VOSS-4-UC
Microsoft Windows PowerShell Proxy Server Installation and Upgrade Guide (Microsoft Teams)

Release 21.1

Sep 02, 2021

Legal Information

Please take careful note of the following legal notices:

Security Information

This product may contain cryptographic features that may be subject to state and local country laws that govern the import, export, transfer and use of such features. The provision of this software does not imply that third-party authorization to import, export, distribute or use encryption in your particular region has been obtained. By using this product, you agree to comply with all applicable laws and regulations within your region of operation. If you require further assistance, please contact your dedicated VOSS support person.

Contents

1. Overview

VOSS-4-UC accesses and provisions both Azure Active Directory (AAD) and Microsoft Teams using PowerShell. It does this by generating PowerShell scripts 'on the fly', then pushing them to one or more customer-owned Windows servers (the PowerShell Proxy) for execution. Results are then returned to VOSS-4-UC for further processing.

The PowerShell scripts generated by VOSS-4-UC utilize two PowerShell modules provided by Microsoft: the 'msonline' module and the 'MicrosoftTeams' module.

This document describes the setup of the PowerShell Proxy servers, including the installation of those two PowerShell modules. It also provides guidance for upgrading a PowerShell Proxy server from an existing deployment that uses the Skype for Business Online Windows PowerShell Module, to the latest PowerShell modules supported by VOSS-4-UC.

1.1. Deployment Topology Options

1.1.1. PowerShell Proxy Server Domain Membership

PowerShell Proxy servers may be joined to an Active Directory domain. If you are using VOSS-4-UC to manage or extract data from any on-premises component, such as Skype for Business Server, on-premises Active Directory, or on-premises Exchange Server, then domain membership is required. In all other cases domain membership is optional.

1.1.2. Redundancy

You can deploy two or more PowerShell Proxy servers to provide redundancy. This configuration requires a load balancer (not provided by VOSS) between VOSS-4-UC and the PowerShell Proxy servers. If you choose this topology option, be aware of the following load balancer configuration requirements:

- The load balancer must forward incoming HTTP and HTTPS requests on TCP ports 5985 and 5986.
- The load balancer must be configured in "IP Affinity" mode, such that all incoming requests from a specific IP address are preferentially routed to the same PowerShell Proxy. This is done to maintain the integrity of HTTP sessions that can consist of multiple HTTP requests.

When VOSS-4-UC is deployed as a multi-node cluster and the load balancer is configured in "IP Affinity" mode, each Unified Node will have all its requests routed to the same PowerShell Proxy. A properly configured load balancer will distribute the overall load from all the Unified Nodes across the deployed PowerShell Proxy servers. When a PowerShell Proxy goes out of service the load balancer will route incoming traffic to the surviving servers, bypassing the failed one.

1.1.3. Outbound Internet Proxy

Some organizations require all traffic outbound to the public Internet - including traffic to Microsoft 365 tenants - to traverse an outbound Internet proxy server for audit logging and, optionally, authentication. This document describes the configuration in VOSS-4-UC and on the PowerShell Proxy server(s) that are required to support this topology option.

1.2. Service Accounts

VOSS-4-UC utilizes service accounts for access to the PowerShell Proxy and for provisioning Microsoft 365 tenants. A single service account is required for the PowerShell Proxy. For Microsoft 365 tenants, VOSS-4-UC requires access to both Azure Active Directory and to Microsoft Teams. This can be accomplished with a single service account, or with separate service accounts for Azure AD and Teams. Each tenant under management requires its own service account(s).

Account permissions and other details are described in this section.

1.2.1. PowerShell Proxy Server Remote Management Service Account

Clients, including VOSS-4-UC, that connect to the WinRM service on the PowerShell Proxy must provide credentials for an account having the characteristics listed below.

Table: *Remote Management Service Account*

Account Type	Local Computer Account (Note: not a domain account)
Local Group Membership	Administrators Remote Management Users

1.2.2. Tenant Service Account: Azure Active Directory

For Azure Active Directory, the permissions required by VOSS-4-UC will depend on the management use cases required for that tenant. Minimum required permissions and additional permissions required for specific use cases are identified in the following tables.

Note: You can combine the role permissions for Azure Active Directory with the role permissions for Microsoft Teams management into a single service account, or you can create two separate service accounts - one for Azure AD and another for Teams.

Table: *Azure Active Directory - Minimum Required Permissions*

Role Permissions	Description	Management Use Case
microsoft.directory/users/standard/read	Read basic properties on users in Azure Active Directory	Retrieve end user information, including existing licensing, from Azure AD
microsoft.directory/users/memberOf/read	Read users.memberOf property in Azure Active Directory	Retrieve end user group membership

Table: *Azure Active Directory - Additional Permissions Required to License / Enable End Users for Direct Routing*

Role Permissions	Description	Management Use Case
microsoft.directory/users/assignLicense	Manage licenses on users in Azure Active Directory	License end user for Direct Routing (assign E1 / E3 / E5 / Phone System license)
microsoft.directory/users/usageLocation/update	Update users.usageLocation property in Azure Active Directory	Update end user Usage membership

Table: *Azure Active Directory - Additional Permissions Required to Manage Active Directory End Users*

Role Permissions	Description	Management Use Case
microsoft.directory/users/create	Add users	End user adds / changes / deletes
microsoft.directory/users/delete	Delete users	End user adds / changes / deletes
microsoft.directory/users/disable	Disable users	End user adds / changes / deletes
microsoft.directory/users/enable	Enable users	End user adds / changes / deletes
microsoft.directory/users/restore	Restore deleted	End user adds / changes / deletes
microsoft.directory/users/basic/update	Update basic properties on users in Azure directory	End user adds / changes / deletes
microsoft.directory/users/manager/update	Update manager for users	End user adds / changes / deletes
microsoft.directory/users/password/update	Reset passwords for all uses	End user adds / changes / deletes
microsoft.directory/users/userPrincipalName/update	Update User Principal Name of users	End user adds / changes / deletes

1.2.3. Tenant Service Account: Microsoft Teams

To manage Microsoft Teams, VOSS-4-UC requires a service account having the following built-in role.

Note: You can combine the role permissions for Azure Active Directory with the role permissions for Microsoft Teams management into a single service account, or you can create two separate service accounts - one for Azure AD and another for Teams.

Table: *Microsoft Teams Management - Required Role*

Role	Description	Management Use Case
Skype for Business Administrator	Full access to all Teams and Skype features, Skype user attributes, manages service requests, requests, and monitors service health	Teams-enabled user and device management; management of voice routing configuration elements

1.3. VOSS-4-UC PowerShell Proxy Configuration

VOSS-4-UC utilizes the Web Services-Management protocol (WSMan) to create the PowerShell sessions used to manage Microsoft UC applications. On Windows computers, WSMan is implemented by the Windows Remote Management (WinRM) service.

This section defines how to configure WinRM on a PowerShell Proxy running on Windows Server 2016.

1.3.1. Local `hosts` File Configuration

If you are not deploying multiple PowerShell Proxy servers behind a load balancer, you may skip this step.

If you are deploying multiple PowerShell Proxy servers with a load balancer, each of the PowerShell Proxy servers must be able to address itself with the Fully Qualified Domain Name (FQDN) corresponding to the load balancer's virtual IP address. You can accomplish this by adding that FQDN to the local 'hosts' file on each of the PowerShell Proxy servers. To do this, on each of the PowerShell Proxy servers open an elevated PowerShell window and issue the following command:

```
PS C:\WINDOWS\system32> notepad C:\Windows\System32\drivers\etc\hosts
```

In the notepad window uncomment (delete the hash) the 127.0.0.1 line and append the FQDN of the load balancer virtual IP:

```
# Copyright (c) 1993-2009 Microsoft Corp.
#
# This is a sample HOSTS file used by Microsoft TCP/IP for Windows.
#
# This file contains the mappings of IP addresses to host names. Each
# entry should be kept on an individual line. The IP address should
# be placed in the first column followed by the corresponding host name.
# The IP address and the host name should be separated by at least one
# space.
#
# Additionally, comments (such as these) may be inserted on individual
# lines or following the machine name denoted by a '#' symbol.
#
# For example:
#
#      102.54.94.97     rhino.acme.com          # source server
#       38.25.63.10     x.acme.com              # x client host

# localhost name resolution is handled within DNS itself.
```

(continues on next page)

(continued from previous page)

```
  127.0.0.1       localhost psproxy.domain.com
# ::1             localhost
```

1.3.2. Outbound Internet Proxy Configuration

If your deployment does not require the use of an outbound Internet proxy to access the public Internet (including Microsoft tenants), skip this step.

To configure a PowerShell Proxy server to use an outbound Internet proxy, configure the proxy as described in this section.

1. Sign in to the PowerShell Proxy server using the local service account that VOSS-4-UC will use to connect to the proxy.

   Note: The requirements for this account are described in the previous section.

   Open **Windows Settings** and select **Network & Internet** > **Proxy** from the navigation bar. Under **Manual proxy setup** flip the **Use a proxy server** switch to **On**. In the **Address** text box enter the IP address or FQDN of the outbound Internet proxy server. In the **Port** box enter the port number required by the proxy - typically 3128, but your organization may require a different port. Select the **Don't use the proxy server for local (intranet) addresses** check box. Click **Save**.

   Note:

   - This is a per-user configuration, so be sure to sign in using the VOSS-4-UC service account before performing this step.
   - The outbound Internet proxy may require authentication. If it does, obtain those credentials and configure them in VOSS-4-UC as described in the Provider Core Feature Guide. You will not configure those credentials directly on the PowerShell Proxy server.

   Outbound proxy setup

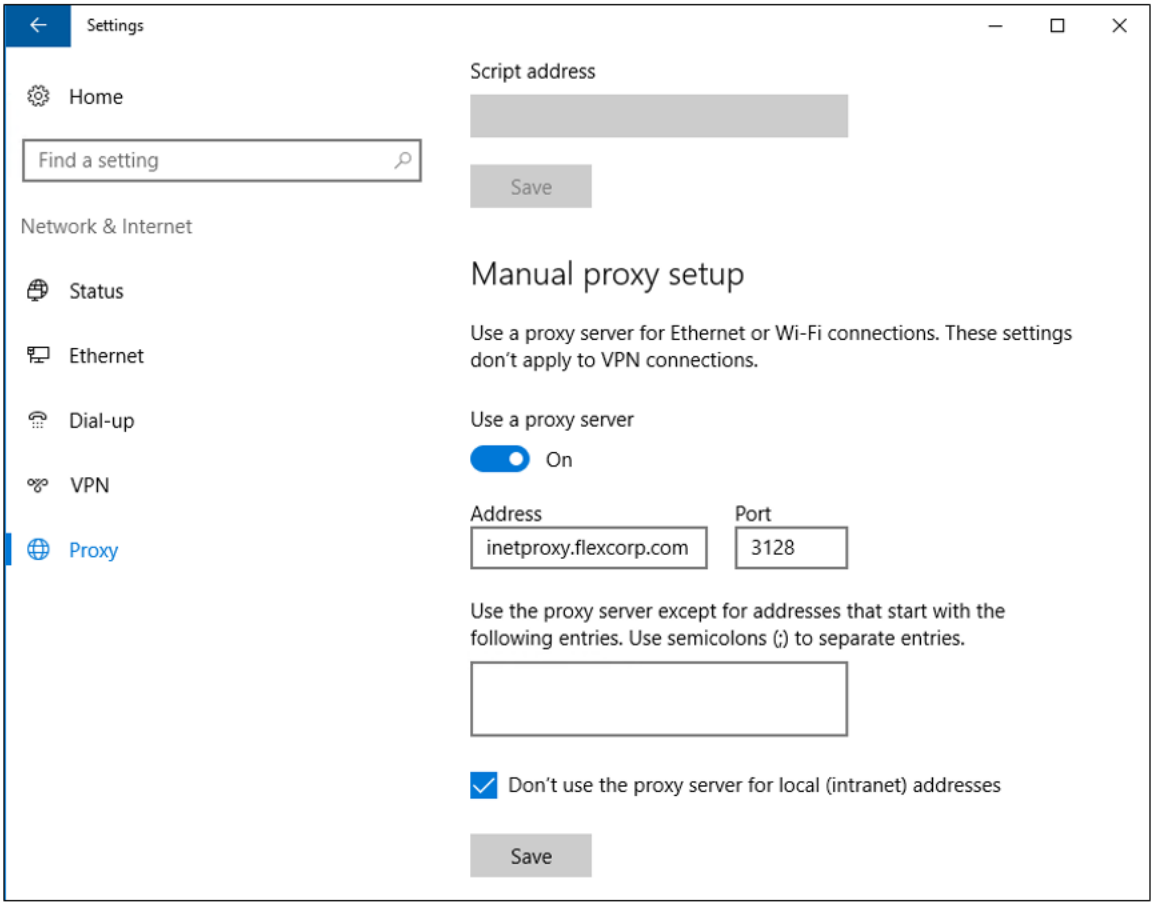
2. Make this the default setting for all HTTP clients by issuing the following command from an elevated PowerShell session:

   ```
   netsh winhttp import proxy source=ie
   ```

1.3.3. WinRM Configuration

Configure WinRM with the appropriate settings for VOSS-4-UC by issuing the following commands from an elevated PowerShell session.

Note: When setting the TrustedHosts value below you will have to provide the identity of this server; that is, the server on which you are executing these commands. If this is a standalone PowerShell Proxy (not behind a load balancer), then provide the server's IP address and FQDN, with a comma between them. If this PowerShell Proxy is behind a load balancer, then append the FQDN of the load balancer's virtual interface. For example, assume the server's FQDN is "psproxy01.domain.com" and its IP address is 10.1.1.10. If the server is not



behind a load balancer, then the value to supply for TrustedHosts, including the quotes, will be: '10.1.1.10,psproxy01.domain.com' If the server is behind a load balancer, and the FQDN of the load balancer's virtual interface is "psproxy.domain.com", then the value to supply for TrustedHosts, including the quotes, will be: '10.1.1.10,psproxy01.domain.com,psproxy.domain.com'

```
Enable-WSManCredSSP -Role Server -Force

Enable-WSManCredSSP -Role Client -DelegateComputer * -Force

Set-Item WSMan:\localhost\Service\AllowUnencrypted $true

Set-Item WSMan:\localhost\Service\Auth\Basic $true

Set-Item WSMan:\localhost\Client\AllowUnencrypted $true

Set-Item WSMan:\localhost\Client\Auth\Basic $true

Set-Item WSMan:\localhost\Client\TrustedHosts `{server identity}`
```

1.3.4. Firewall Settings

Any firewalls between VOSS-4-UC and the PowerShell Proxy, including Windows Firewall on the proxy, must permit the connections listed in the table below.

Note: These firewall exceptions are enabled by default in Windows Server 2016.

Table: WinRM Firewall Settings

Service	Protocol	Port
WinRM 2.0 (HTTP)	TCP	5985
WinRM 2.0 (HTTPS)	TCP	5986

1.3.5. Determining the Installed Management Software Version

To determine the installed version of each of the management software components, follow the steps below.

- Online Services Sign-in Assistant

  You will find the Microsoft Online Services Sign-in Assistant in the **Programs and Features** section of the Windows Control Panel. Right-click the **Start** icon and select **Programs and Features**. Look in the list of installed programs for 'Microsoft Online Services Sign-in Assistant'. If the version displayed is 7.250.4556.0 or higher, then you have the required version and do not need to reinstall or upgrade it.

- Azure Active Directory Module for Windows PowerShell

  From any PowerShell session, issue the following command:

```
  Get-Module -ListAvailable | Select-String msonline

If If 'MSOnline' is returned then you have the correct module and do not need to␣
↪reinstall or upgrade it.
```

(continues on next page)

(continued from previous page)

- .NET Framework 4.8

  From any PowerShell session, issue the following command:

```
Get-ChildItem 'HKLM:\SOFTWARE\Microsoft\NET Framework Setup\NDP' -Recurse |
Get-ItemProperty -Name version -EA 0 | Where { $_.PSChildName -Match '^(?!S)\p{L}
↪'} |
Select PSChildName, Version
```

  There may be multiple versions of .NET installed. VOSS-4-UC requires version 4.8. Example output is shown below. Note that version 4.8 is among the installed versions, so in this example no additional installation would be required.

```
PS C:\> Get-ChildItem 'HKLM:\SOFTWARE\Microsoft\NET Framework Setup\NDP' -Recurse␣
↪| Get-ItemProperty
-Name version -EA 0 | Where { $_.PSChildName -Match '^(?!S)\p{L}'} | Select␣
↪PSChildName, Version

PSChildName                          Version
-----------                          -------
v2.0.50727                           2.0.50727.4927
v3.0                                 3.0.30729.4926
Windows Communication Foundation     3.0.4506.4926
Windows Presentation Foundation      3.0.6920.4902
v3.5                                 3.5.30729.4926
Client                               4.8.04161
Full                                 4.8.04161
Client                               4.0.0.0
```

- Microsoft Teams PowerShell Module From any PowerShell session issue the following command:

```
Get-Module -ListAvailable | Select-String MicrosoftTeams
```

  If “MicrosoftTeams” is returned then you have the correct module and do not need to upgrade or reinstall anything.

1.3.6. Upgrading the Management Software on an Existing PowerShell Proxy

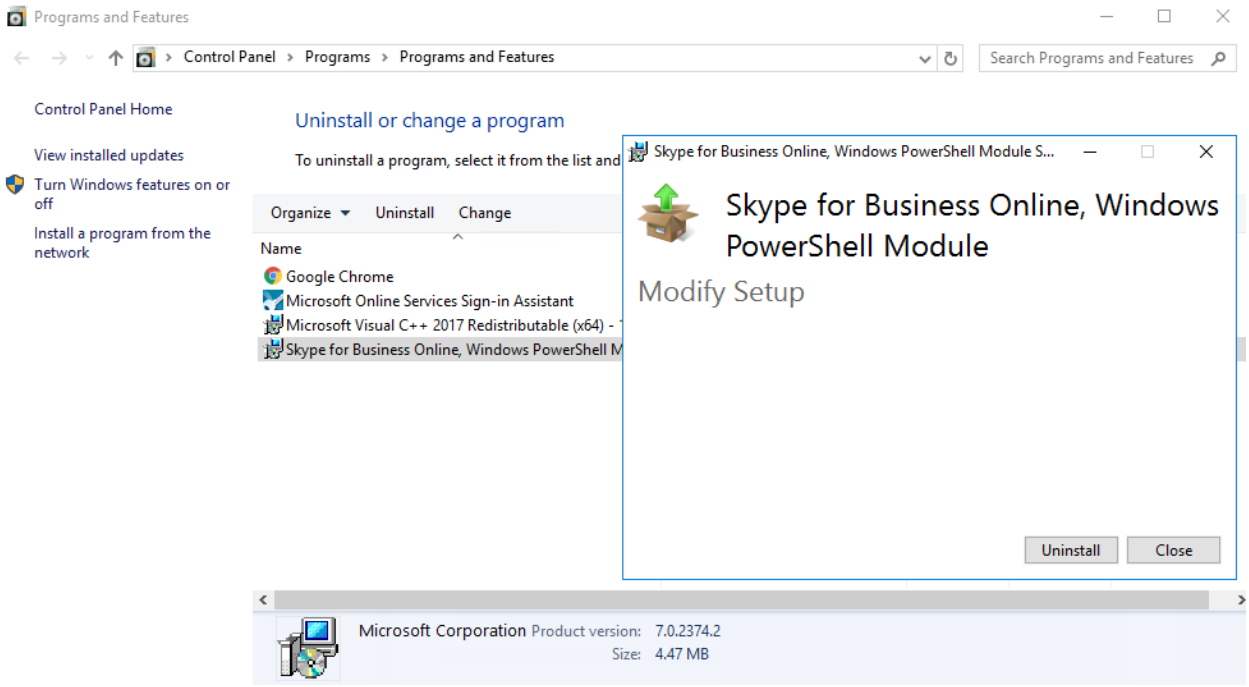
Refer to the previous section to determine what is already installed on your PowerShell Proxy server.

- Online Services Sign-in Assistant If you have determined that you already have the Online Services Sign-in Assistant installed, then you do not need to reinstall or update it. If you do not have it installed, refer to the next section for instructions on how to obtain and install this module.
- Azure Active Directory Module for Windows PowerShell If you have determined that you already have this PowerShell module installed, then you do not need to reinstall or update it. If you do not have this module installed, refer to the next section for instructions on how to obtain and install the module.
- .NET Framework 4.8 If you have determined that you already have .NET Framework 4.8 (any sub-version) installed, then you do not need to reinstall or update it. If you do not have .NET Framework 4.8 installed, refer to the next section for instructions on how to obtain and install it.

Note: It is not unusual to have multiple versions of .NET Framework installed on a single server.

Regardless of any other versions that may be installed on the server, if you do not have version 4.8 installed then you must follow the instructions in the next section to install version 4.8.

- Microsoft Teams PowerShell Module If you have determined that you already have the Microsoft Teams PowerShell module installed, then you do not need to reinstall or update it. If you do not have this module installed, then you probably have the now-deprecated Skype for Business Online PowerShell module instead. You can remove that module by performing the following procedure:
  1. Right-click the **Start** icon and select **Programs and Features**.
  2. Look in the list of installed programs for **Skype for Business Online, Windows PowerShell Module**.
  3. Uninstall the module if it is there, then refer to the next section to install the Microsoft Teams PowerShell Module.



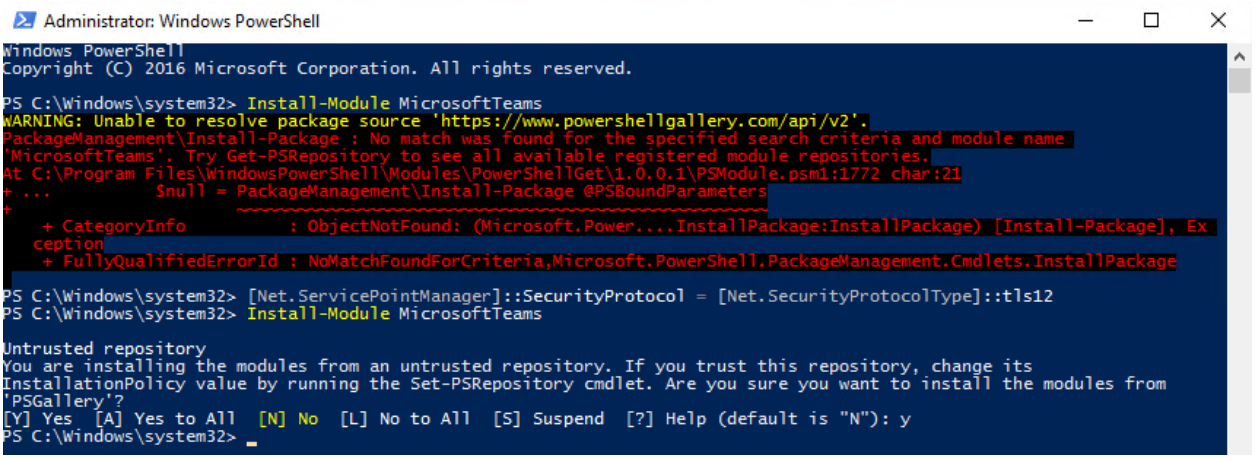
Uninstalling Skype for Business Online PowerShell Module

1.3.7. Installing the Management Software on a New PowerShell Proxy

The following software components must be installed on the PowerShell Proxy server. Install these components in the order listed.

Note: You will use the Install-Module command in the steps below to install the Azure AD and Microsoft Teams PowerShell modules. The Install-Module command downloads the specified PowerShell module from an online repository called the PowerShell Gallery. The PowerShell Gallery has deprecated the use of TLS versions earlier than TLS 1.2, so for Install-Module to work correctly you must force PowerShell to use TLS 1.2. You do this by issuing the command below. The command affects only the current PowerShell session, and its effect persists until the session ends (i.e., you close the PowerShell window).

If you see the “Unable to resolve package source” warning or the “No match was found” error shown below when using Install-Module, the likely cause is this TLS version mismatch.



TLS Version Mismatch Error and Resolution

```
[Net.ServicePointManager]::SecurityProtocol = [Net.SecurityProtocolType]::tls12
```

- Online Services Sign-in Assistant Download and install `msoidcli_64.msi` from the VOSS customer portal.
- Azure Active Directory Module for Windows PowerShell From an elevated PowerShell session issue the following command:

```
Install-Module msonline
```

- .NET Framework 4.8 Browse to https://dotnet.microsoft.com and navigate to .NET Framework 4.8 Runtime or do an Internet search for “.NET Framework 4.8 download”. Download and run the .NET Framework 4.8 Runtime installer. Following installation, a reboot of the server will likely be required.

  Important: Be sure to download only from a URL ending in “microsoft.com”. Do not download software from any third-party web site as the authenticity of that software cannot be guaranteed.

- Microsoft Teams PowerShell Module From an elevated PowerShell session issue the following command:

```
Install-Module MicrosoftTeams -RequiredVersion 2.0.0
```

1.4. Test Your Tenant Connection

You can test your ability to connect to Azure Active Directory by performing the following procedure from a non-privileged PowerShell session.

1.4.1. Configure Your Test Session for Outbound Internet Proxy

If your PowerShell Proxy server is behind an outbound Internet proxy that requires authentication, issue the following commands from your PowerShell session.

When prompted, enter your outbound proxy credentials.

```
$w = New-Object System.Net.WebClient
$w.Proxy.Credentials = (Get-Credential)
```

Note: The credentials you enter above persist only for the duration of this PowerShell session. When you exit the PowerShell session the credentials are deleted.

Keep this window open for the remainder of the procedures in this section.

1.4.2. Test Connection to Azure Active Directory

Connect to Azure Active Directory and do a test query by issuing the following commands. If your PowerShell Proxy is behind an outbound Internet proxy that requires authentication, first refer to the steps at the beginning of this section.

When prompted, enter your Azure AD service account credentials.

```
Connect-MsolService -Credential (Get-Credential)
Get-MsolUser -MaxResults 1
```

The above commands should successfully connect to the tenant and retrieve one random user.

1.4.3. Test Connection to Microsoft Teams

Connect to Microsoft Teams and do a test query by issuing the following commands. If your PowerShell Proxy is behind an outbound Internet proxy that requires authentication, first refer to the steps at the beginning of this section.

When prompted, enter your Teams service account credentials.

```
Connect-MicrosoftTeams -Credential (Get-Credential)
Import-PSSession $s -AllowClobber
Get-CsOnlineUser -ResultSize 1 | Select DisplayName
```

The above commands should successfully connect to the tenant and retrieve one random user.