

# Configure ASA AnyConnect VPN with Microsoft Azure MFA through SAML

## Contents

[Introduction](#)  
[Prerequisites](#)  
[Requirements](#)  
[Components Used](#)  
[Background Information](#)  
[SAML Components](#)  
[Certificates for Signature and Encryption Operations](#)  
[Network Diagram](#)  
[Configure](#)  
[Add Cisco AnyConnect from the Microsoft App Gallery](#)  
[Assign Azure AD User to the App](#)  
[Configure ASA for SAML via CLI](#)  
[Verify](#)  
[Test AnyConnect with SAML Auth](#)  
[Common Issues](#)  
[Entity ID Mismatch](#)  
[Time Mismatch](#)  
[Wrong IdP Signing Certificate Used](#)  
[Invalid Assertion Audience](#)  
[Wrong URL for Assertion Consumer Service](#)  
[SAML Configuration Changes That Do Not Take Effect](#)  
[Troubleshoot](#)  
[Related Information](#)

## Introduction

This document describes how to configure Security Assertion Markup Language (SAML) with a focus on Adaptive Security Appliance (ASA) AnyConnect through Microsoft Azure MFA.

## Prerequisites

## Requirements

Cisco recommends that you have knowledge of these topics:

- Basic knowledge of RA VPN configuration on ASA.
- Basic knowledge of SAML and Microsoft Azure.
- AnyConnect Licenses enabled (APEX or VPN-Only).

## Components Used

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

- A Microsoft Azure AD subscription.
- Cisco ASA 9.7+ and Anyconnect 4.6+
- Working AnyConnect VPN profile

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.

## Background Information

SAML is an XML-based framework for exchanging authentication and authorization data between security domains. It creates a circle of trust between the user, a Service Provider (SP), and an Identity Provider (IdP) which allows the user to sign in a single time for multiple services. Microsoft Azure MFA seamlessly integrates with Cisco ASA VPN appliance to provide additional security for the Cisco AnyConnect VPN logins.

### SAML Components

**Metadata:** It is an XML based document that ensures a secure transaction between an IdP and an SP. It allows the IdP and SP to negotiate agreements.

Roles supported by the devices (IdP, SP)

A device can support more than one role and could contain values for both an SP and an IdP. Under the EntityDescriptor field is an IDPSSODescriptor if the information contained is for a Single Sign-On IdP or a SPSSODescriptor if the information contained is for a Single Sign-On SP. This is important since the correct values must be taken from the appropriate sections in order to set up SAML successfully.

**Entity ID:** This field is a unique identifier for an SP or an IdP. A single device can have several services and can use different Entity IDs to differentiate them. For example, ASA has different Entity IDs for different tunnel-groups that need to be authenticated. An IdP that authenticates each tunnel-group has a separate Entity ID entries for each tunnel-group in order to accurately identify those services.

ASA can support multiple IdPs and has a separate entity ID for each IdP to differentiate them. If either side receives a message from a device that does not contain an entity ID that has been previously configured, the device likely drops this message, and SAML authentication fails. The Entity ID can be found within the EntityDescriptor field beside entityID.

**Service URLs:** These define the URL to a SAML service provided by the SP or IdP. For IdPs, this is most commonly the Single Logout Service and Single Sign-On Service. For SPs, this is commonly the Assertion Consumer Service and the Single Logout Service.

The Single Sign-On Service URL found in the IdP metadata is used by the SP to redirect the user to the IdP for authentication. If this value is incorrectly configured, the IdP does not receive or is unable to successfully process the Authentication request sent by the SP.

The Assertion Consumer Service URL found in the SP metadata is used by the IdP to redirect the user back to the SP and provide information about the user's authentication attempt. If this is configured incorrectly, the SP does not receive the assertion (the response) or is unable to successfully process it.

The Single Logout Service URL can be found on both the SP and the IdP. It is used to facilitate logging out of all SSO services from the SP and is optional on the ASA. When the SLO service URL from the IdP metadata is configured on the SP, when the user logs out of the service on the SP, the SP sends the request to the IdP. Once the IdP has successfully logged the user out of the services, it redirects the user back to the

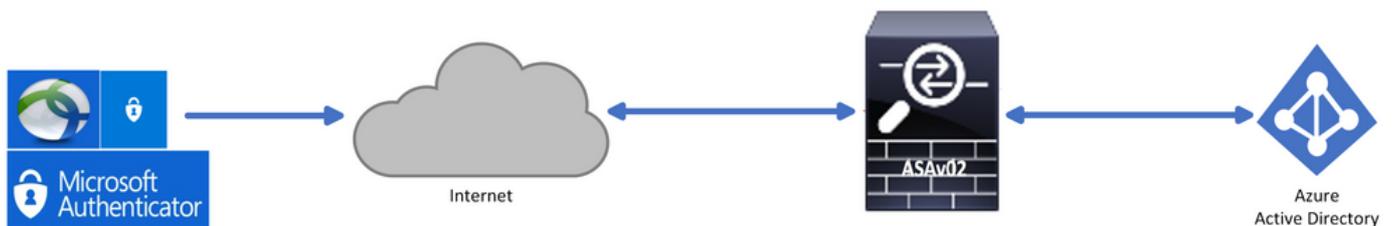
SP and uses the SLO service URL found within the SP's metadata.

SAML Bindings for Service URLs: Bindings are the method the SP uses to transfer information to the IdP and vice versa for services. This includes HTTP Redirect, HTTP POST, and Artifact. Each method has a different way to transfer data. The binding method supported by the service is included within the definition of that services. For example: SingleSignOnService  
Binding="urn:oasis:names:tc:SAML:2.0:bindings:HTTP-Redirect"  
Location=<https://saml.example.com/simplesaml/saml2/idp/SSOService.php/> >. The ASA does not support the Artifact binding. ASA always uses the HTTP Redirect method for SAML authentication requests, so it is important to choose the SSO Service URL that uses the HTTP Redirect binding so that the IdP expects this.

## Certificates for Signature and Encryption Operations

To provide confidentiality and integrity for the messages sent between the SP and the IdP, SAML includes the ability to encrypt and sign the data. The certificate used to encrypt and/or sign the data can be included within the metadata so that the end that receives can verify the SAML message and ensure that it comes from the expected source. The certificates used for signing and encryption can be found within the metadata under KeyDescriptor use="signing" and KeyDescriptor use="encryption", respectively, then X509Certificate. The ASA does not support encrypting SAML messages.

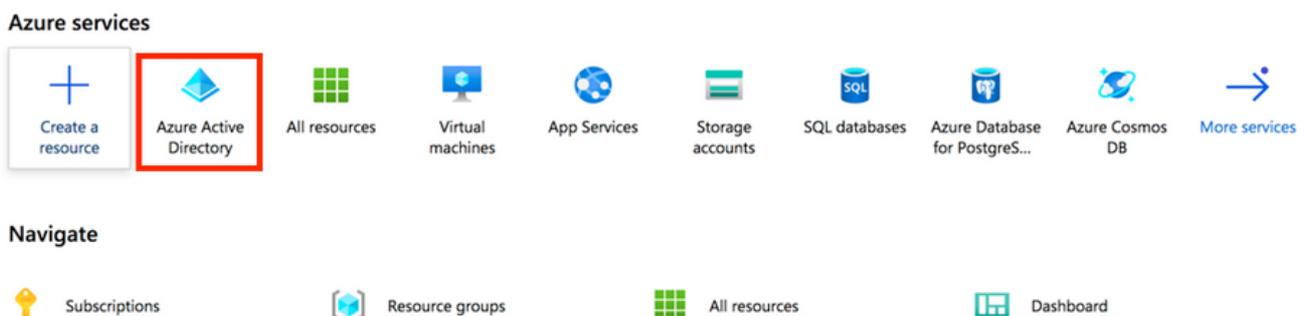
## Network Diagram



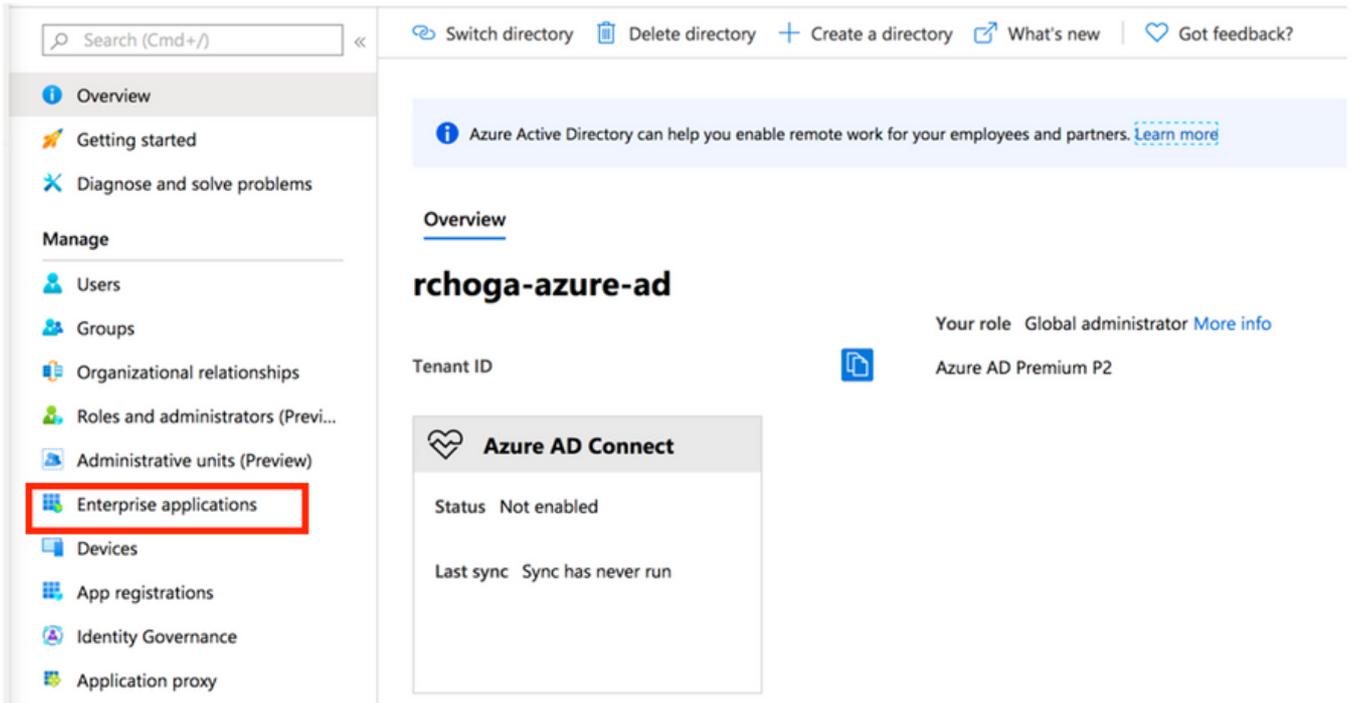
## Configure

### Add Cisco AnyConnect from the Microsoft App Gallery

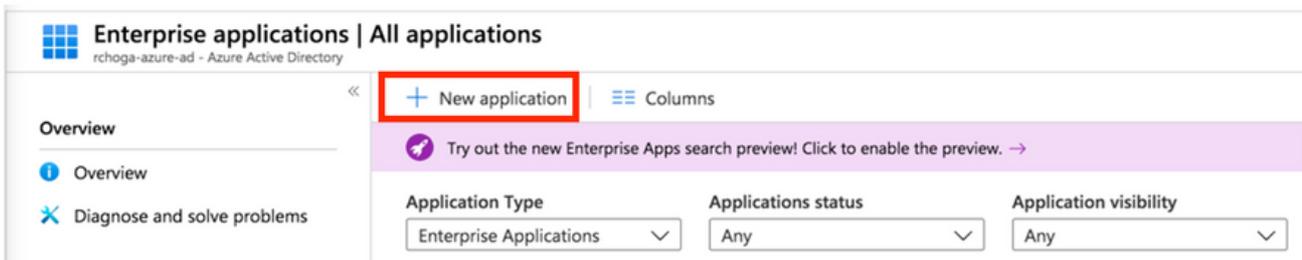
Step 1. Log in to Azure Portal and choose **Azure Active Directory**.



Step 2. As shown in this image, choose **Enterprise Applications**.



Step 3. Now, choose **New Application**, as shown in this image.



Step 4. In the **Add from the gallery** section, type **AnyConnect** in the search box, choose **Cisco AnyConnect** from the results panel, and then **add** the app.

**Add an application**

Click here to try out the new and improved app gallery. →

**Add your own app**

- Application you're developing
- On-premises application
- Non-gallery application

**Add from the gallery**

Category: All (3422) | **AnyConnect**

1 applications matched "AnyConnect".

Name	Category
<b>Cisco AnyConnect</b>	Business management

**Add app**

Cisco Systems, Inc.

Empower your employees to work from anywhere, on company laptops or personal mobile devices, at any time. AnyConnect simplifies secure endpoint access and provides the security necessary to help keep your organization safe and protected.

Use Microsoft Azure AD to enable user access to Cisco AnyConnect.

Requires an existing Cisco AnyConnect subscription.

Name: Cisco AnyConnect

Publisher: Cisco Systems, Inc.

Single Sign-On Mode: SAML-based Sign-on

URL: https://www.ciscoanyconnect.com/

Logo

**Add**

Step 5. Choose the **Single Sign-on** menu item, as shown in this image.

**AnyConnectVPN | Overview**  
Enterprise Application

Overview

- Deployment Plan
- Diagnose and solve problems

**Manage**

- Properties
- Owners
- Users and groups
- Single sign-on**
- Provisioning
- Application proxy
- Self-service

**Security**

- Conditional Access
- Permissions
- Token encryption

**Activity**

- Sign-ins
- Usage & insights (Preview)

**Properties**

Name: AnyConnectVPN

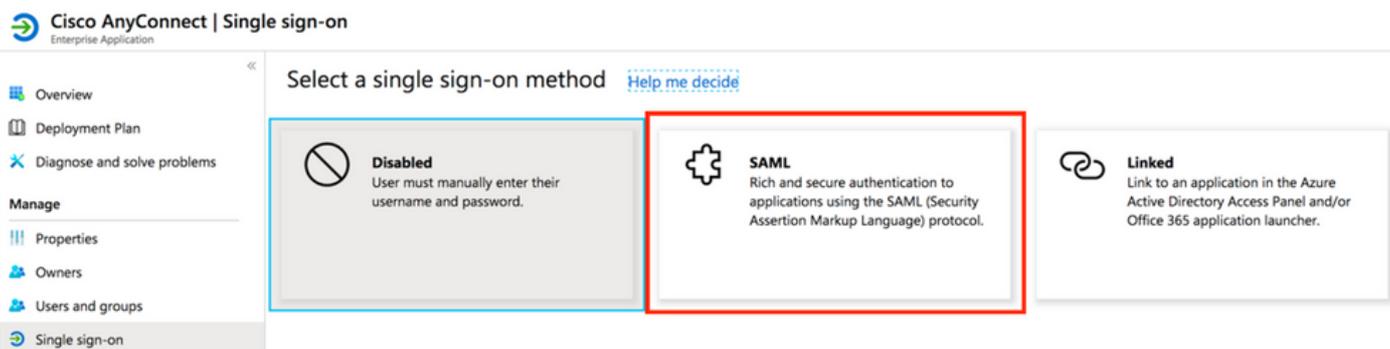
Application ID

Object ID

**Getting Started**

- 1. Assign users and groups**  
Provide specific users and groups access to the applications.  
[Assign users and groups](#)
- 2. Set up single sign on**  
Enable users to sign into their application using their Azure AD credentials.  
[Get started](#)
- 3. Provision User Accounts**  
Automatically create and delete user accounts in the application.  
[Get started](#)
- 4. Conditional Access**  
Secure access to this application with a customizable access policy.  
[Create a policy](#)
- 5. Self service**  
Enable users to request access to the application using their Azure AD credentials.  
[Get started](#)

Step 6. Choose **SAML**, as shown in the image.



Step 7. Edit **Section 1** with these details.

<#root>

a. Identifier (Entity ID) - `https://<VPN URL>/saml/sp/metadata/<TUNNEL-GROUP NAME>`

b. Reply URL (Assertion Consumer Service URL) - `https://<VPN URL>/+CSCOE+/saml/sp/acs?tgname=<TUNNEL-G`

Example: vpn url called

`asa.example.com`

and tunnel-group called

`AnyConnectVPN-1`

**Basic SAML Configuration** ✎

Identifier (Entity ID)	<b>Required</b>
Reply URL (Assertion Consumer Service URL)	<b>Required</b>
Sign on URL	<i>Optional</i>
Relay State	<i>Optional</i>
Logout Url	<i>Optional</i>

Step 8. In the **SAML Signing Certificate** section, choose **Download** to download the certificate file, and **save** it on your computer.

**SAML Signing Certificate** 

Status: Active

Thumbprint: \_\_\_\_\_

Expiration: 5/1/2023, 4:04:04 PM

Notification Email: \_\_\_\_\_

App Federation Metadata Url:  

**Certificate (Base64)** [Download](#)

Certificate (Raw) [Download](#)

Federation Metadata XML [Download](#)

Step 9. This is required for ASA configuration.

- Azure AD Identifier - This is the saml idp in our VPN configuration.
- Login URL - This is the URL sign-in.
- Logout URL - This is the URL sign-out.

**Set up AnyConnectVPN**

You'll need to configure the application to link with Azure AD.

**Login URL**  

**Azure AD Identifier**  

**Logout URL**  

[View step-by-step instructions](#)

## Assign Azure AD User to the App

In this section, **Test1** is enabled to use Azure single sign-on, as you grant access to the Cisco AnyConnect app.

Step 1. In the app's overview page, choose **Users and groups**, and then **Add user**.

**Cisco AnyConnect | Users and groups**  
Enterprise Application

[+ Add user](#) [Edit](#) [Remove](#) [Update Credentials](#) [Columns](#) [Got feedback?](#)

**Overview**

- Deployment Plan
- Diagnose and solve problems

**Manage**

- Properties
- Owners
- Users and groups**
- Single sign-on

**Information**

The application will appear on the Access Panel for assigned users. Set 'visible to users?' to no in properties to prevent this. →

First 100 shown, to search all users & groups, enter a display name.

Display Name	Object Type	Role assigned
No application assignments found		

Step 2. Choose **Users and groups** in the Add Assignment dialog.



Step 3. In the **Add Assignment** dialog, click the **Assign** button.



## Configure ASA for SAML via CLI

Step 1. Create a Trustpoint and import our SAML cert.

```
config t
```

```
crypto ca trustpoint AzureAD-AC-SAML
  revocation-check none
  no id-usage
  enrollment terminal
  no ca-check
crypto ca authenticate AzureAD-AC-SAML
-----BEGIN CERTIFICATE-----
...
PEM Certificate Text you downloaded goes here
...
-----END CERTIFICATE-----
quit
```

Step 2. These commands provision your SAML IdP.

```
webvpn
```

```
saml idp https://xxx.windows.net/xxxxxxxxxxxxx/ - [Azure AD Identifier]
```

```
url sign-in https://login.microsoftonline.com/xxxxxxxxxxxxxxxxxxxxxxxx/saml2 - [Login URL]
url sign-out https://login.microsoftonline.com/common/wsfederation?wa=wsignout1.0 - Logout URL
trustpoint idp AzureAD-AC-SAML - [IdP Trustpoint]
trustpoint sp ASA-EXTERNAL-CERT - [SP Trustpoint]
no force re-authentication
no signature
base-url https://asa.example.com
```

Step 3. Apply SAML Authentication to a VPN Tunnel Configuration.

```
tunnel-group AnyConnectVPN-1 webvpn-attributes
  saml identity-provider https://xxx.windows.net/xxxxxxxxxxxxxxxx/
  authentication saml
end

write memory
```

---

**Note:** If you make changes to the IdP config, you need to remove the saml identity-provider config from your Tunnel Group, and re-apply it for the changes to become effective.

---

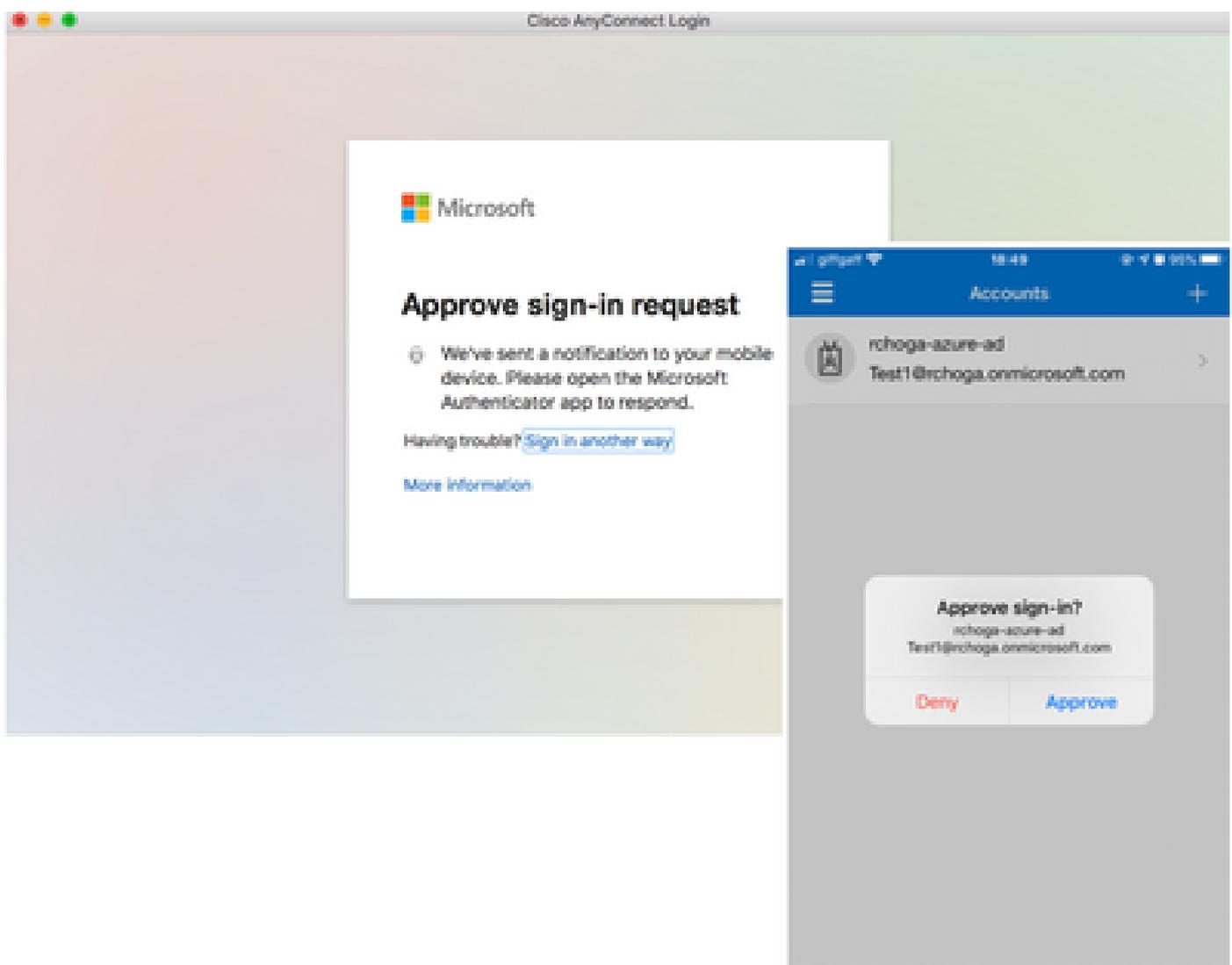
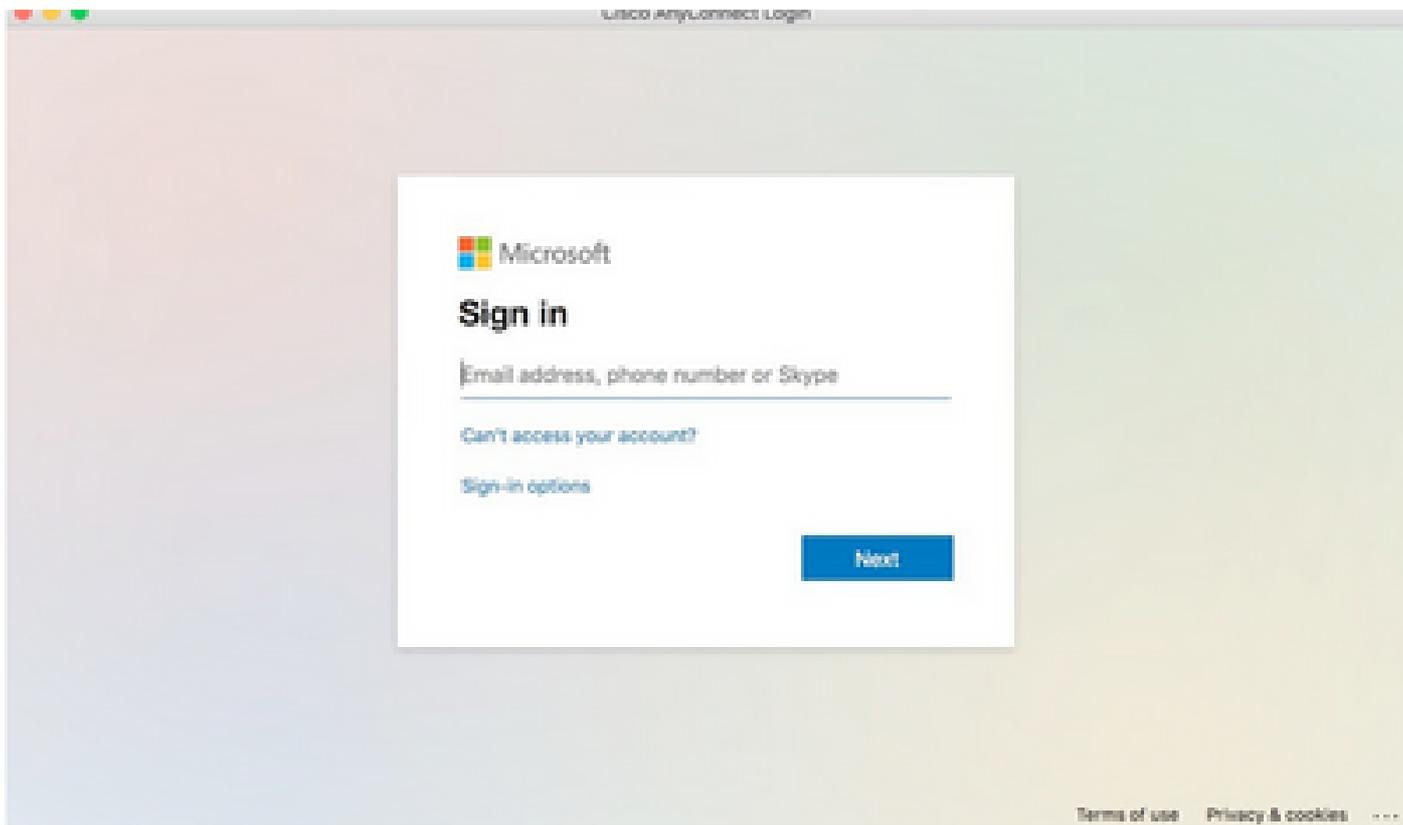
## Verify

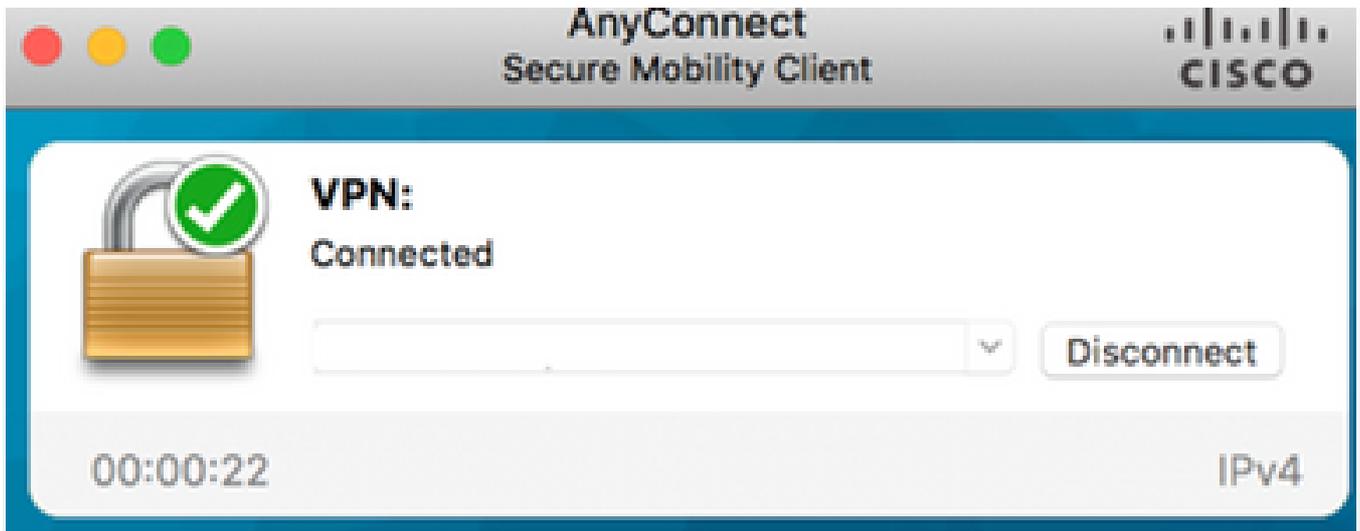
### Test AnyConnect with SAML Auth

Step 1. **Connect** to your VPN URL and input your log in Azure AD details.

Step 2. **Approve** sign-in request.

Step 3. AnyConnect is Connected.





## Common Issues

### Entity ID Mismatch

Debug Example:

```
[SAML] consume_assertion: The identifier of a provider is unknown to #LassoServer. In order to register a provider in a #LassoServer object, you must use the methods lasso_server_add_provider() or lasso_server_add_provider_from_buffer().
```

Problem: Generally, means that **saml idp [entityID]** command under the ASA's webvpn configuration does not match the IdP Entity ID found in the IdP's metadata.

Solution: Check the entity ID of the IdP's metadata file and change the **saml idp [entity id]** command to match this.

### Time Mismatch

Debug Example:

```
[SAML] NotBefore:2017-09-05T23:59:01.896Z NotOnOrAfter:2017-09-06T00:59:01.896Z timeout: 0
```

```
[SAML] consume_assertion: assertion is expired or not valid
```

Problem 1. ASA time not synced with IdP's time.

Solution 1. Configure ASA with the same NTP server used by IdP.

Problem 2. The assertion is not valid between the specified time.

Solution 2. Modify the timeout value configured on the ASA.

### Wrong IdP Signing Certificate Used

Debug Example:

[Lasso] func=xmlSecOpenSSLEvpSignatureVerify:file=signatures.c:line=493:obj=rsa-sha1:subj=EVP\_VerifyFinal:error=18:data do not match:signature do not match

[SAML] consume\_assertion: The profile cannot verify a signature on the message

Problem: ASA not able to verify the message signed by the IdP or there is no signature for the ASA to verify.

Solution: Check the IdP signing certificate installed on the ASA to make sure it matches what is sent by the IdP. If this is confirmed, make sure that the signature is included in the SAML response.

## **Invalid Assertion Audience**

Debug Example:

[SAML] consume\_assertion: assertion audience is invalid

Problem: IdP defines the incorrect audience.

Solution: Correct the Audience configuration on the IdP. It must match the ASA's Entity ID.

## **Wrong URL for Assertion Consumer Service**

Example Debug: Unable to receive any debugs after the initial authentication request is sent. The user is able to enter credentials at IdP but IdP does not redirect to ASA.

Problem: IdP is configured for the wrong Assertion Consumer Service URL.

Solution(s): Check base URL in configuration and make sure it is correct. Check ASA metadata with show to make sure that the Assertion Consumer Service URL is correct. In order to test it, browse it, If both are correct on the ASA, check the IdP to make sure that the URL is correct.

## **SAML Configuration Changes That Do Not Take Effect**

Example: After a single sign-on URL is modified or changed, the SP certificate, SAML still does not work and sends previous configurations.

Problem: ASA needs to regenerate its metadata when there is a configuration change that affects it. It does not do this automatically.

Solution: After changes are made, under the affected tunnel-group remove and re-apply the saml idp [entity-id] command.

## **Troubleshoot**

Most SAML troubleshoots involve a misconfiguration that can be found when the SAML configuration is checked, or debugs are run. debug webvpn saml 255 can be used to troubleshoot most issues, however, in scenarios where this debug does not provide useful information, additional debugs can be run:

```
debug webvpn saml 255  
debug webvpn 255  
debug webvpn session 255  
debug webvpn request 255
```

## Related Information

- [SAML single sign-on for on-premises applications with Application Proxy](#)