Configuring Modern Authentication for EWS in Crestron Fusion® Software

Integration Guide

Crestron Electronics, Inc.

This document was written by the Technical Publications department at Crestron.

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Configuring Modern Authentication for EWS in Crestron Fusion® Software

Introduction

This document provides the procedures required to configure Modern Authentication (OAuth 2) support for Crestron Fusion® software in the Microsoft® EWS (Exchange Web Services) service.

The Modern Authentication authorization model is provided by the Azure® Active Directory® service to integrate managed API applications with the same authentication model used by the Office 365® software REST APIs. Once Modern Authentication is configured in EWS, Crestron Fusion uses this access method to provide heightened user authentication.

NOTE: This authentication method is compatible only with Office 365 at this time. On-premises support may be available at a future date.

Create a New Application Registration

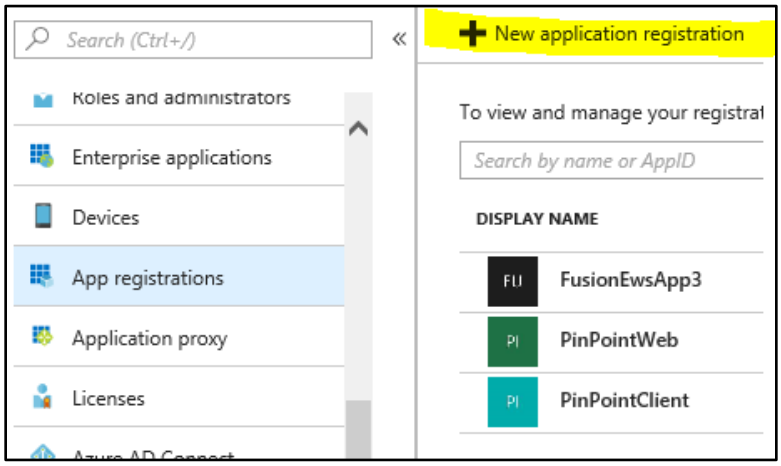
To configure Modern Authentication in EWS, a Crestron Fusion application registration must be configured in Azure Active Directory using the Azure portal. This procedure only must be done once per Office 365 tenant.

Register the Application with Azure

To create a new Crestron Fusion application registration in Azure Active Directory:

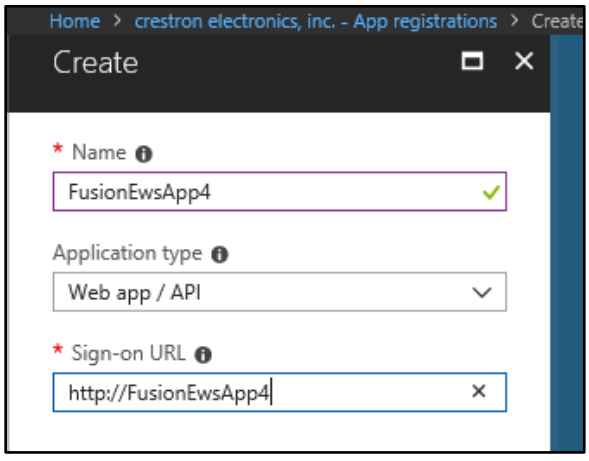
1. Sign into the Azure portal with a user ID that has Global Administrator rights.
2. Select **Azure Active Directory** from the left navigation menu.
3. Select **App registrations** from the Azure widget menu.
4. Click + **New application registration**.

App registrations - New application registration



A **Create** dialog box is displayed.

Create Dialog Box



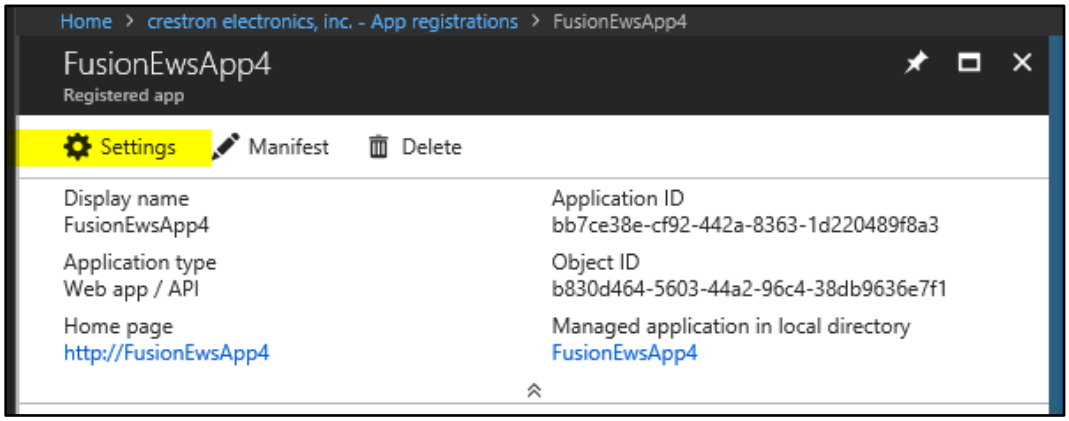
5. Enter the following information:
   - **Name:** Enter a name for the application. The name must be unique to the Azure Active Directory profile.
   - **Application type:** Select **Web app / API** from the drop-down menu.
   - **Sign-on URL**: Enter a sign-on URL for the application. The application name entered in the **Name** text field should be repeated as the URL.
6. Click **Create**. The application is created and displayed in the widget.

Add Office 365 API Access

To add Office 365 API access to the Crestron Fusion application:

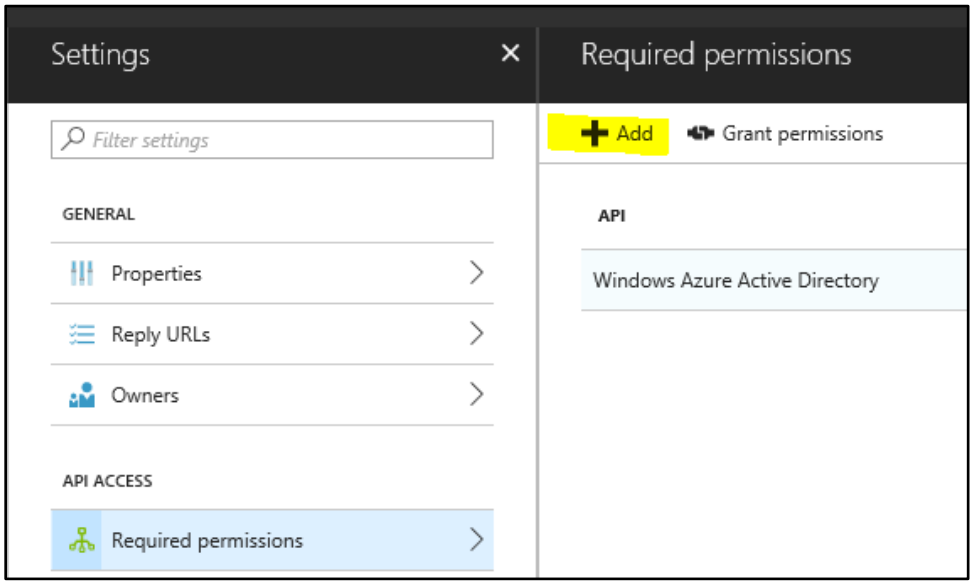
1. Select **App registrations** from the Azure widget menu.
2. Select the application created for Crestron Fusion. An application dialog box is displayed.
3. Click **Settings.** A **Settings** dialog box is displayed.

Crestron Fusion App Window



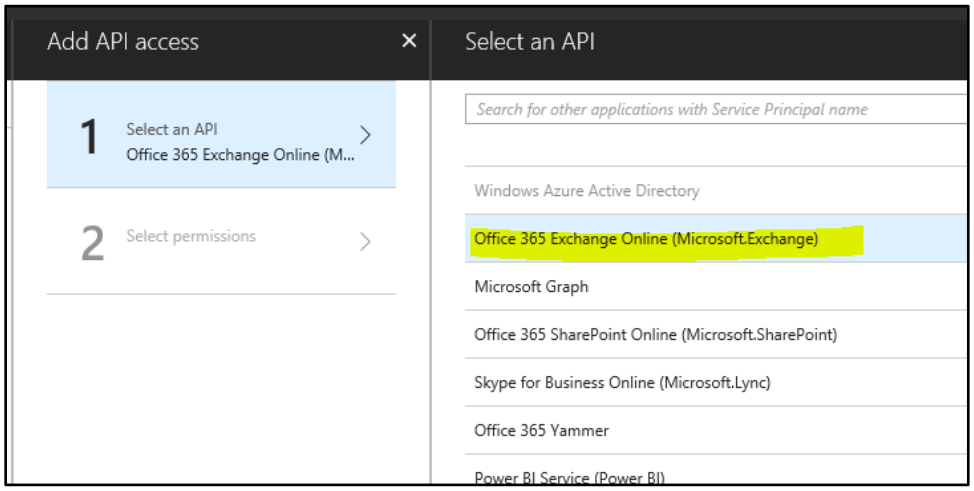
4. Select **Required permissions** under the **API ACCESS** menu.
5. Click + **Add**. An **Add API access** dialog box is displayed.

Settings Dialog Box - Required Permissions



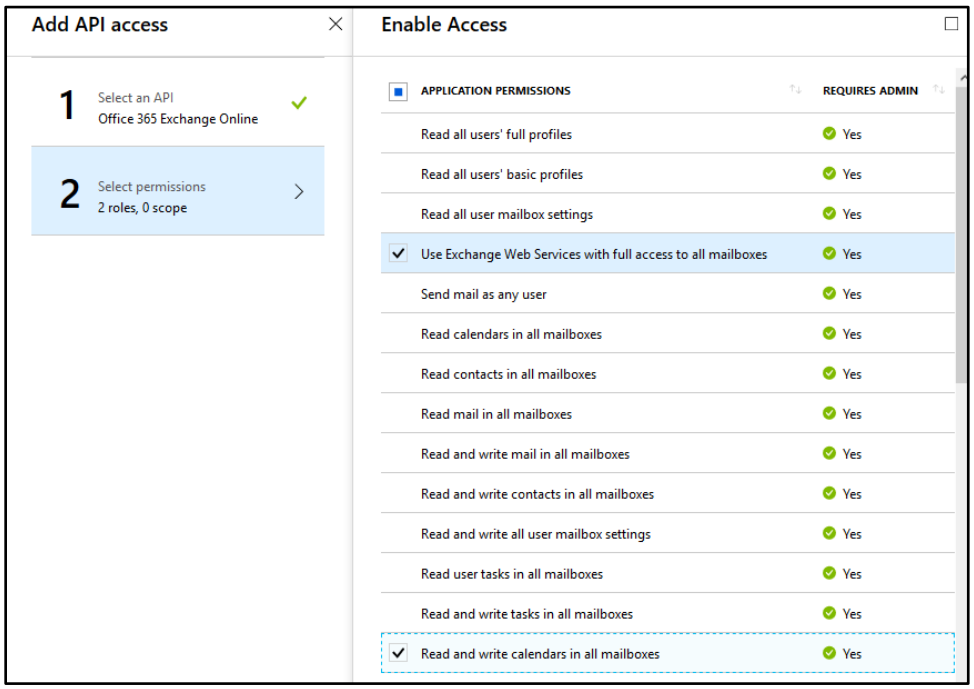
6. Select **Office 365 Exchange Online (Microsoft.Exchange)** from the **Select an API** menu.

Add API access Dialog Box - Select an API



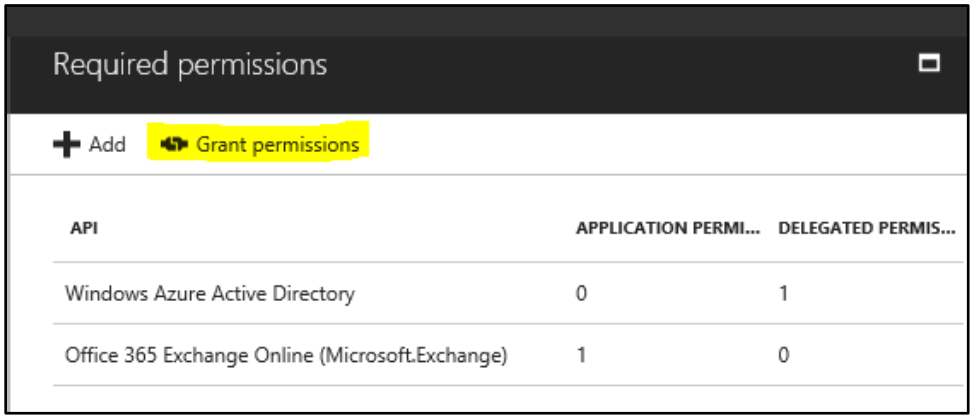
7. Click **Select**.
8. Click the associated check boxes to display a check mark next to **Use Exchange Web Services with full access to all mailboxes** and the **Read and write calendars in all mailboxes** in the **Enable Access** menu.

Add API access Dialog Box - Enable Access



9. Click **Select** and then **Done**.
10. Select **Required permissions** under the **API ACCESS** menu.
11. Click **Grant permissions** to grant the Office 365 API permissions to the Crestron Fusion application. A confirmation window is displayed.
12. Click **Yes** to confirm granting the API permissions.

Required Permissions Menu



Generate a Self-Signed Certificate

EWS Modern Authentication requires a self-signed certificate to travel with the application, which provides additional application security.

The self-signed certificate may be generated using various tools (such as PowerShell® software or openssl). The procedure below explains how to generate the certificate from the Windows® operating system SDK (software development kit).

To generate a self-signed certificate from the Windows SDK:

1. Open the command prompt in the Windows system.
2. Issue the following command, replacing `[ApplicationName]` with the application name created in EWS:

```
cd C:\Program Files\Microsoft SDKs\Windows\v6.0A\Bin\x64
makecert -r -pe -n "CN=[ApplicationName]" -b 09/05/2018 -e
09/05/2025 -ss my -len 2048
```

If the certificate is generated, a "Succeeded" message is displayed.

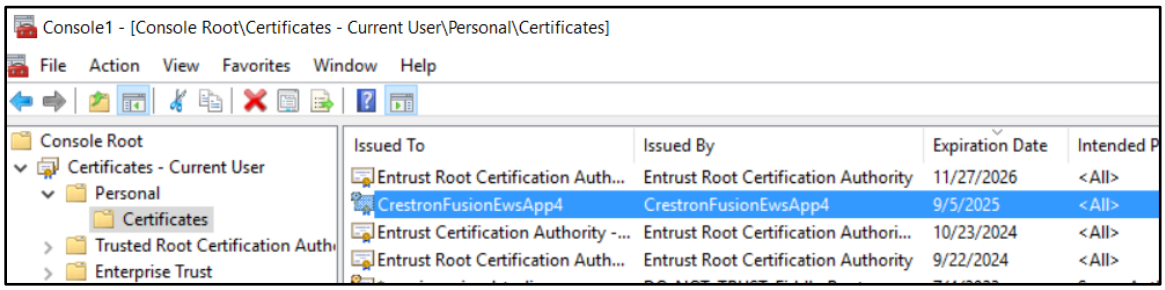
NOTE: The command above may not be compatible with some versions of the Windows SDK. The command has been confirmed to work with Windows SDK version 6.0a.

- The `-b` and `-e` parameters set the validity time range. The date entered for `-e` should be at least five years ahead of the date entered for `-b`.
- The `-r` parameter indicates that the certificate is self-signed.
- The `-pe` parameter indicates that the private key is exportable.
- The `-ss my` parameter sets the certificate in the **Personal** folder of the cert store.

To export the self-signed certificate for use with the application:

1. Issue the `mmc` command in the command prompt to run Certificate Manager.
2. Navigate to **File** > **Add/Remove Snap-In**.
3. Move the **Certificates** snap-in from the **Available snap-ins** menu to the **Selected snap-ins** menu.
4. Select the **My user account** radio button in the dialog box that displays, and then click **Finish.**
5. Navigate to **Console Root** > **Certificates** - **Current User** > **Personal** > **Certificates** in the menu tree.

Console 1 - Personal Cert Store



6. Right-click the application cert.
7. Select **All tasks** > **Export**. A certificate export wizard opens.
    a. When prompted, select the **No, do not export the private key** radio button.
    b. When prompted, select the **Base-64 encoded X.509 (.CER)** radio button.
    c. When prompted, name the certificate "[ApplicationName].cer". where [ApplicationName] is the application name created in EWS.
    d. Click **OK** to exit the wizard once the export has completed.
8. Right-click the application cert.
9. Select **All tasks** > **Export**. A certificate export wizard opens.
    a. When prompted, select the **Yes, export the private key** radio button.
    b. Retain the default file export settings.
    c. When prompted, enter and confirm a password for the private key.
    d. When prompted, name the certificate "[ApplicationName].pfx". where [ApplicationName] is the application name created in EWS.
    e. Click **OK** to exit the wizard once the export has completed.
10. Run the following PowerShell script, pointing to the saved .cer file as highlighted below.

```
# This will print out the values needed to put into the AD App manifest.
#
$Cert = New-Object
System.Security.Cryptography.X509Certificates.X509Certificate2
$Cert.Import("c:\Temp\[ApplicationName].cer")
$BinaryData = $Cert.GetRawCertData()
$Base64Value = [System.Convert]::ToBase64String($BinaryData)
$BinaryData = $Cert.GetCertHash()
$Base64Thumbprint = [System.Convert]::ToBase64String($BinaryData)
$Keyid = [System.Guid]::NewGuid().ToString()

Write-Host "Base-64 Thumbprint:"
$Base64Thumbprint
Write-Host "Keyid:"
$Keyid
Write-Host "Base-64 Value:"
$Base64Value
```

The PowerShell output appears as follows:

```
PS C:\WINDOWS\system32> C:\Projects\Other\ExchScripts\EwsCert.ps1
Base-64 Thumbprint:
ehg0qxkvD12mFqjT8u88MzSZW1Y=
Keyid:
ff144009-ce5c-46e1-8cd2-1c0733e92195
Base-64 Value:
MIIDHzCCAgegAwIBAgIQ/AQnORgvc5hAdvZUXIuSLTANBgkqhkiG9w0BAQQFADAgMR4wHAYDVQQDExV
DcmVzdHJvbkZ1c2lvbkV3c0FwcDQwHhcNMTgwOTA1MDQwMDAwWhcNMjUwOTA1MDQwMDAwWjAgMR4wHA
YDVQQDExVDcmVzdHJvbkZ1c2lvbkV3c0FwcDQwggEiMA0GCSqGSIb3DQEBAQUAA4IBDwAw
ggEKAoIBAQDE+y6HyO8r8r+kj0BlG1ffRMf7RiwMAFOhWGlNxSUYEVPQTjTzkARme8oClrlTyxk0ftv
56LleR0xqBrIxufqjru0qyx1lY1sqTMNNPquaGehlvIny75tClz+tAtOuw6wOlJQ28P3RjrlOnqQ4tY
gi98C2GcaNHSPsExZY36B8cMZCbIirQqPENSqwKg/SudNoNjX/LMFLJBcJoD5r7xdg/5JG
symhuRKhxfo58th1Pdu1nOeQfGzlcxjXW8YSGMelgK97eTOQCPqCAWEwI9wiY8hfjVUDNxg9WBM76Pq
5y17QV7rK+IS1xON1FusYxiof+SMYnclnHZLRAopQJoU/AgMBAAGjVTBTMFEGA1UdAQRKMEiAEA4PF6
eu27gCKKeFugtFfGihIjAgMR4wHAYDVQQDExVDcmVzdHJvbkZ1c2lvbkV3c0FwcDSCEPwE
JzkYL3OYQHb2VFyLki0wDQYJKoZIhvcNAQEEBQADggEBAGLXnaeVqSvOefiV/sit5cS+8eyEArrPZAK
MmfPnUm5gVsMZtI/ivqgVp8TpvSp3DQhrQkkW1qHHlJOf2PyhwEpv3ZEbEPwkk+xW1udhjwVVrTIbMm
vqQQMIiAxxL3ymQ0A9Xd+FfRuhYQvozZVyDYWDaqVG8CBYH8Yj55FJhhjR2LkEdgyEVq8o
5UK9lMbN2LWRRu5c2NHmGuNAakp7+RFCEdT4u9s5ADFVgpl21lpNUI2nwVasyn2p6zWW5jVQD9VPfpT
1tWaZwsVqEJIRfpeQ8ZFPsTWFAR0P1ArJi1PhtEg267a3pzlPe3E+fnrt2EXC6+4H0xI/AEEtgKYDDq
o=
```

Ensure that this output is available for the remaining procedures.

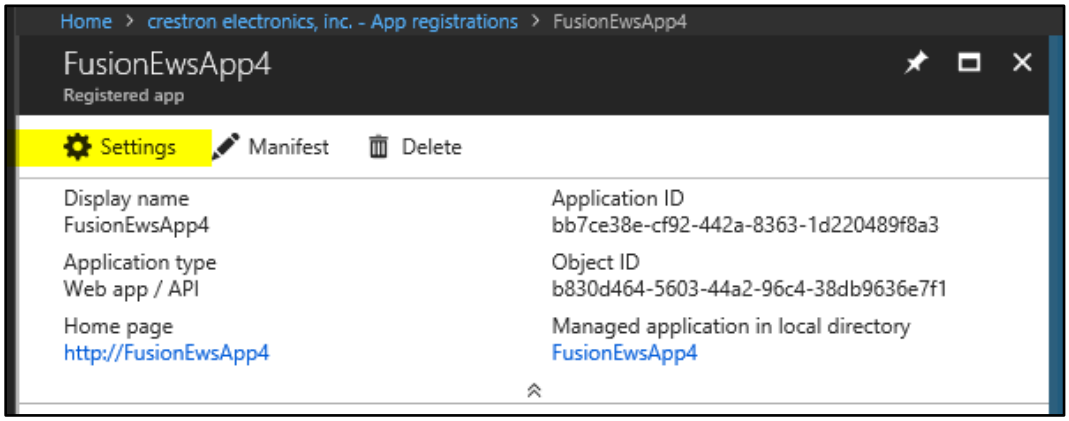
Add the Certificate to the Application

Once a self-signed certificate has been generated for the application, it may be added to the application in the Azure portal.

To add the self-signed certificate to the application via the Azure Active Directory:

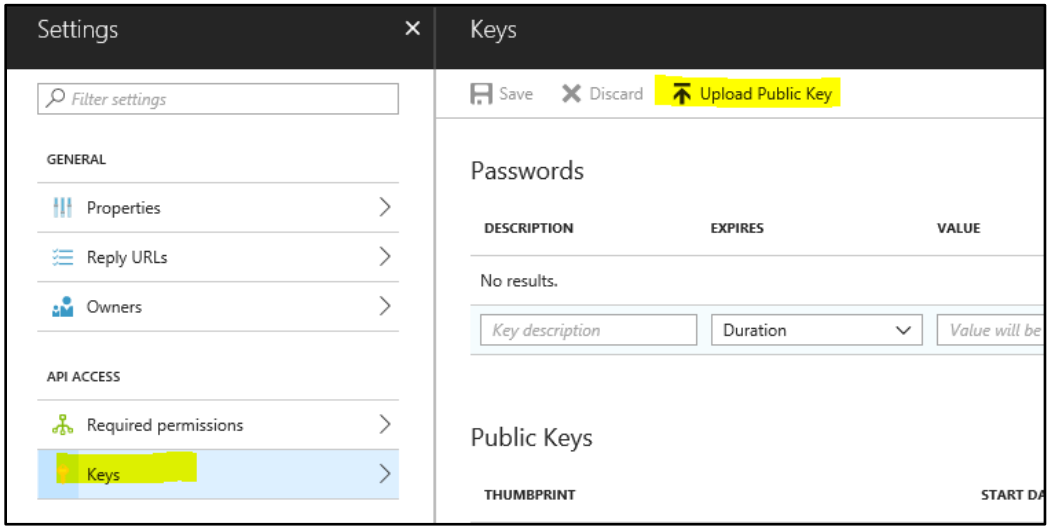
1. Select **App registrations** from the Azure widget menu.
2. Select the application created for Crestron Fusion. An application dialog box is displayed.
3. Click **Settings**. A **Settings** dialog box is displayed.

Crestron Fusion App Window



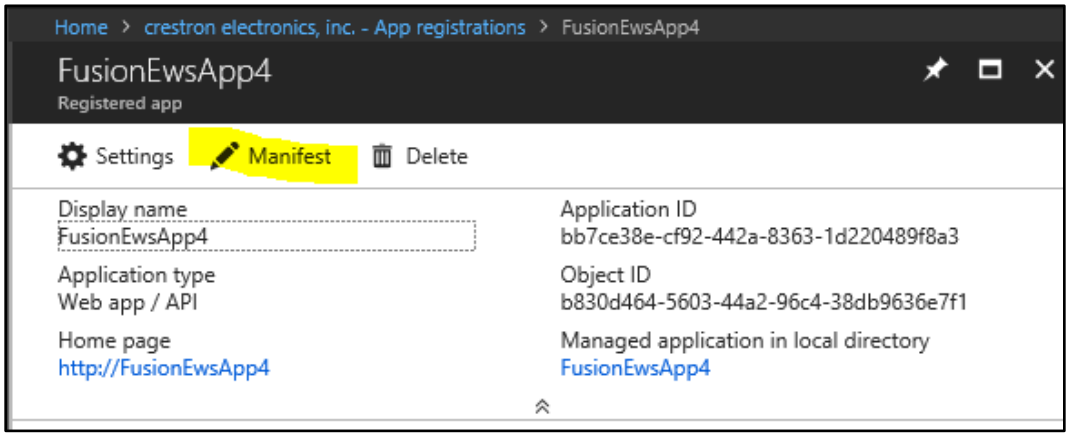
4. Select **Keys** under the **API ACCESS** menu.
5. Click **Upload Public Key**.

Keys Menu - Upload Public Key



6. Select the [ApplicationName].cer file created for the application. The .cer file is uploaded to the application.
7. Once the upload completes, click **Save.** The thumbprint from the PowerShell script used to create the self-signed certificate is added to the **Public Keys** menu.
8. Select **App registrations** from the Azure widget menu.
9. Select the Crestron Fusion application. An application dialog box is displayed.
10. Click **Manifest**. The JSON manifest for the application is displayed in an **Edit** screen.

Crestron Fusion App Window



11. In the `keyCredentials` section, replace the existing code with the code below, where `[Base64Thumbprint from PS script]`, `[Keyid from PS script]`, and `[Base64Value from PS script]`, are replaced with the appropriate values from the PowerShell script used to create the self-signed certificate.

```
"keyCredentials": [
    {
       "customKeyIdentifier": "[Base64Thumbprint from PS script]",
       "keyId": "[Keyid from PS script]",
       "type": "AsymmetricX509Cert",
       "usage": "Verify",
       "value": "[Base64Value from PS script]"
     }
   ],
```

NOTES:

- Copying the PowerShell output directly into the JSON manifest may add extraneous line ends, which will cause the manifest to fail when saved. To avoid this scenario, copy the PowerShell output into a text editing program, and then remove the extraneous line ends before pasting the content into the manifest.
- Any `keyCredentials` values in the existing JSON manifest that are not in the pasted code will return after the manifest is saved.

The following code uses the sample PowerShell output shown on page 8 as an example.

```
"keyCredentials": [
    {
       "customKeyIdentifier": " ehg0qxkvD12mFqjT8u88MzSZW1Y=",
       "keyId": " ff144009-ce5c-46e1-8cd2-1c0733e92195",
       "type": "AsymmetricX509Cert",
       "usage": "Verify",
       "value":
"MIIDHzCCAgegAwIBAgIQ/AQnORgvc5hAdvZUXIuSLTANBgkqhkiG9w0BAQQFADAgMR4w
HAYDVQQDExVDcmVzdHJvbkZ1c2lvbkV3c0FwcDQwHhcNMTgwOTA1MDQwMDAwWhcNMjUwO
TA1MDQwMDAwWjAgMR4wHAYDVQQDExVDcmVzdHJvbkZ1c2lvbkV3c0FwcDQwggEiMA0GCS
qGSIb3DQEBAQUAA4IBDwAwggEKAoIBAQDE+y6HyO8r8r+kj0BlG1ffRMf7RiwMAFOhWGl
NxSUYEVPQTjTzkARme8oClrlTyxk0ftv56LleR0xqBrIxufqjru0qyx1lY1sqTMNNPqua
GehlvIny75tClz+tAtOuw6wOlJQ28P3RjrlOnqQ4tYgi98C2GcaNHSPsExZY36B8cMZCb
IirQqPENSqwKg/SudNoNjX/LMFLJBcJoD5r7xdg/5JGsymhuRKhxfo58th1Pdu1nOeQfG
zlcxjXW8YSGMelgK97eTOQCPqCAWEwI9wiY8hfjVUDNxg9WBM76Pq5y17QV7rK+IS1xON
1FusYxiof+SMYnclnHZLRAopQJoU/AgMBAAGjVTBTMFEGA1UdAQRKMEiAEA4PF6eu27gC
KKeFugtFfGihIjAgMR4wHAYDVQQDExVDcmVzdHJvbkZ1c2lvbkV3c0FwcDSCEPwEJzkYL
3OYQHb2VFyLki0wDQYJKoZIhvcNAQEEBQADggEBAGLXnaeVqSvOefiV/sit5cS+8eyEAr
rPZAKMmfPnUm5gVsMZtI/ivqgVp8TpvSp3DQhrQkkW1qHHlJOf2PyhwEpv3ZEbEPwkk+x
W1udhjwVVrTIbMmvqQQMIiAxxL3ymQ0A9Xd+FfRuhYQvozZVyDYWDaqVG8CBYH8Yj55FJ
hhjR2LkEdgyEVq8o5UK9lMbN2LWRRu5c2NHmGuNAakp7+RFCEdT4u9s5ADFVgpl21lpNU
I2nwVasyn2p6zWW5jVQD9VPfpT1tWaZwsVqEJIRfpeQ8ZFPsTWFAR0P1ArJi1PhtEg267
a3pzlPe3E+fnrt2EXC6+4H0xI/AEE"
     }
  ],
```

12. Click **Save** on the **Edit** screen.

Exit the **Edit** screen, and then click **Manifest** to display the **Edit** screen again. The `keyCredentials` section should now appear as follows:

keyCredentials Section

```
18  "keyCredentials": [
19    {
20      "customKeyIdentifier": "ehg0qxkvD12mFqjT8u88MzSZW1Y=",
21      "endDate": "2025-09-05T04:00:00Z",
22      "keyId": "ff144009-ce5c-46e1-8cd2-1c0733e92195",
23      "startDate": "2018-09-05T04:00:00Z",
24      "type": "AsymmetricX509Cert",
25      "usage": "Verify",
26      "value": null
27    }
28  ],
```

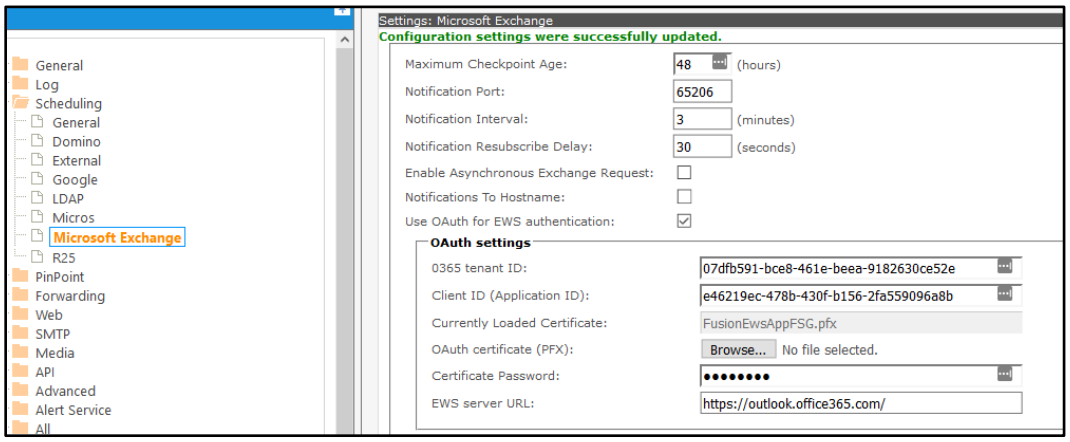
Confirm that the `startDate` and `endDate` values match the start and end dates specified when creating the certificate. If so, the application has read the uploaded certificate successfully.

NOTE: It is normal that `null` is shown for `value`.

Configure Crestron Fusion Settings

Modern Authentication for EWS configuration parameters must be set in Crestron Fusion. The **Microsoft Exchange** page in the Crestron Fusion Configuration web client has been extended so that Modern Authentication may be configured outside of the **All Config** page.

Microsoft Exchange Page



If the **Use OAuth for EWS authentication** option is selected, additional **OAuth settings** are provided at the bottom of the **Microsoft Exchange** page.

The following sections identify the configuration variable name and the associated **OAuth settings** setting in the **Microsoft Exchange** page (if present).

NOTE: Sample values are used in the following sections for reference. These values must be replaced with values from the application created using the previous sections.

EwsOAuthTenantId (O365 tenant ID)

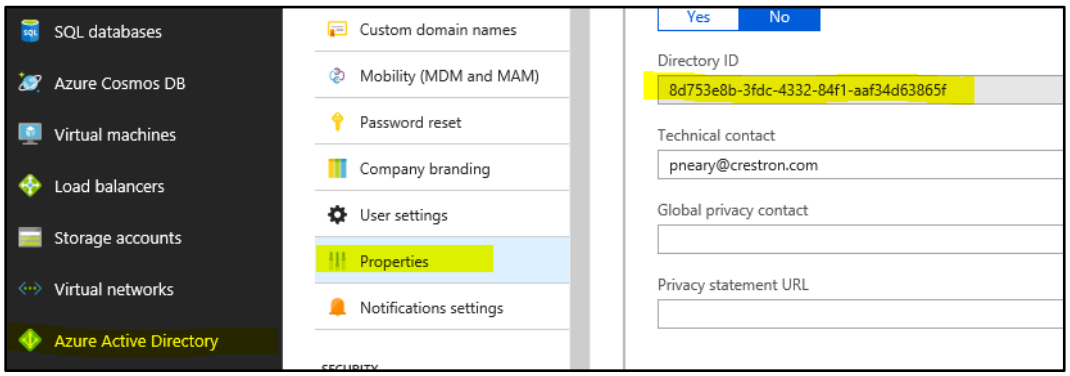
The EwsOAuthTenantId variable sets the tenant ID of the Office 365 account. This variable may also be set using the **O365 tenant ID** field in the **Microsoft Exchange** page.

To locate the Office 365 tenant ID:

1. Sign into the Azure portal with a user ID that has Global Administrator rights.
2. Select **Azure Active Directory** from the left navigation menu.
3. Select **Properties** from the Azure widget menu.

The tenant ID is listed in the **Directory ID** field.

Azure Active Directory Properties - Directory ID



EwsOAuthClientId (Client ID (Application ID))

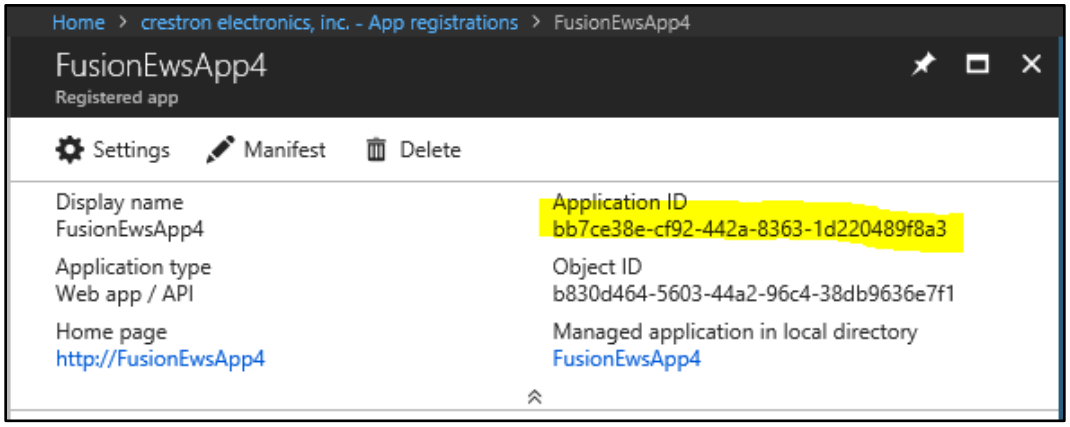
The EwsOAuthClientId variable sets the application ID. This variable may also be set using the **Client ID (Application ID)** field in the **Microsoft Exchange** page.

To locate the application ID:

1. Sign into the Azure portal with a user ID that has Global Administrator rights.
2. Select **Azure Active Directory** from the left navigation menu.
3. Select **App registrations** from the Azure widget menu.
4. Select the application created for Crestron Fusion. An application dialog box is displayed.

The application ID is listed in the **Application ID** field.

Crestron Fusion App Window



EwsOAuthCertificatePassword (Certificate Password)

The EwsOAuthCertificatePassword variable sets the certificate private key password. This variable may also be set using the **Certificate Password** field in the **Microsoft Exchange** page.

For this variable, enter the private key password created while exporting the self-signed certificate.

EwsOAuthCertificate (OAuth Certificate (PFX))

The EwsOAuthCertificate variable sets the contents of the .pfx file created when the certificate with the private key was exported. This variable may also be set using the **OAuth Certificate (PFX)** field in the **Microsoft Exchange** page.

For this variable, enter the path of the .pfx file on the network, or use the **Browse** button on the **Microsoft Exchange** page to locate the file on the network.

NOTE: The read-only **Currently Loaded Certificate** text field shows the .pfx file that is loaded to the application. The file path of the .pfx file is not included.

EwsOAuthServerName (EWS Server URL)

The EwsOAuthServerName variable sets the URL of the EWS server. This variable may also be set using the **EWS ServerURL** field in the **Microsoft Exchange** page.

For this variable, enter "https://outlook.office365.com/".

Configure Office 365 Tenant for OAuth

The Office 365 tenant must be configured to enable OAuth if it is not already configured by setting the `OAuth2ClientProfileEnabled` variable to `$True`.

The following PowerShell script queries the OAuth settings for the Office 365 tenant:

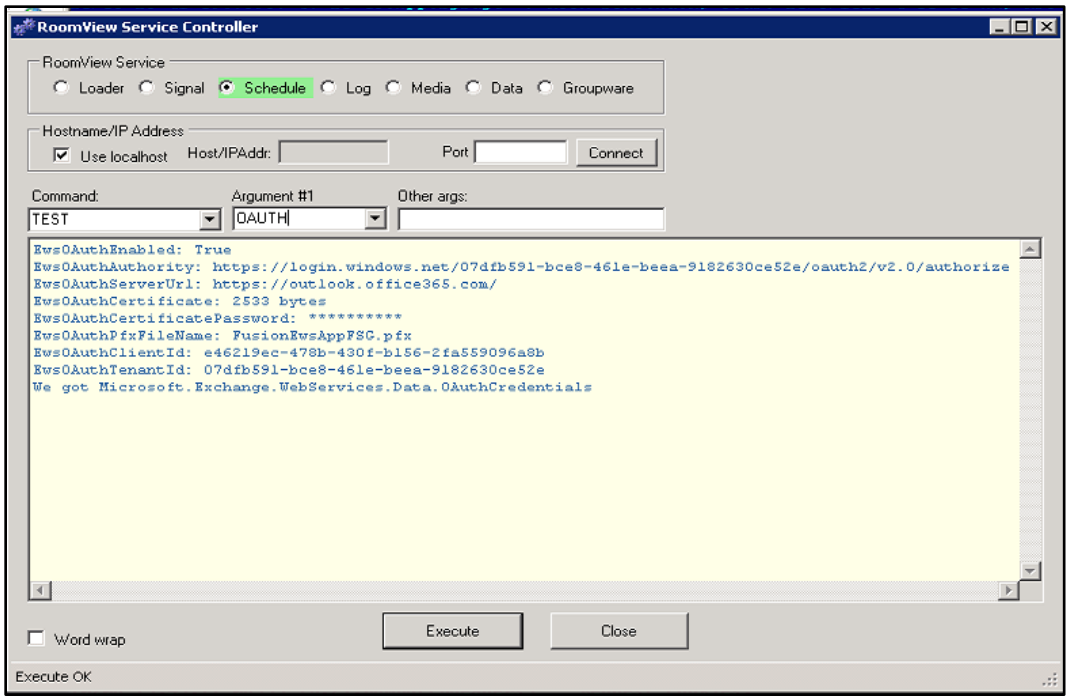
```
$UserCredential = Get-Credential # Enter your O365 admin credentials in the pop-up
$Session = New-PSSession -ConfigurationName Microsoft.Exchange -ConnectionUri
https://outlook.office365.com/powershell-liveid/ -Credential $UserCredential -
Authentication Basic -AllowRedirection
Import-PSSession $Session -DisableNameChecking
Get-OrganizationConfig | Format-Table -Auto Name,OAuth*
#Set-OrganizationConfig -OAuth2ClientProfileEnabled $true
```

The command to enable OAuth is commented at the bottom of the script.

Test the Configuration

A new TEST OAUTH command has been added to the Crestron Fusion Services controller to help validate the configuration for OAuth settings.

Crestron Fusion Services Controller - TEST OAUTH



The readout shown in the image above indicates a successful test run.

NOTE: The CONFIG RELOAD command must be run if any changes have been made to the OAuth configuration prior to issuing a new TEST OAUTH command. If changes are made to the configuration, the Groupware service may take up to 10 minutes to receive the new values; otherwise, the service app pool may be cycled again to receive the new values immediately.

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