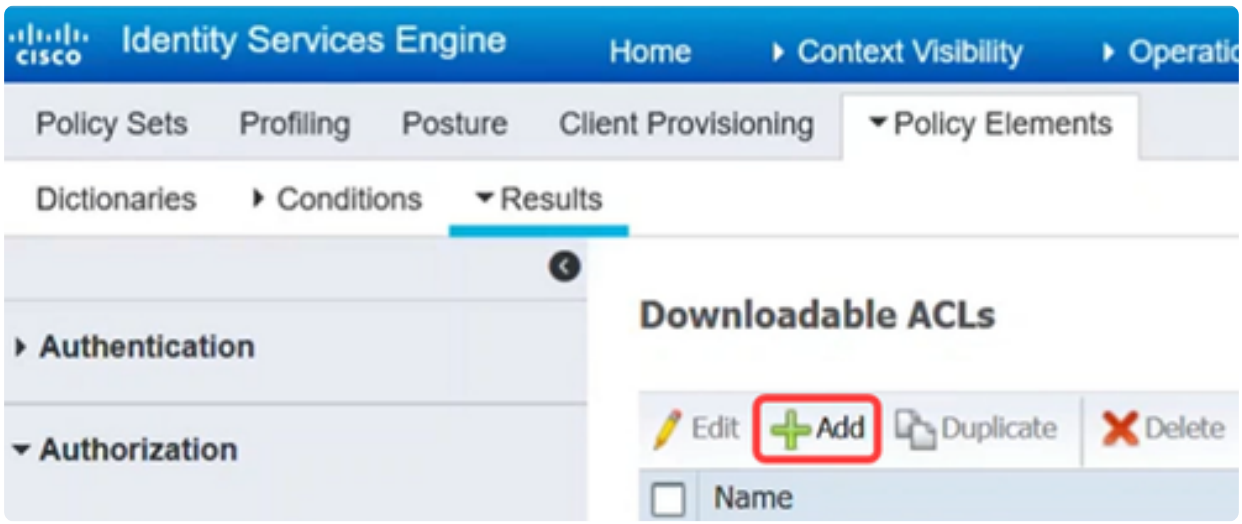

**Step 4**

Navigate to **Policy > Policy Elements > Results** menu. Under **Authorization**, click on **Downloadable ACLs**.



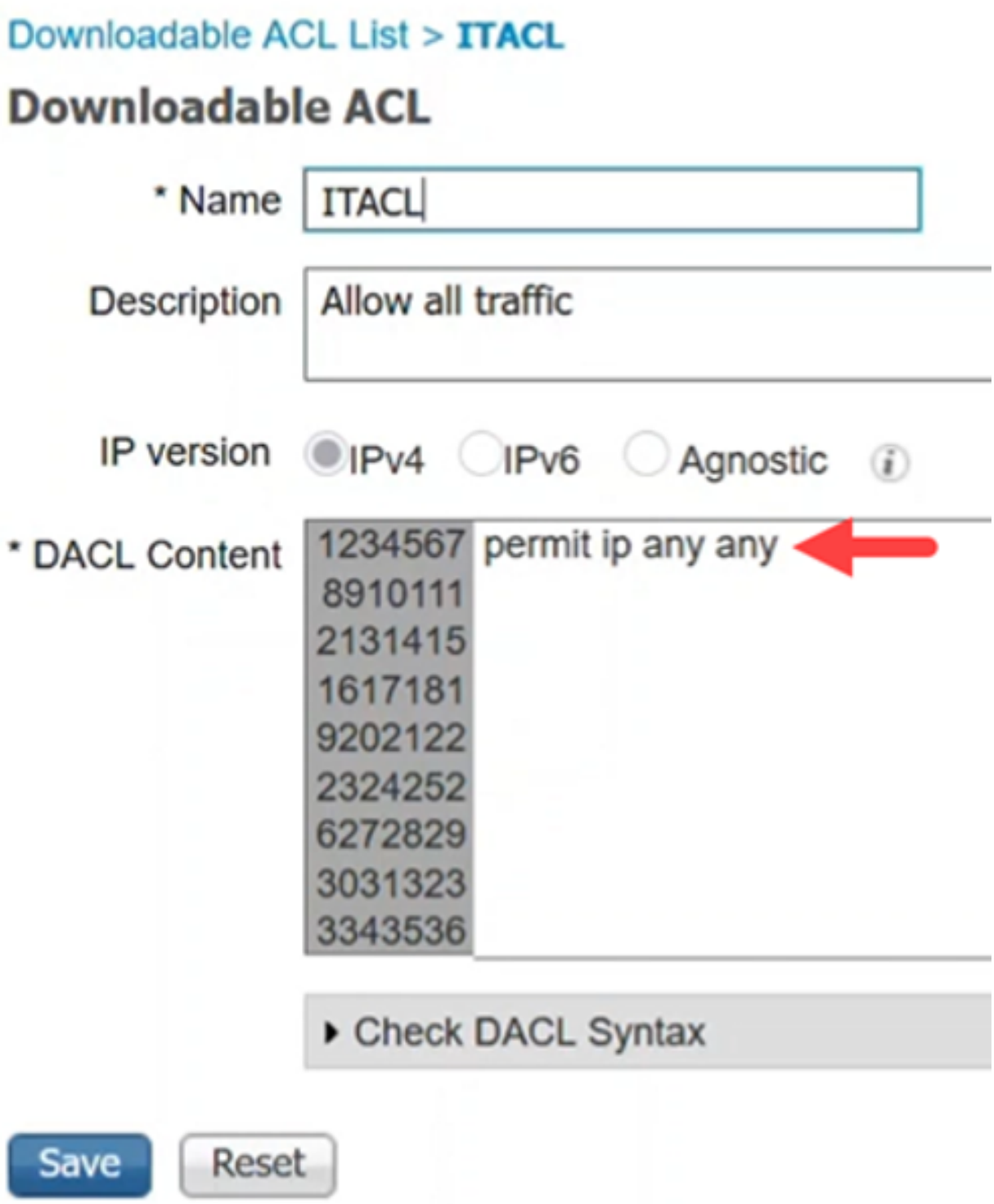

**Step 5**

Click on the **Add icon** to create the downloadable ACL.




**Step 6**

Configure the *Name*, *Description*, select the IP version, and enter the access control entries (ACEs) that will make up the downloadable ACL in the *DACL Content* field. Click **Save**.



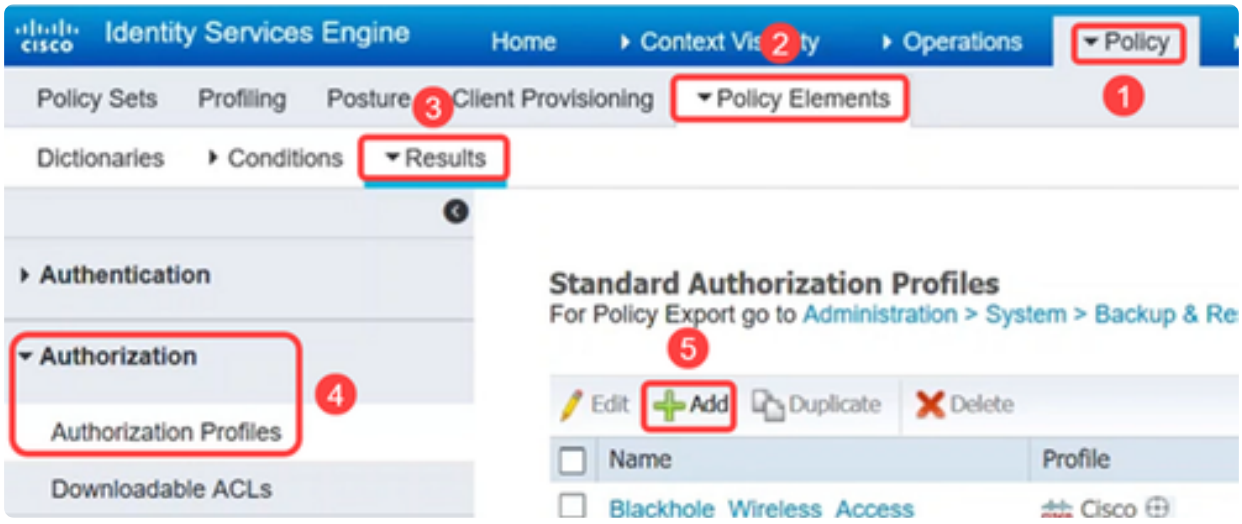

**Note:**

Only IP ACLs are supported, and the source must be **ANY**. For ACL on ISE, only IPv4 is supported now. If an ACL is entered with another source, while the syntax may be fine as far as ISE is concerned, it will fail when applied to the switch.

**Step 7**

Create authorization profiles that will be used to logically associate your DACL and other policies together inside the ISE policy sets.

To do this, navigate to **Policy > Policy Elements > Results > Authorization > Authorization Profiles** and click on **Add.**

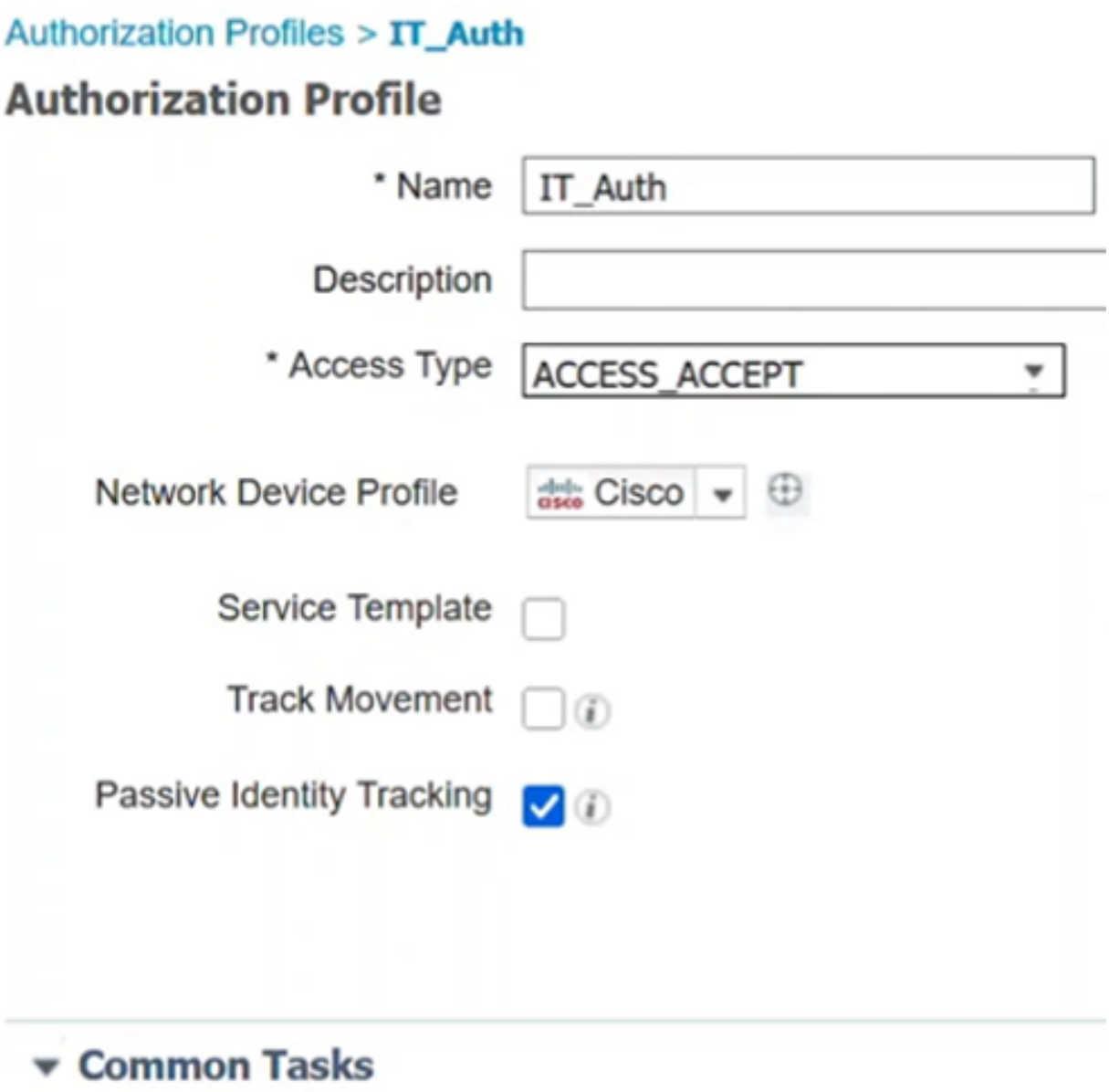



**Step 8**

In the *Authorization Profile* page, configure the following:

- *Name*
- *Description*
- *Access Type* - this should be set to ACCESS_ACCEPT. If set to ACCESS_REJECT it will reject the authentication.
- *Network Device Profile* – this should be selected as Cisco.
- *Passive Identity Tracking* - may need to be enabled for some authentication scenarios. It is required for EasyConnect_PassiveID scenarios linked to AD.
- *Common Tasks* – This section has many options. For this example, *DACL Name* is configured.

Click **Save**.

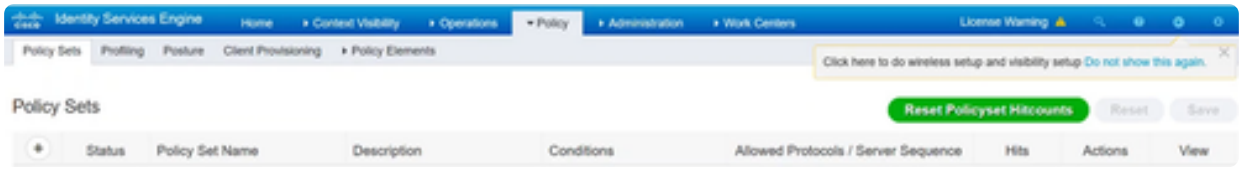



**Step 9**

To configure policy sets that are logical groupings of authentication and authorization policies, click on **Policy > Policy Sets** menu.

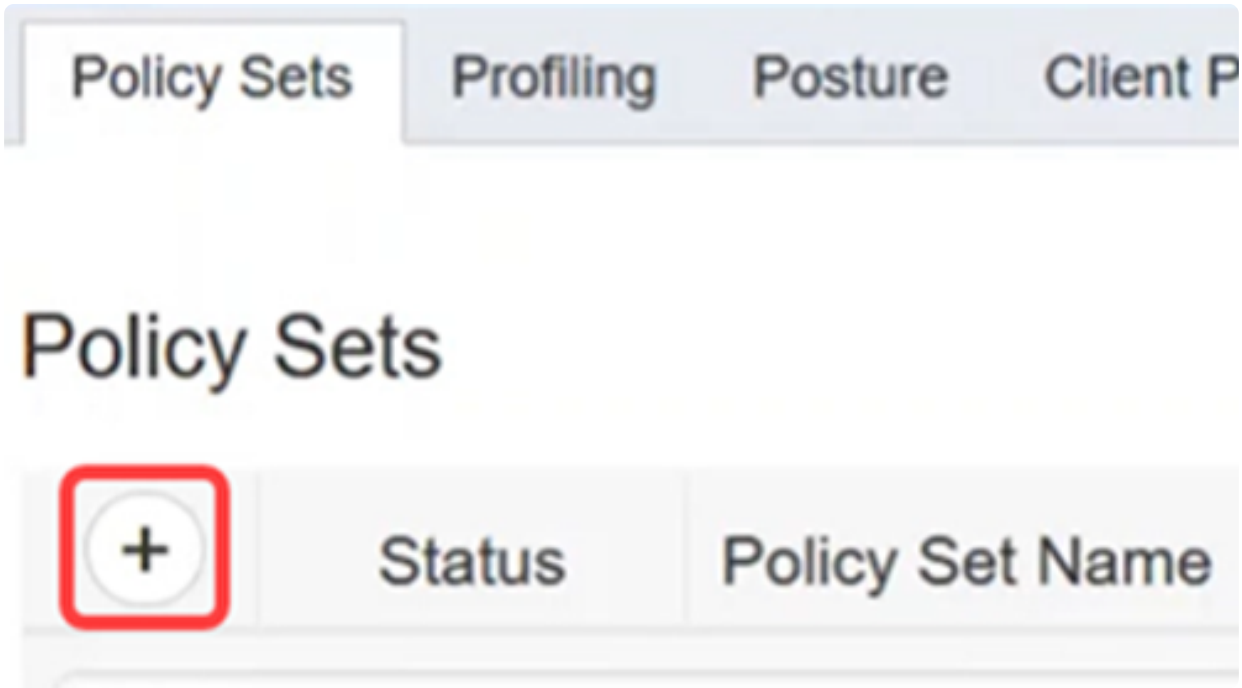
You can view the following when looking at a list of policy sets:

- *Status* - A green check indicates enabled, empty white circle indicates disabled, and an eye icon is for a monitor only configuration.
- *Policy Set Name* and *Description* - *a*re self-explanatory
- *Conditions* - define where the policy set applies.
- *Allowed Protocols/Server Sequence* - sets more advanced controls.
- *Hits* - show the number of times the policy set has been used.
- *Actions* - allow you to change the order where policy sets could be applied, copy an existing policy set, or delete an existing policy set.
- *View* - allows you to edit the policy set details.



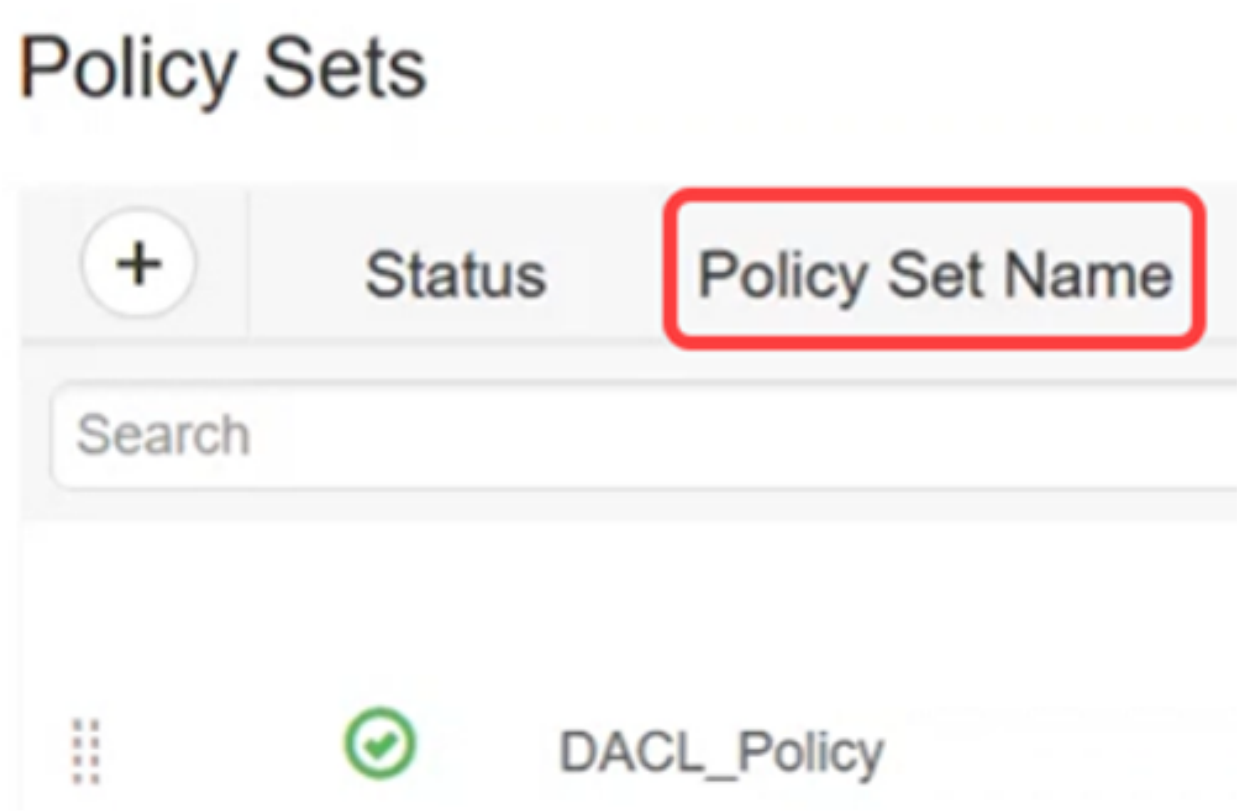

**Step 10**

To create a policy set, click on the **add** button.



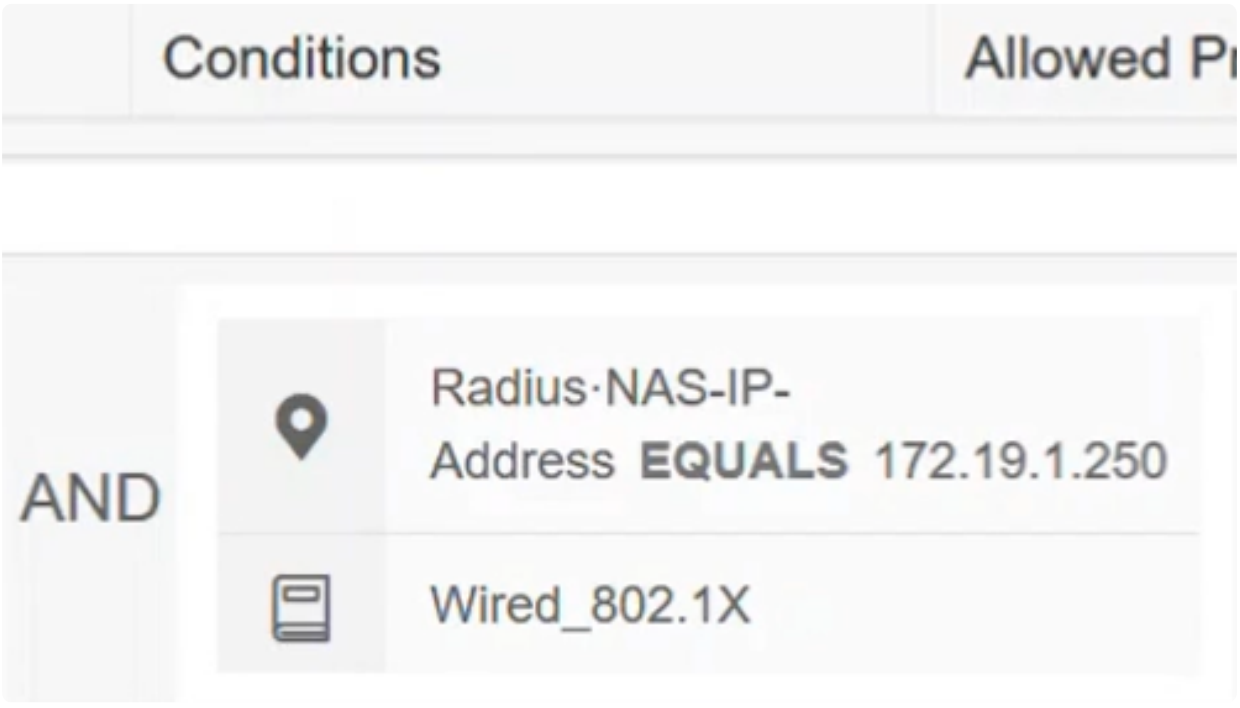

**Step 11**

Define a *Policy Set Name*.




**Step 12**

Under *Conditions*, click the **add button**. This opens the *Conditions Studio* where you can define where this authentication profile will be used. In this example, it has been applied to the *Radius-NAS-IP-Address* (the switch) which is 172.19.1.250 and wired_802.1x traffic.

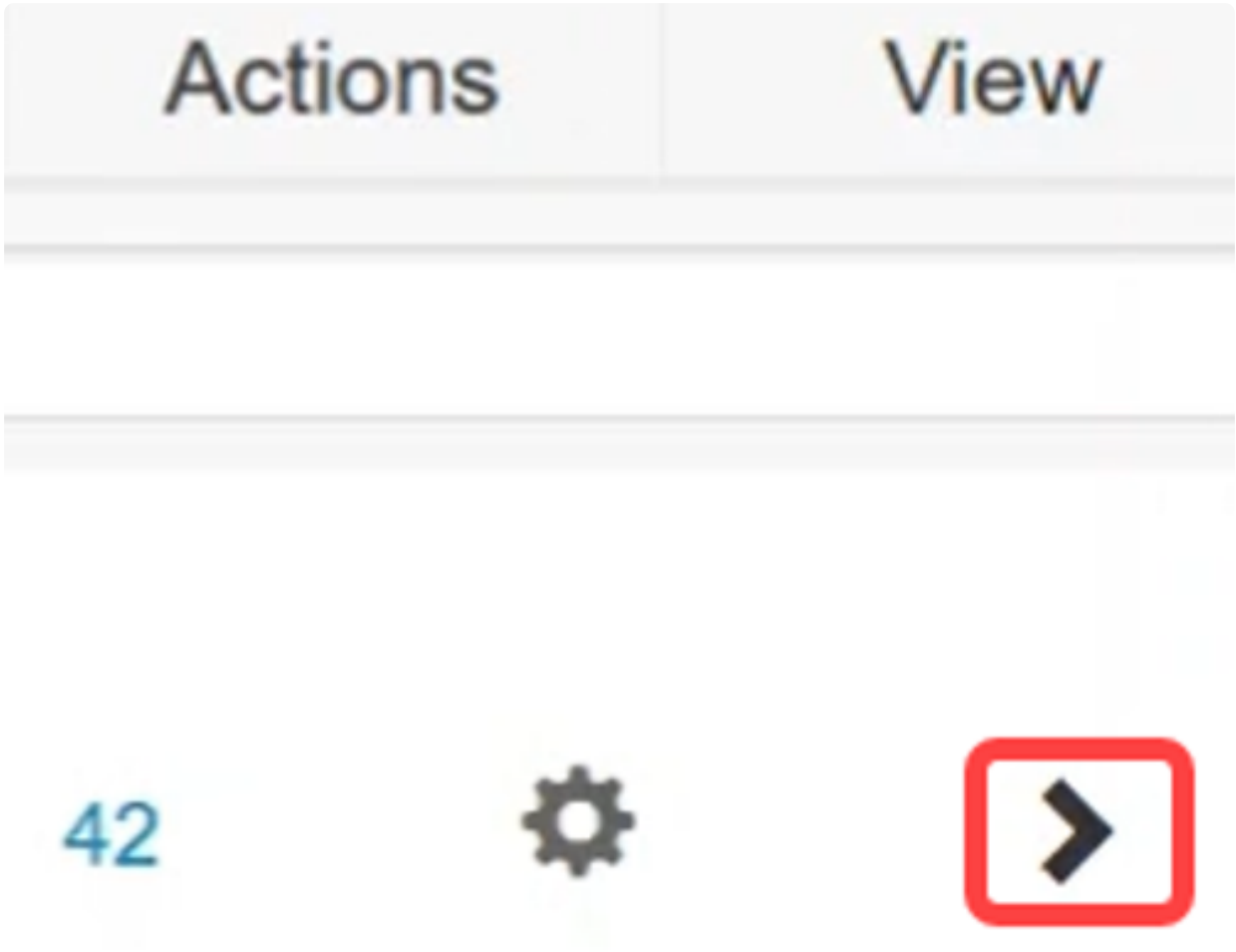


**Step 13**

Configure the *Allowed Protocols* to the **Default Network Access** and click **Save.**

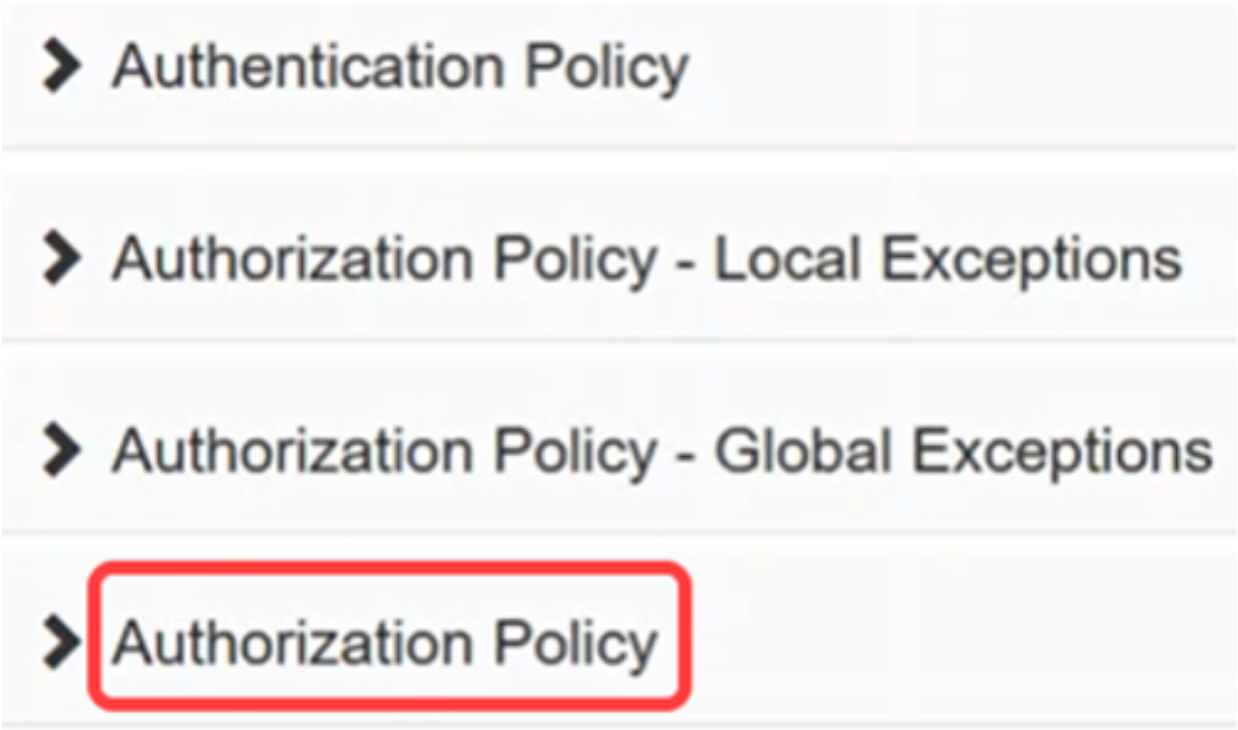

**Step 14**

Under *View*, click on the **arrow** icon to configure authentication and authorization policies based on your network set up and requirements or you can choose the default settings. In this example, click on Authorization policy.



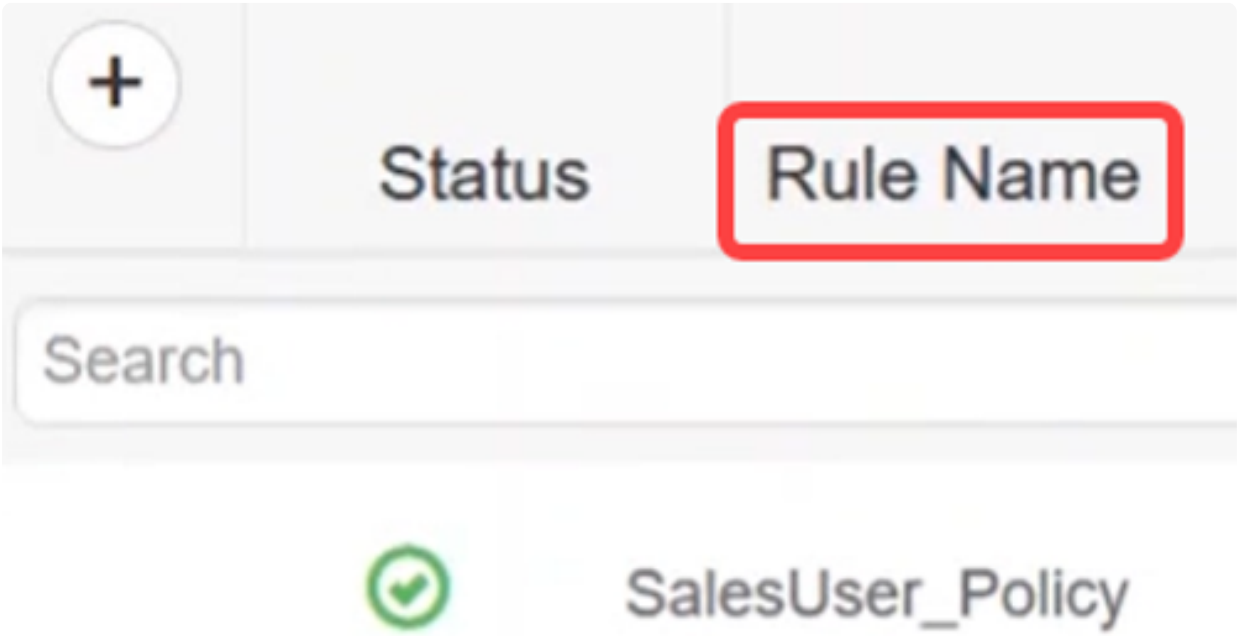

**Step 15**

Click on the **plus** icon to add a policy.




**Step 16**

Enter the *Rule Name*.

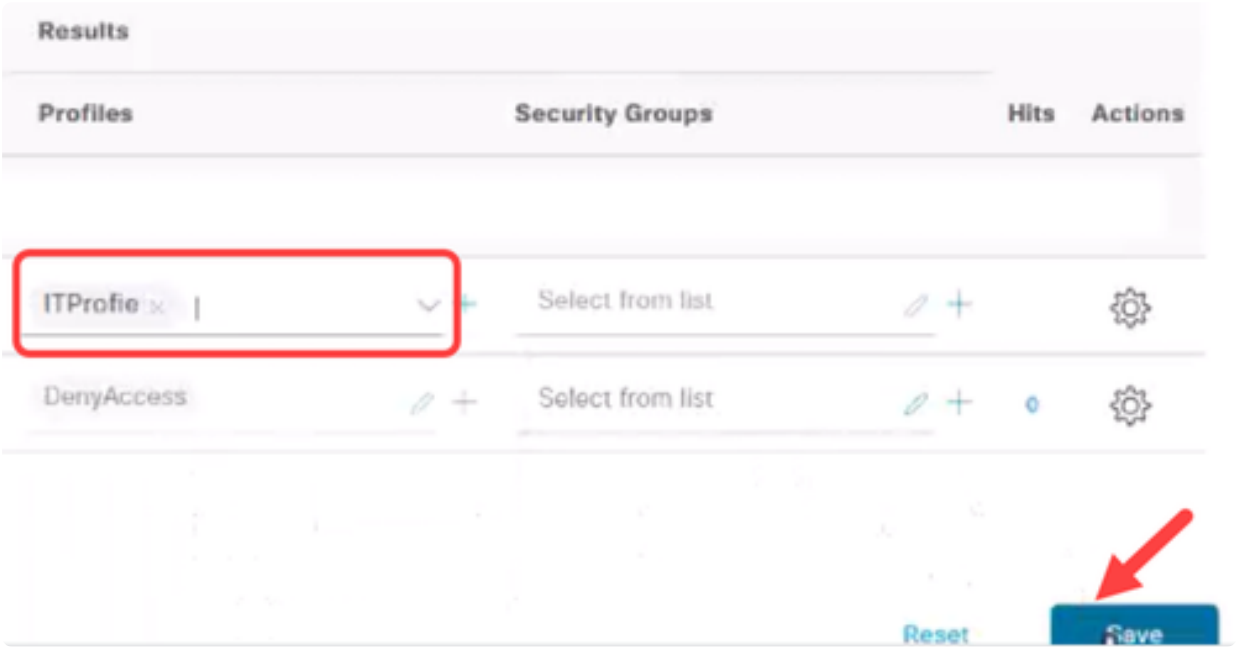



**Step 17**

Under *Conditions*, click on the **plus** icon and select the identity group. Click **Use**.


**Step 18**

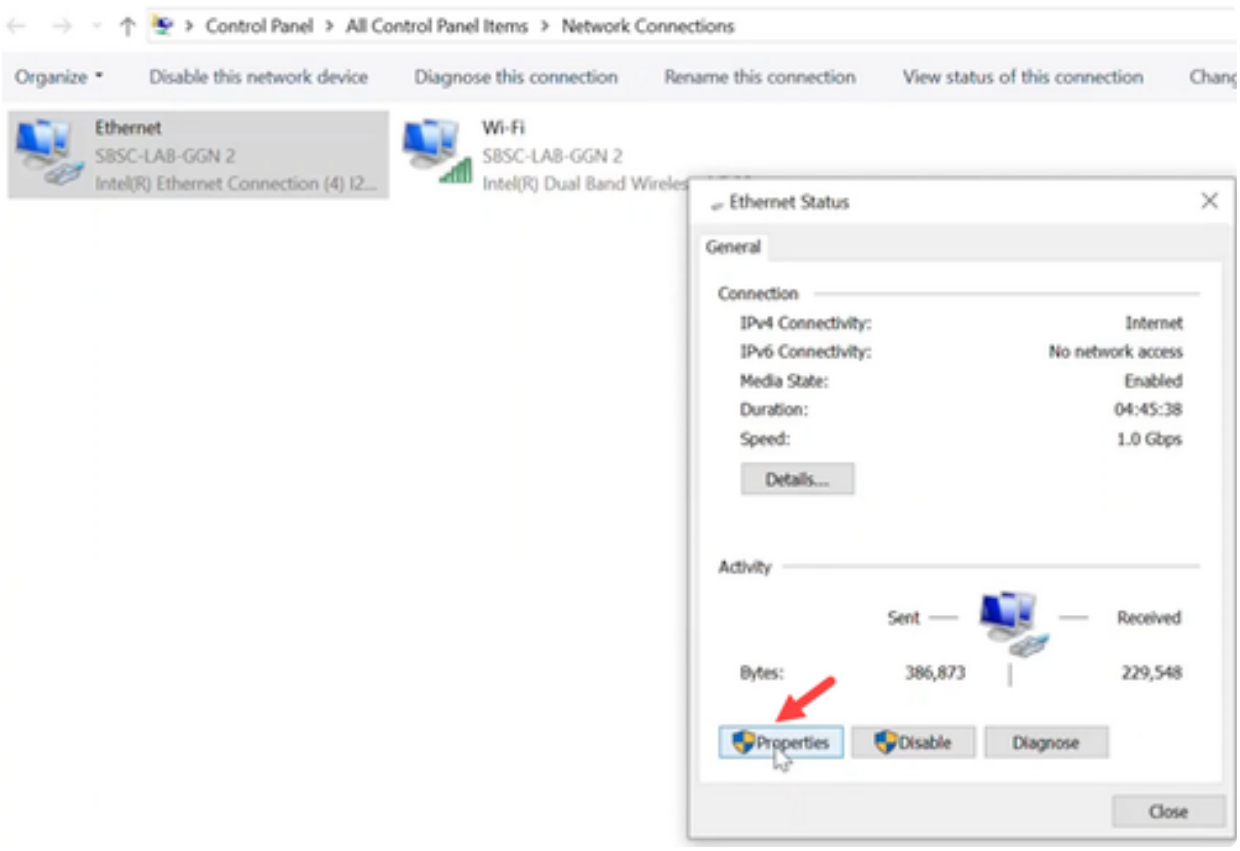
Apply the required Profile and click **Save**.




## Client Configurations

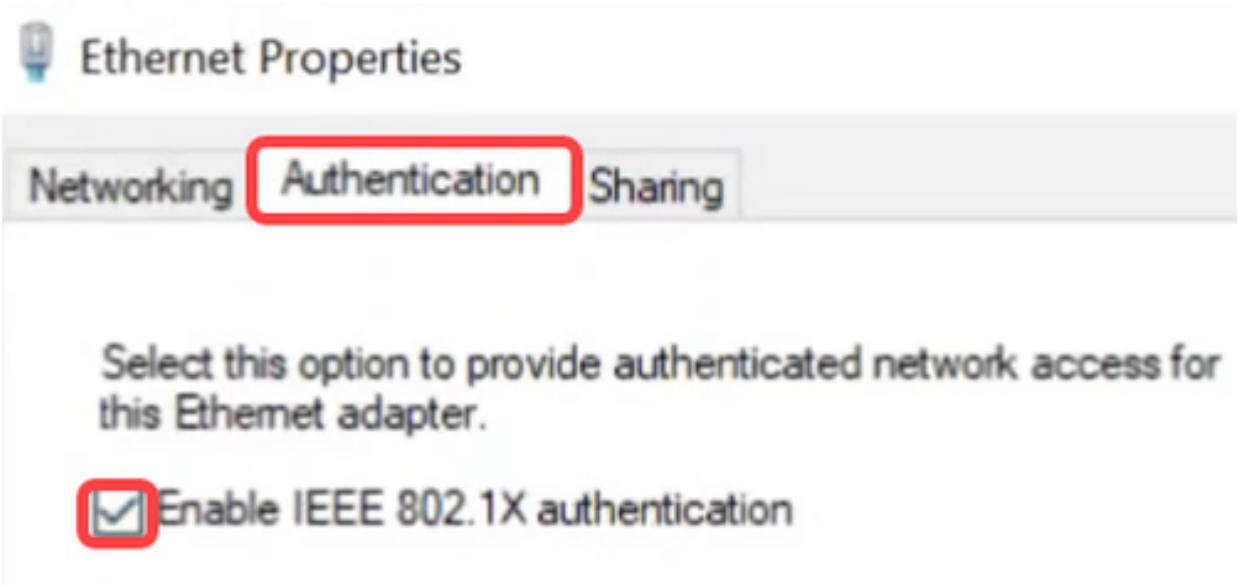
**Step 1**

On the client laptop, navigate to **Network Connections > Ethernet** and click on **Properties**.



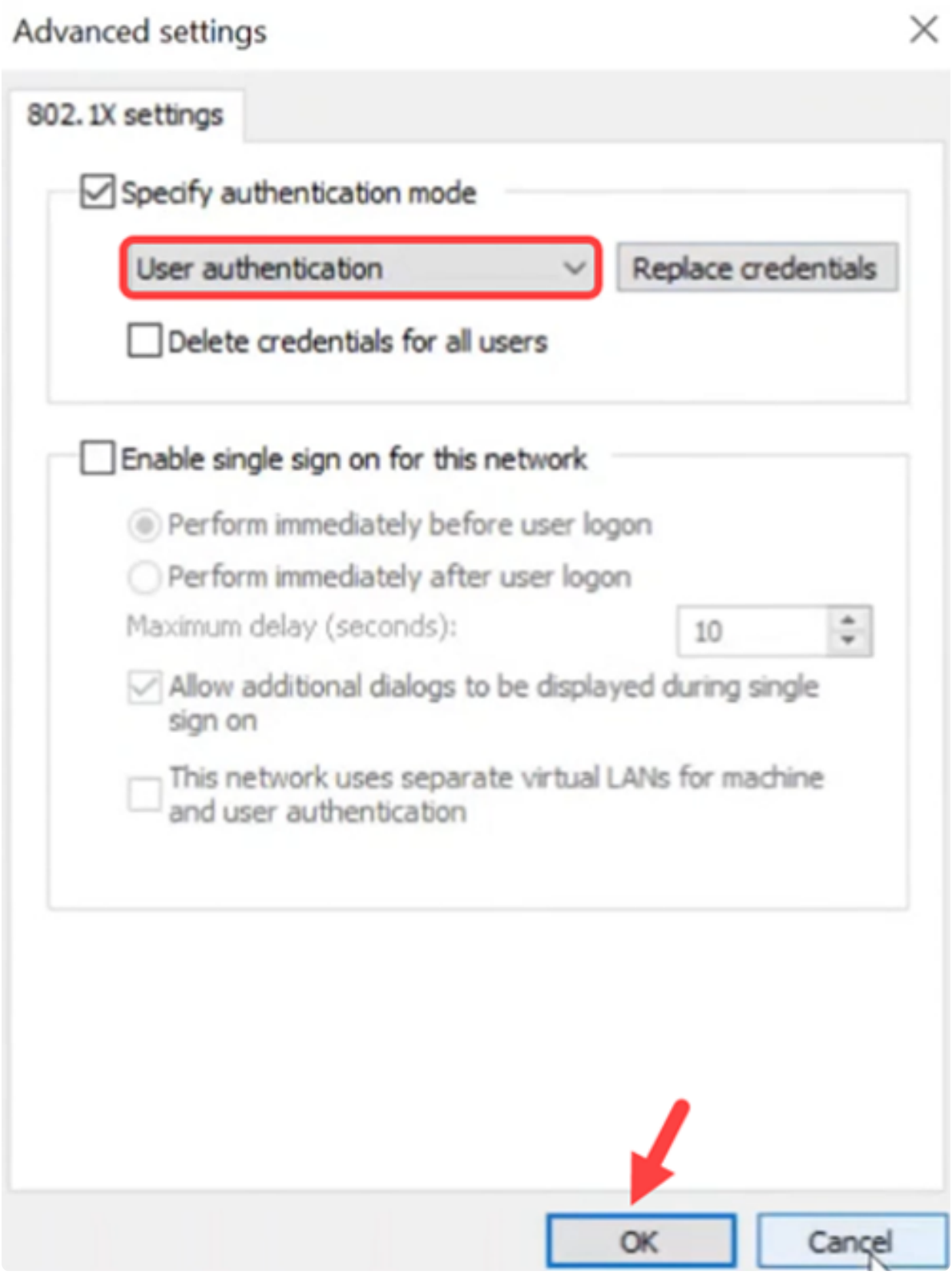

**Step 2**

Click on the **Authentication** tab and make sure **802.1X authentication** is enabled.



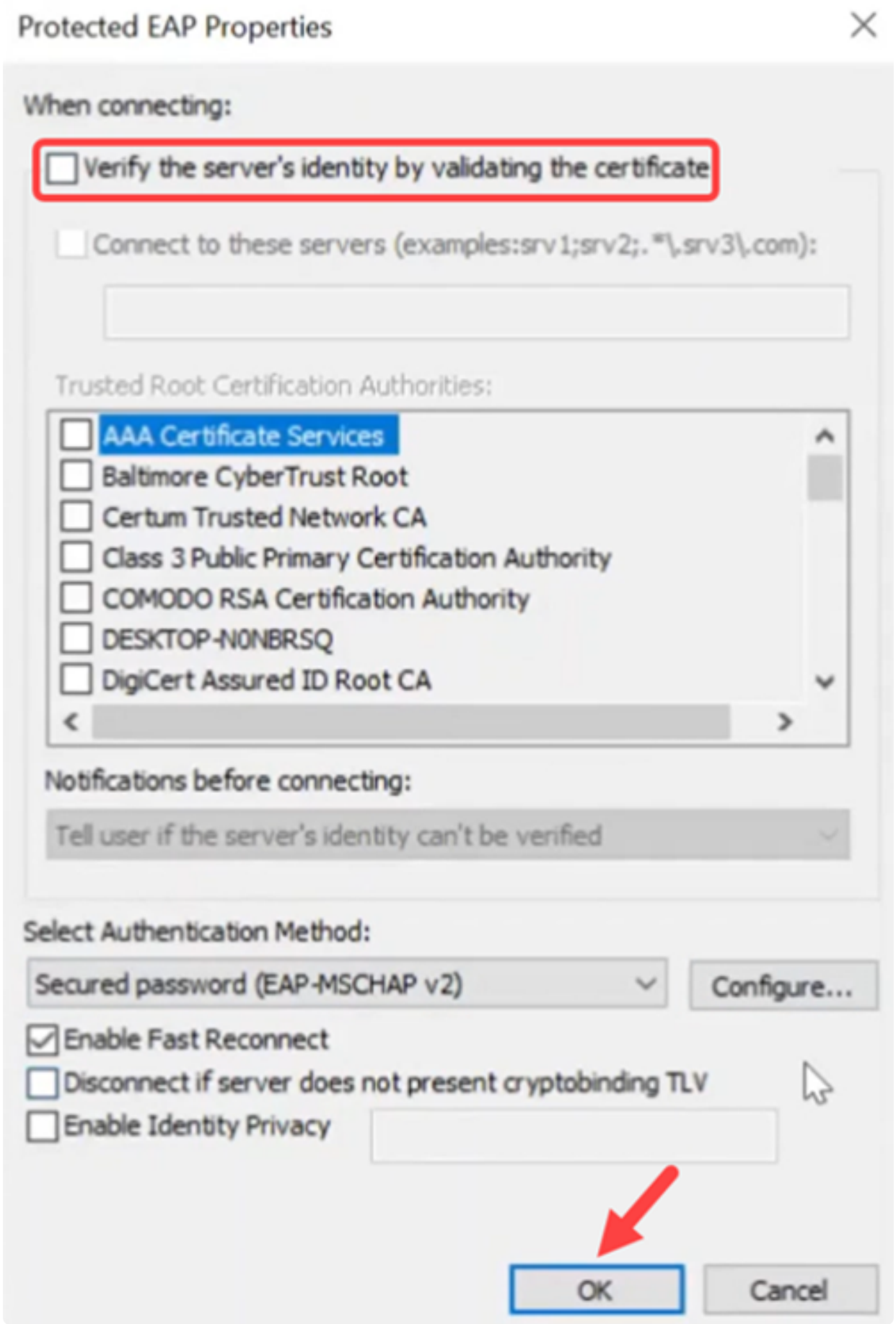

**Step 3**

Under *Additional Settings*, select **User authentication** as authentication mode. Click **Save Credentials** and then **OK**.



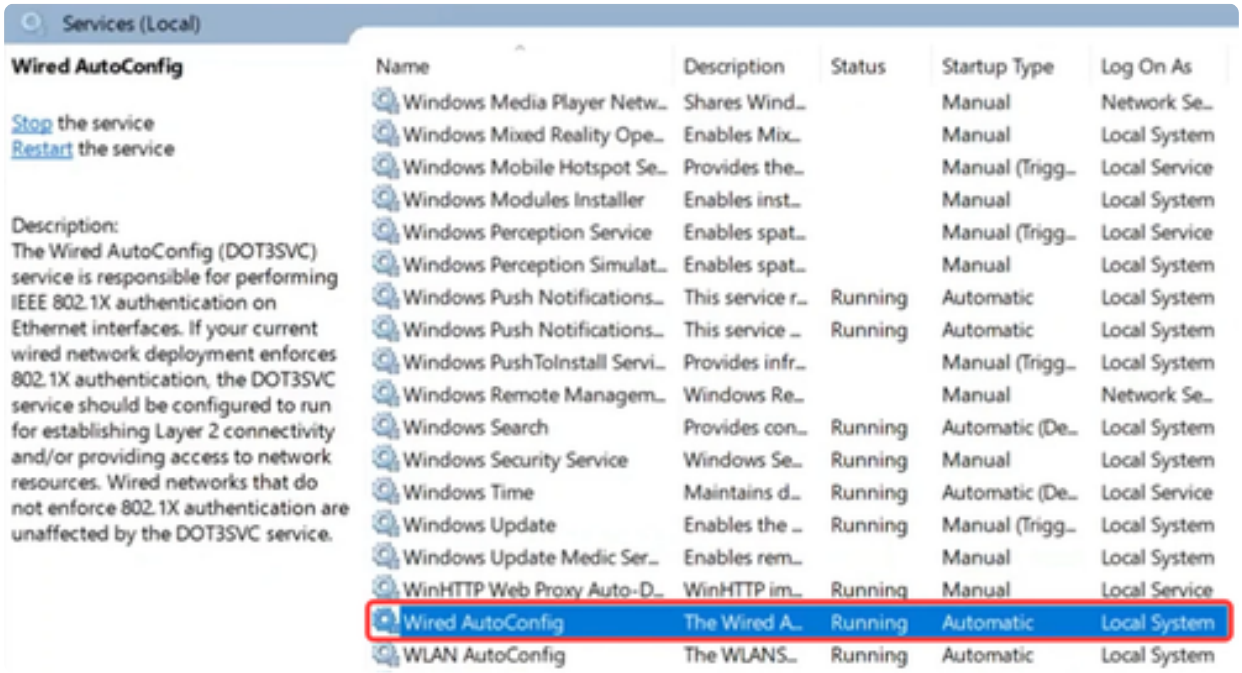
**Step 4**

Click on **Settings** and make sure the box next to *Verify the server's identity by validating the certificate* is unchecked. Click **OK**.


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
Certum Trusted Network CA
Class 3 Public Primary Certification Authority
COMODO RSA Certification Authority
DESKTOP-N0NBRSQ
DigiCert Assured ID Root CA
Notifications before connecting:
Tell user if the server's identity can't be verified
Select Authentication Method:
Secured password (EAP-MSCHAP v2)
Configure...
Enable Fast Reconnect
Disconnect if server does not present cryptobinding TLV
Enable Identity Privacy
OK
Cancel

**Step 5**

Under *Services*, enable **Wired AutoConfig** settings.

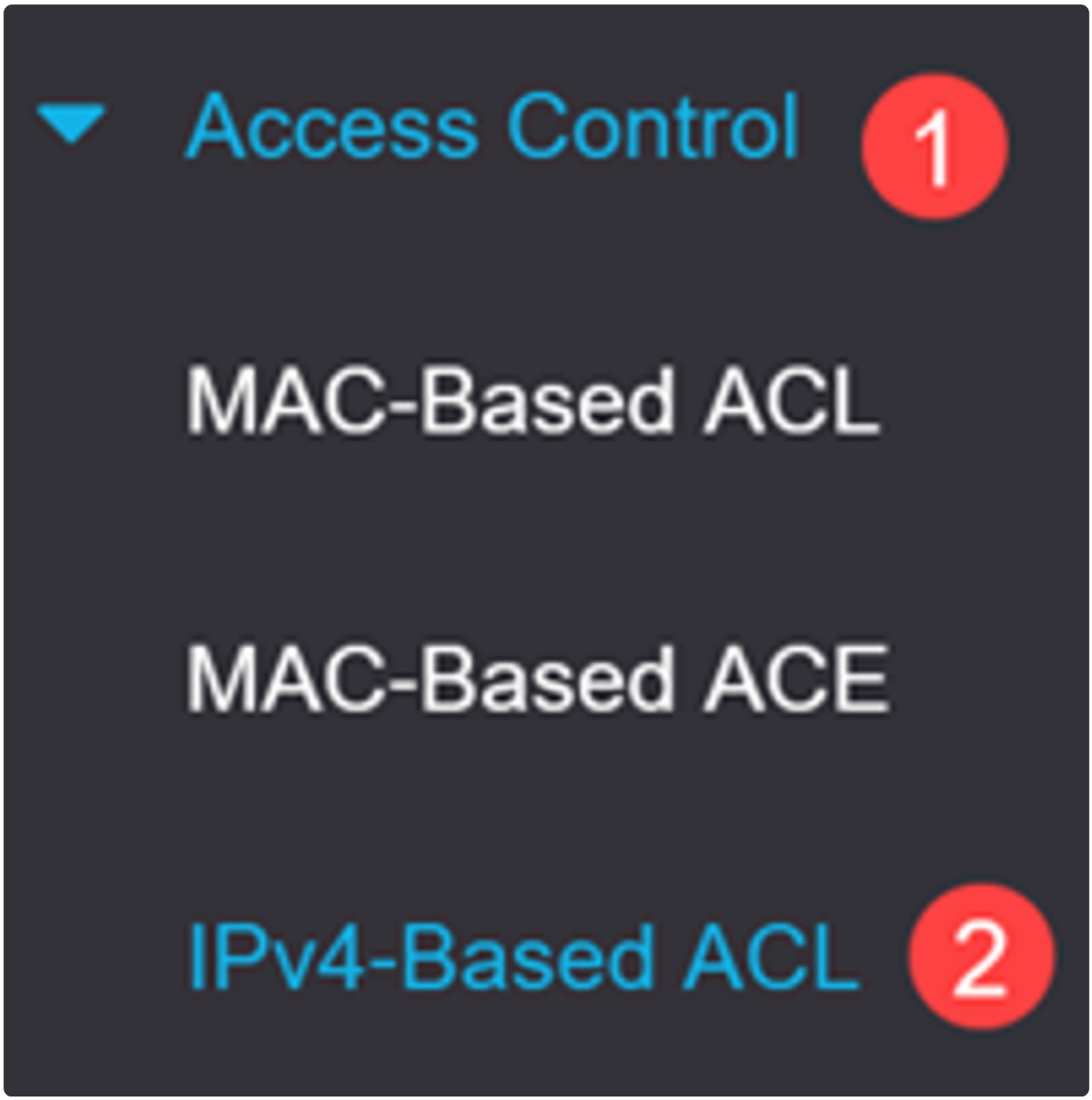



# DACL Verification

Once the user is authenticated, you can verify the downloadable ACL.

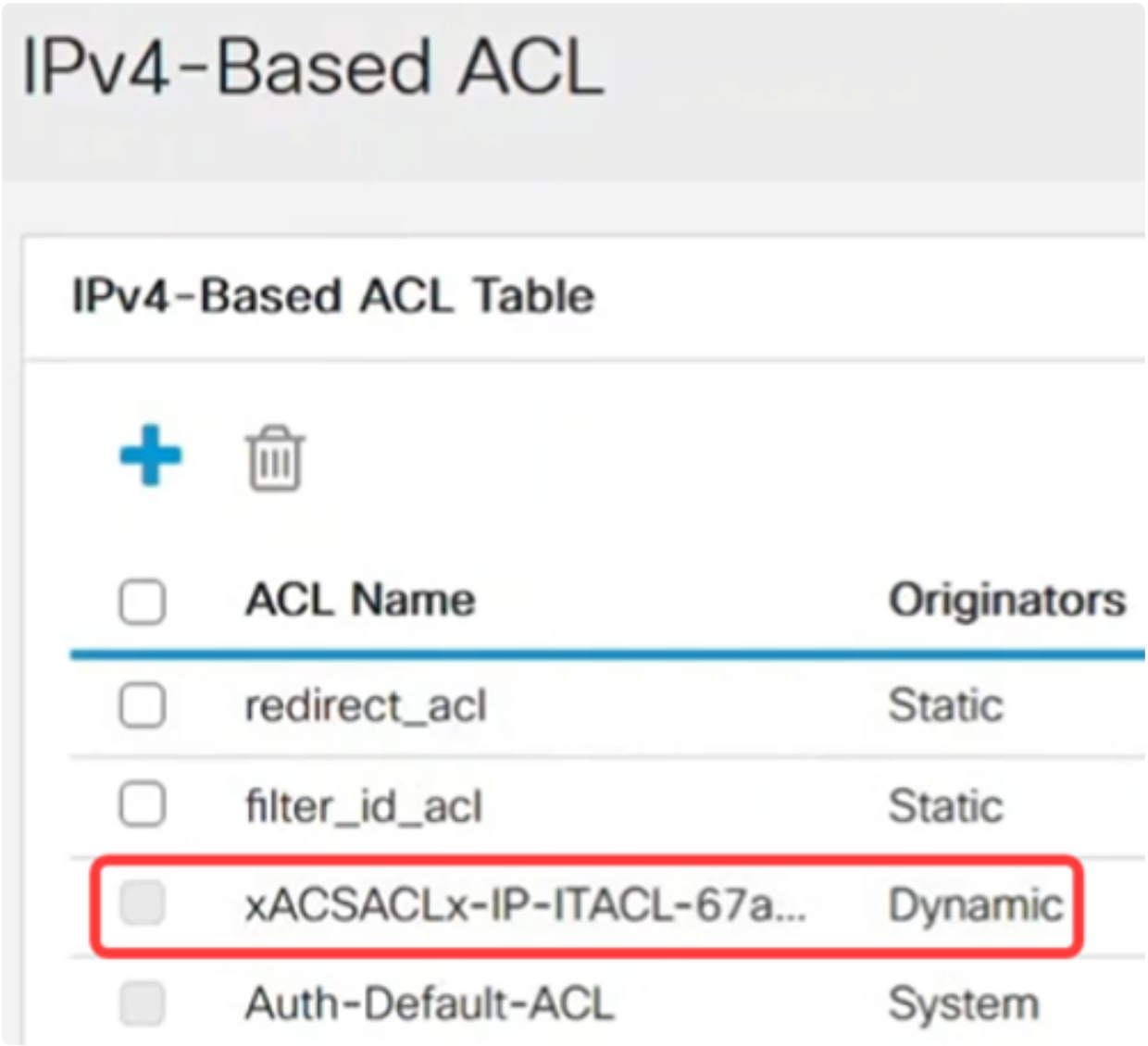
**Step 1**

Login to the Catalyst 1300 switch and navigate to **Access Control > IPv4-Based ACL** menu.




**Step 2**

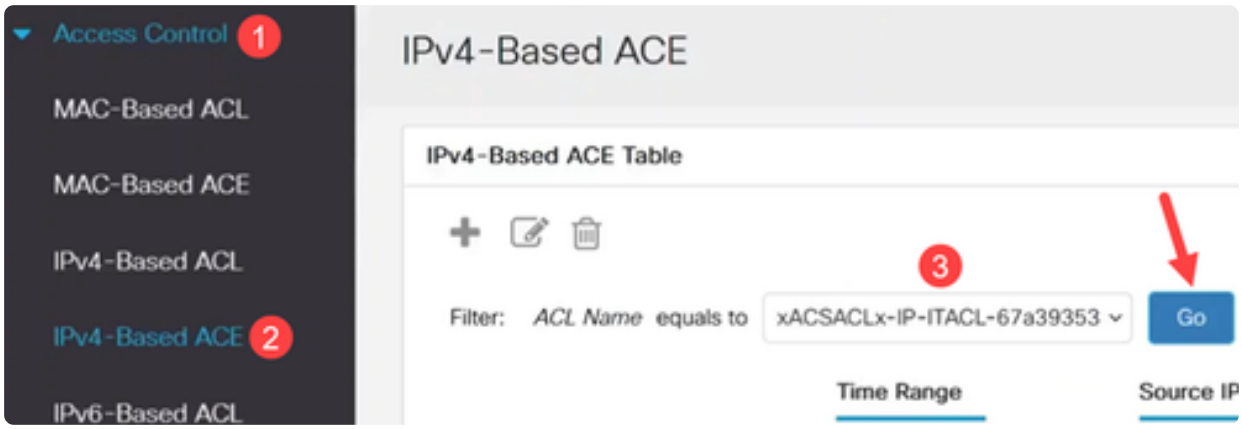
The *IPv4-Based ACL Table* will display the downloaded ACL.




**Note:**
Downloadable ACLs cannot be edited.

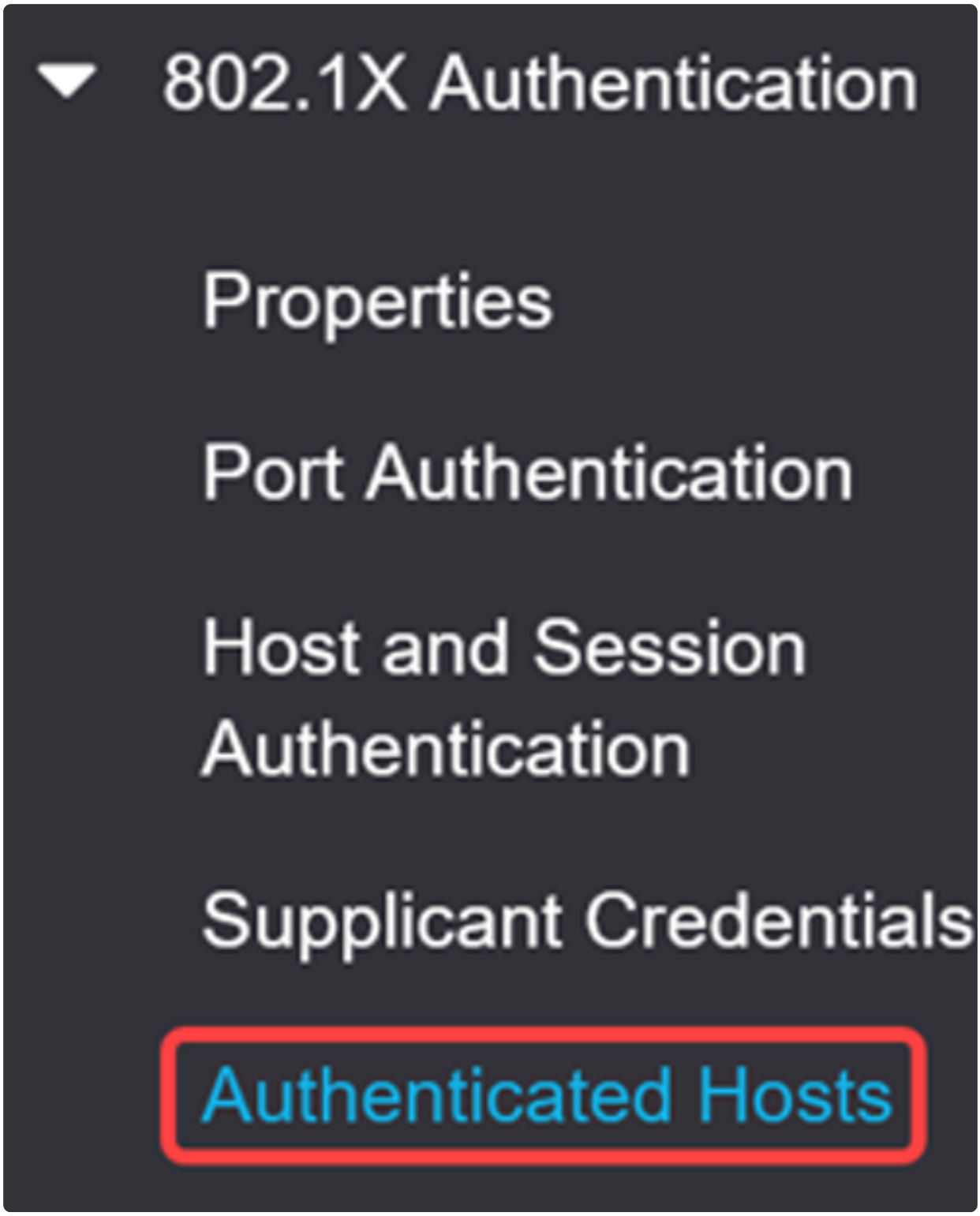
**Step 3**

Another way to verify is to navigate to**IPv4-Based ACE**, select the downloadable ACL from the *ACL Name* drop-down menu, and click **Go**. The rules that were configured in ISE will be displayed.




**Step 4**

Navigate to **Security > 802.1 Authentication > Authenticated Hosts** menu. You can verify the users that are authenticated. Click on **Authenticated Sessions** to see more details.




**Step 5**

From the CLI, run the command **show ip access-lists interface** followed by the *interface ID.*

In this example, ACLs and ACEs applied to Gigabit Ethernet 3 can be seen.

```
switch4a7d55#show ip access-lists interface ge1/0/3
ip access-list extended xACSACLx-IP-SalesACL-6760399d
    deny    ip any host 192.168.251.10 ace-priority 1
    permit  ip any any ace-priority 2
ip access-list extended Auth-Default-ACL
    permit  udp any any any domain ace-priority 20
    permit  tcp any any any domain ace-priority 40
    permit  udp any bootps any any ace-priority 60
    permit  udp any any any bootpc ace-priority 80
    permit  udp any bootpc any any ace-priority 100
    deny    ip any any ace-priority 120
```

**Step 6**

You can also see settings relating to the ISE connection and ACL downloads using the command

***show dot1x sessions interface <ID> detailed.*** You can view the status, 802.1x authentication state, and the ACLs downloaded.

```
switch4a7d55#show dot1x sessions interface ge1/0/3 detailed

          Interface: gi1/0/3
        MAC Address: e4:           :31
       IPv4 Address: 192.168.251.11
          User-Name: user5
             Status: Authorized
     Oper host mode: multi-host
    Session timeout: N/A
     Session Uptime: 196 sec
  Common Session ID: 14FBA8C00500032222C35D9E
    Acct Session ID: 0x05000322
 Server Policies:
            ACS ACL: xACSACLx-IP-SalesACL-6760399d

 Method status list:
    Method                  State
    802.1x                  Authentication success
```

# Conclusion

There you go! Now you know how downloadable ACL works on Cisco Catalyst 1300 switches with Cisco ISE.

For more information, check out the **Catalyst 1300 Admin Guide** and the **Cisco Catalyst 1300 Series Support Page**.