ExtremeConnect® User Guide

2/2024
24.02.10
PN: 9038405-00
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Getting Started with ExtremeConnect

Use the Connect tab to integrate third-party software with ExtremeCloud IQ Site Engine's ExtremeControl solution.

The ExtremeControl solution enables you to monitor end-systems and configure the appropriate experience for users accessing your network based on a variety of criteria. Network administrators can also have a variety of other tools to help monitor and control the user experience. ExtremeConnect bridges the gap between these tools and allows you to control your network configurations from within ExtremeCloud IQ Site Engine.

NOTE: ExtremeXOS/Switch Engine devices using ExtremeConnect must be running version 21.1.2 or later.

Navigating the Connect Tab

The tab contains three sub-tabs:

- Configuration — Provides information about each of your supported network monitoring tools (called modules) and the services and options for each, and enables you to configure the end-user experience using each module.
- Diagnostics — Provides information about end-systems and end-system groups analyzed by each of your supported network monitoring tools (called modules), as well as end-system statistical data.
- Services API — Allows you to execute a client/server application, known as a web service.

ExtremeConnect Requirements

The following outlines the system requirements for ExtremeConnect:

- ExtremeCloud IQ Site Engine Version 24.02.10
- Enough switches that support multi-user authentication and policy for the number of end-user sessions on the network.

ExtremeConnect Installation

- Installation
- Post Installation Tasks

Tips

- Installation of the ExtremeConnect plugin requires stopping the ExtremeCloud IQ Site Engine server service. In production environments, a maintenance window is highly recommended for this installation.

Tips

- ExtremeConnect already comes packaged with ExtremeCloud IQ Site Engine and does not need to be installed manually. The following instructions are only for reference if a manual installation or update is required.

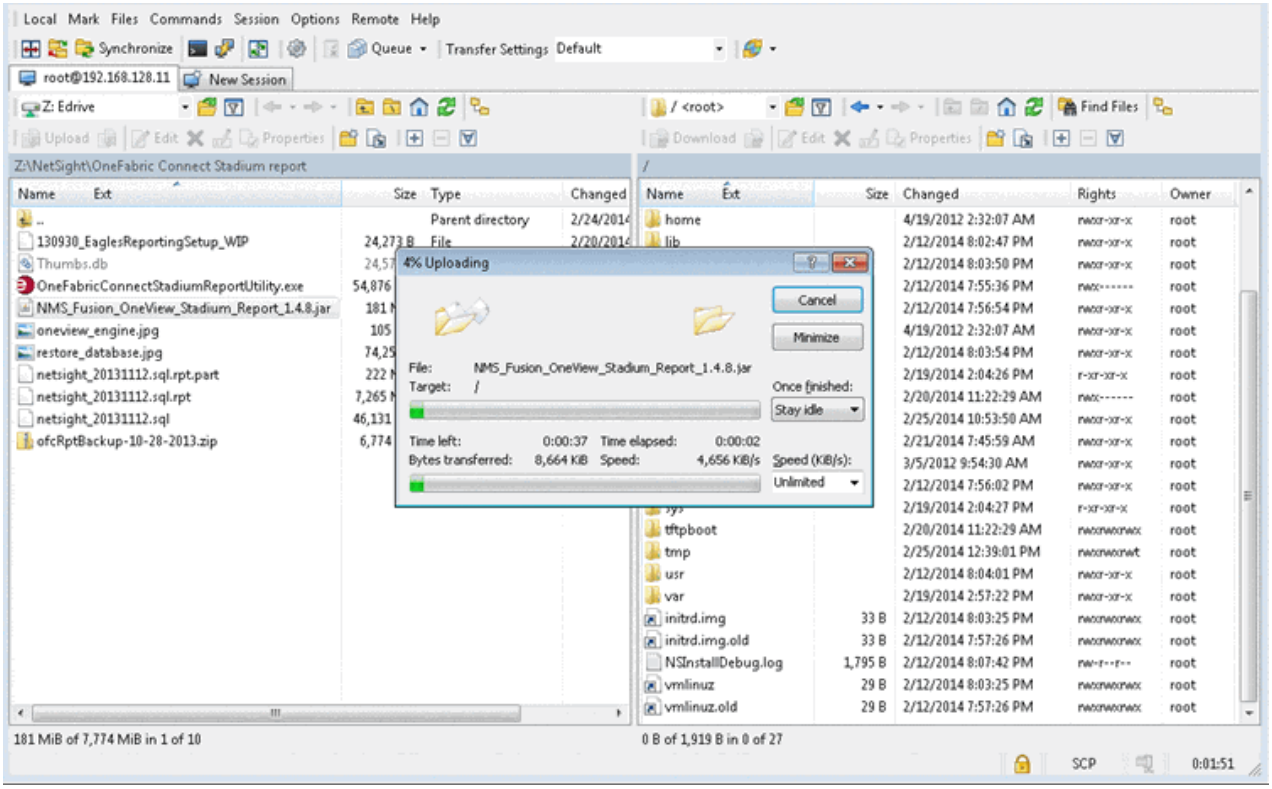
Installation of the ExtremeConnect plugin is performed using an installation script. The following table outlines information required during installation of the ExtremeConnect plugin.

Description	Default Value
Installation Directory	`/usr/local/Extreme_Networks/NetSight`
Installation Mode	Update

Installation

To perform the installation:

1. Use SCopy application (WinSCP) to download the ExtremeConnect JAR file (NMS_Connect_x.xx_xx.jar) to the root directory.



2. Open an SSH session to the ExtremeCloud IQ Site Engine server. Change to the following directory:

```
cd/usr/local/Extreme_Networks/NetSight
```

```
root@NetSight.6.0.0.70:~$ cd /usr/local/Extreme_Networks/NetSight/
root@NetSight.6.0.0.70:/usr/local/Extreme_Networks/NetSight$ _
```

3. To stop the ExtremeCloud IQ Site Engine service, enter the following command:

   ```
   service nsserver stop
   ```

   ```
   root@NetSight.6.0.0.70:~$ service nsserver stop
   Stopping NetSightServer daemon: PID =  5322[SUCCESS]

   root@NetSight.6.0.0.70:~$ _
   ```

   Note: Your ExtremeCloud IQ Site Engine prompts and version numbers can be different than what is shown here.

4. To initiate the installation script, enter the following command:

   ```
   java/bin/java -jar /NMS_Connect_x.xx_xx.jar -console
   ```

   ```
   root@NetSight.6.0.0.70:/usr/local/Extreme_Networks/NetSight$ java/bin/java -jar
   /NMS_OFConnect_1.01_33.jar -console_
   ```

   Caution: NMS_Connect_*x.xx_xx*.jar is the name of the jar file you are installing. Use care with cutting and pasting because the hyphen (-) in the command (`-console`) can change to a period (.). Move the cursor and replace the symbols if needed.

5. Complete installation by following instructions provided in the script. When the Starting to unpack message displays, the installation takes about a minute to complete.

   ```
   **** Extreme Networks ************************************************************

   This is the NetSight Suite Appliance 6.0.0.65.  Alter files with caution.

   WWW Site:       http://www.extremenetworks.com
   Support Email:  support@extremenetworks.com
   Phone:          800-998-2408

   ********************************************************************************
   root@TMELNetsight:~$ PS1='\u:\W\$ '
   root:~# cd /usr/local/Extreme_Networks/NetSight
   root:NetSight# java/bin/java -jar /NMS_Fusion_OneView_Stadium_Report_1.4.8.jar -console
   Welcome to the installation of Netsight OneFabric Connect 1.01-35!
    - Daniel Koenig-Schieber <datacentermanager@enterasys.com>
    - Kurt Semba <datacentermanager@enterasys.com>
    - Leo Lam <datacentermanager@enterasys.com>
    - Markus Nispel <datacentermanager@enterasys.com>
   The homepage is at: http://www.enterasys.com/support/contact-support.aspx/
   press 1 to continue, 2 to quit, 3 to redisplay
   ```

6. Press 1, [Enter] and read the installation instructions that follow.

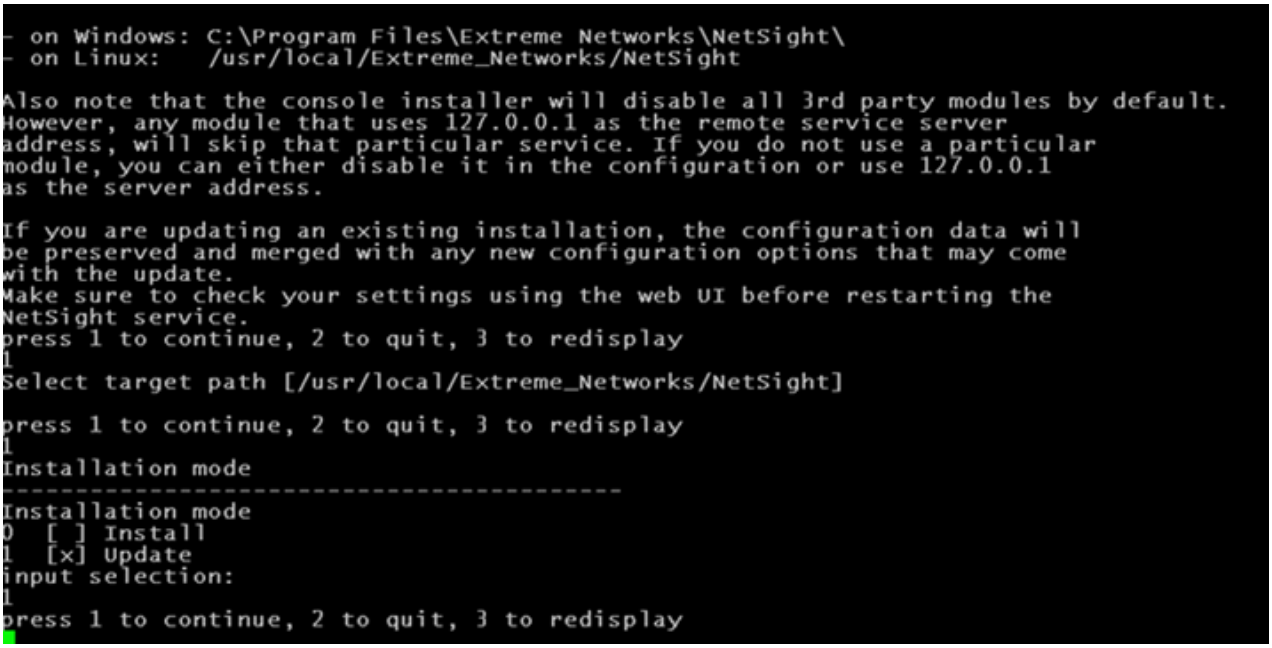
```
The homepage is at: http://www.enterasys.com/support/contact-support.aspx/
press 1 to continue, 2 to quit, 3 to redisplay
1
Welcome
---------------------------------------
Welcome to the Extreme OneFabric Connect installation!

Please run this installer from the NetSight directory if console mode is used and
provide the NetSight directory path and Fusion installation mode
to customize your setup. The installation path is usually:

- on Windows: C:\Program Files\Extreme Networks\NetSight\
- on Linux:   /usr/local/Extreme_Networks/NetSight

Also note that the console installer will disable all 3rd party modules by default.
However, any module that uses 127.0.0.1 as the remote service server
address, will skip that particular service. If you do not use a particular
module, you can either disable it in the configuration or use 127.0.0.1
as the server address.

If you are updating an existing installation, the configuration data will
be preserved and merged with any new configuration options that may come
with the update.
Make sure to check your settings using the web UI before restarting the
NetSight service.
press 1 to continue, 2 to quit, 3 to redisplay
```

7. Press 1, [Enter]. Then press [Enter] or enter the target path if different from the default shown.

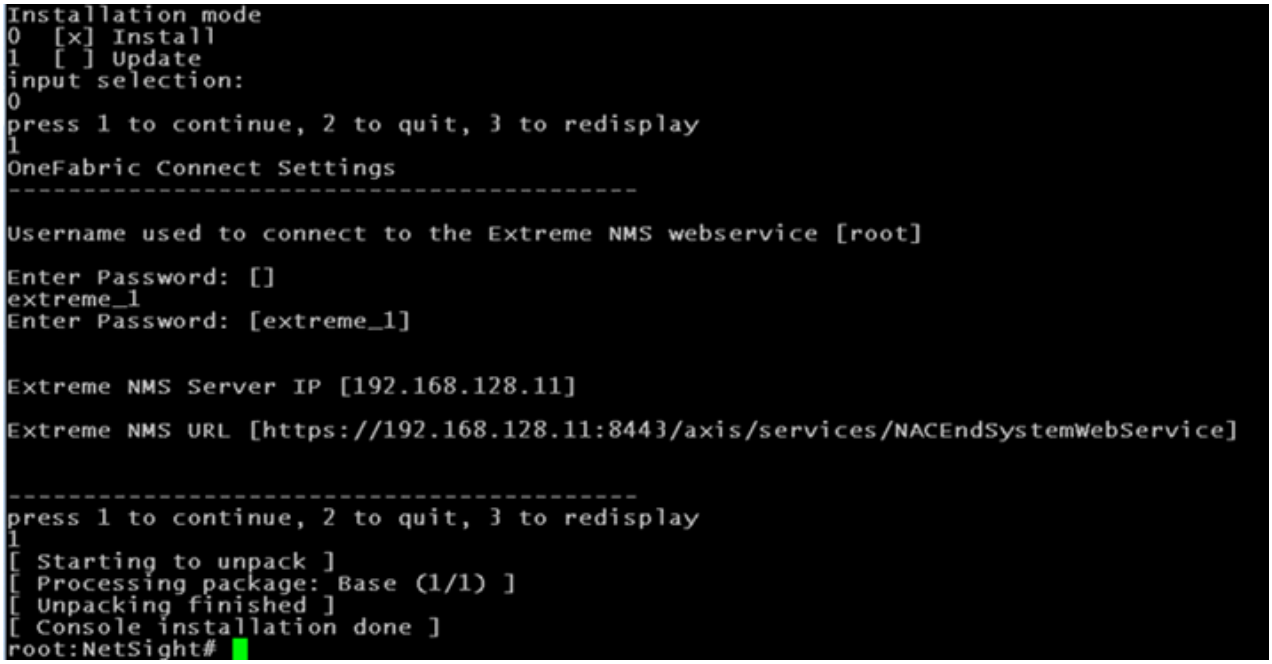
```
The homepage is at: http://www.enterasys.com/support/contact-support.aspx/
press 1 to continue, 2 to quit, 3 to redisplay
1
Welcome
---------------------------------------
Welcome to the Extreme OneFabric Connect installation!

Please run this installer from the NetSight directory if console mode is used and
provide the NetSight directory path and Fusion installation mode
to customize your setup. The installation path is usually:

- on Windows: C:\Program Files\Extreme Networks\NetSight\
- on Linux:   /usr/local/Extreme_Networks/NetSight

Also note that the console installer will disable all 3rd party modules by default.
However, any module that uses 127.0.0.1 as the remote service server
address, will skip that particular service. If you do not use a particular
module, you can either disable it in the configuration or use 127.0.0.1
as the server address.

If you are updating an existing installation, the configuration data will
be preserved and merged with any new configuration options that may come
with the update.
Make sure to check your settings using the web UI before restarting the
NetSight service.
press 1 to continue, 2 to quit, 3 to redisplay
1
Select target path [/usr/local/Extreme_Networks/NetSight]
```

8. To select install if no previous version of Extreme Connect is present, press 0, [Enter].
   To update an existing ExtremeConnect installation and preserves configuration data, select 1.
   To clear the data, select 0.

To redisplay and confirm your selection, press 3, [Enter].



9. To continue and start the installation, press 1, [Enter]. The installation process will show Console installation done when it is finished.



When the console prompt displays, the installation is complete.

10. To start the ExtremeCloud IQ Site Engine server service, enter the following command:

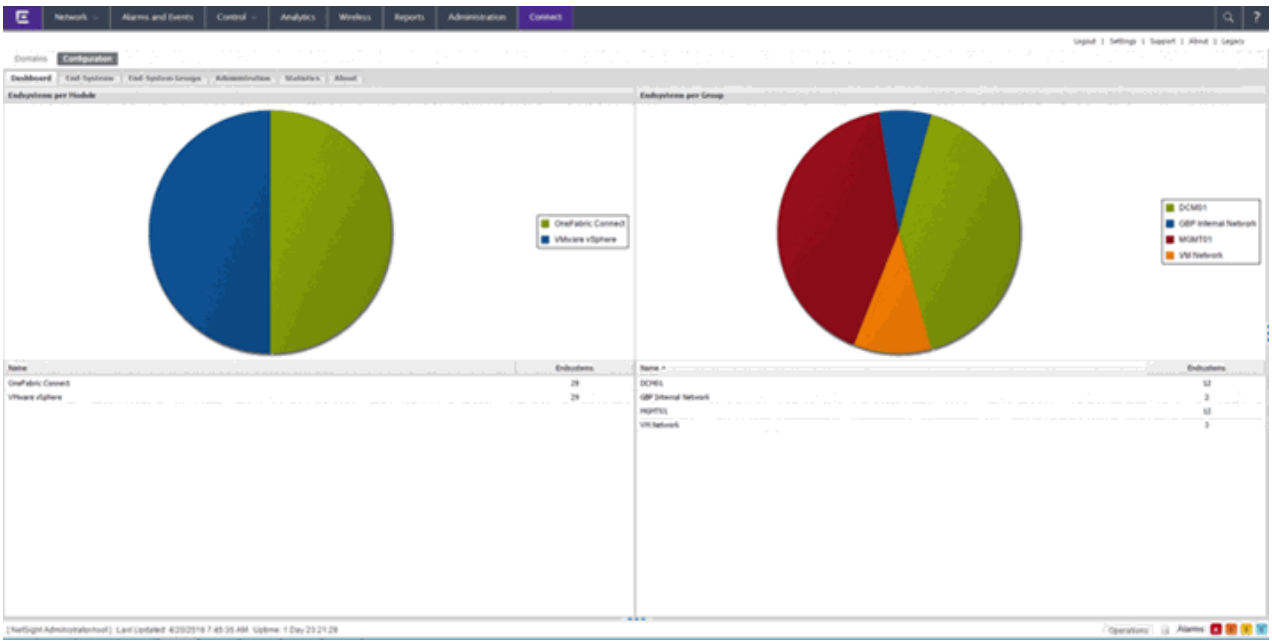
```
service nsserver start
```

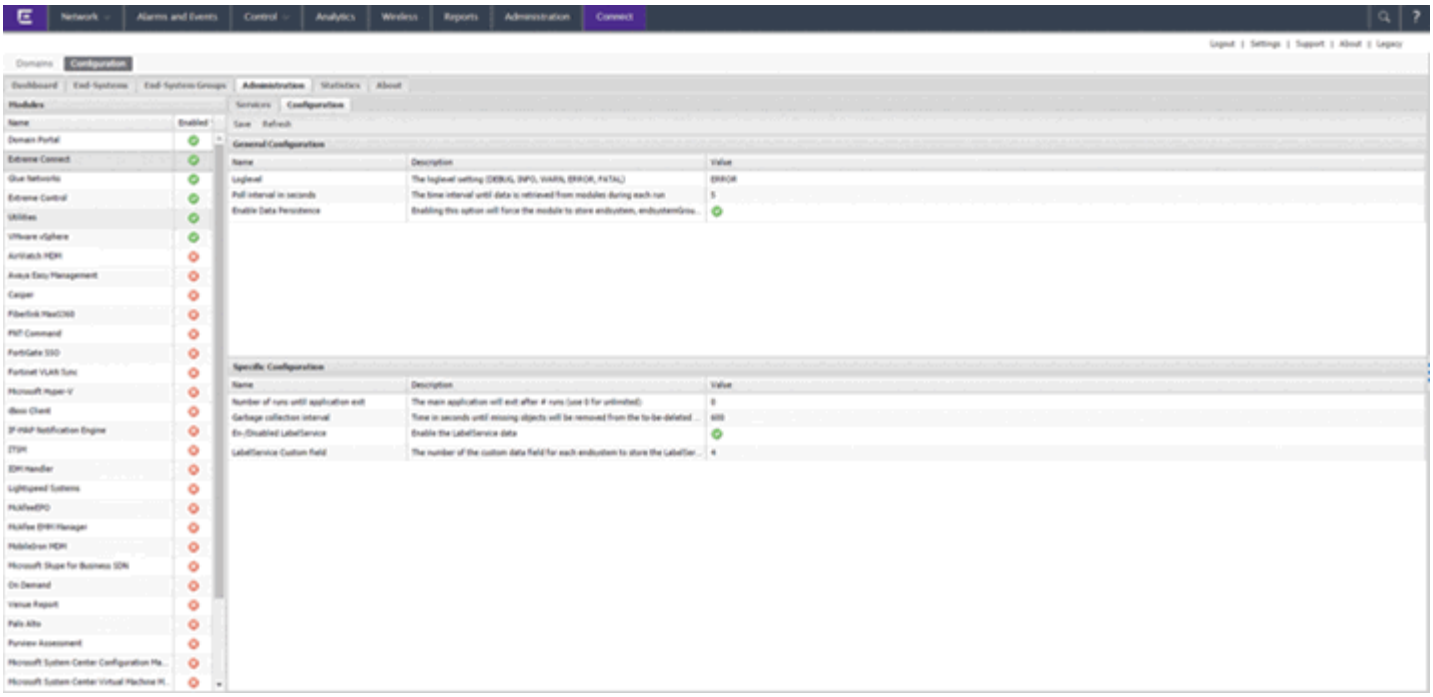
```
root@NetSight.6.0.0.70.ebcdemolab.com:~$ service nsserver start
Starting NetSightServer daemon:
[SUCCESS]
```

Post-Installation

After an installation, most modules are disabled by default. Each module must be configured and enabled individually. The ExtremeControl module creates the default end system groups in the ExtremeCloud IQ Site Engine database (if they do not already exist).

1. To access the ExtremeConnect configuration page, select **OneView > Connect**. The dashboard most likely displays without any data available initially.





2. Each module has its own configuration panel with parameters specific to each of them. You must define the parameter for each value that starts with a $ after a text install before enabling the module.
3. Verify for each plugin that you want to enable that there are no $ variables left before enabling the plugin.
4. After making changes to any variable in the configuration files, select Save.
   Configuration changes are indicated by a red triangle after each save action.
5. Enable the plugins that you want to integrate with ExtremeCloud IQ Site Engine.

ExtremeConnect Configuration

The **Configuration** tab provides information about the end-systems and end-system groups connecting to your network.

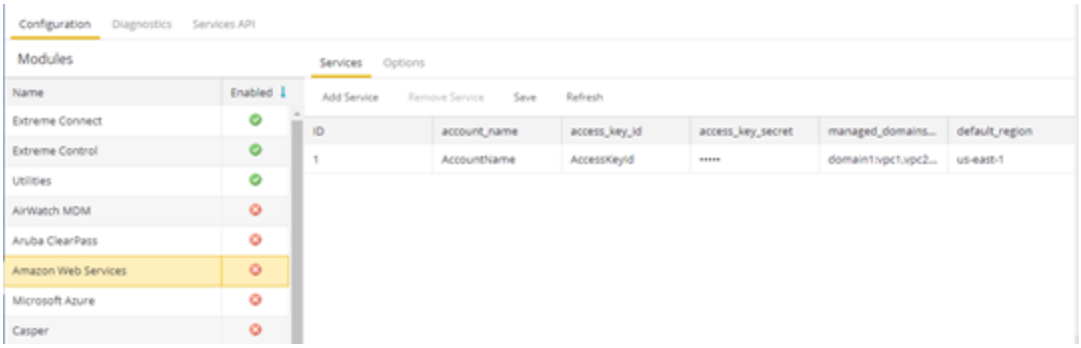
Using third-party software (known as modules) in conjunction with the network monitoring and access control functionality found in ExtremeControl, the **Configuration** tab provides information about the services and options configured for devices accessing your network.

The **Configuration** tab contains the following sub-tabs, each providing information that details how ExtremeCloud IQ Site Engine connects to the module server and how it is configured in ExtremeCloud IQ Site Engine.

- Services — A service outlines to ExtremeCloud IQ Site Engine how it connects to the server of the module you select. This includes the login credentials, IP, and port information for the module.
- Options — Options allow you to configure how the module gathers end-system information and controls network access in ExtremeCloud IQ Site Engine, and how that information is presented.

Services

Access the **Services** tab to specify information detailing how ExtremeCloud IQ Site Engine contacts the module's server. The **Services** tab allows you to specify multiple services for modules that have more than one server.



Left Panel

The left panel of the tab shows all of the modules available in the **Connect** tab.

The **Enabled** column indicates whether the module is enabled:

- Check icon ( ) — Module enabled on your network.
- X icon ( ) — Module not enabled on your network.

Right Panel

The right panel displays a table containing the services saved for the selected module. Use the following tabs to configure the data in the right panel:

Add Service
Select this button to add a new row in the Services table from which you can create a new service for the module.

Remove Service
Select this button to remove the selected row from the Services table.

Save
Select the Save button to save any changes made to services in the Services table.

Refresh
Select this button to update the table with any changes.

The information in the right panel varies depending on the module selected in the left panel. The information below is an example using the Fiberlink MaaS360 module.

ID
A unique identifier for each service. This field cannot be edited.

Username
The username used to access the module's server.

Password
The password used to access the module's server.

apiUrl
The url that provides access to the module's server.

billingIdEncrypt
The billing account ID used for the module.

appId
The application ID used to contact the module's web service.

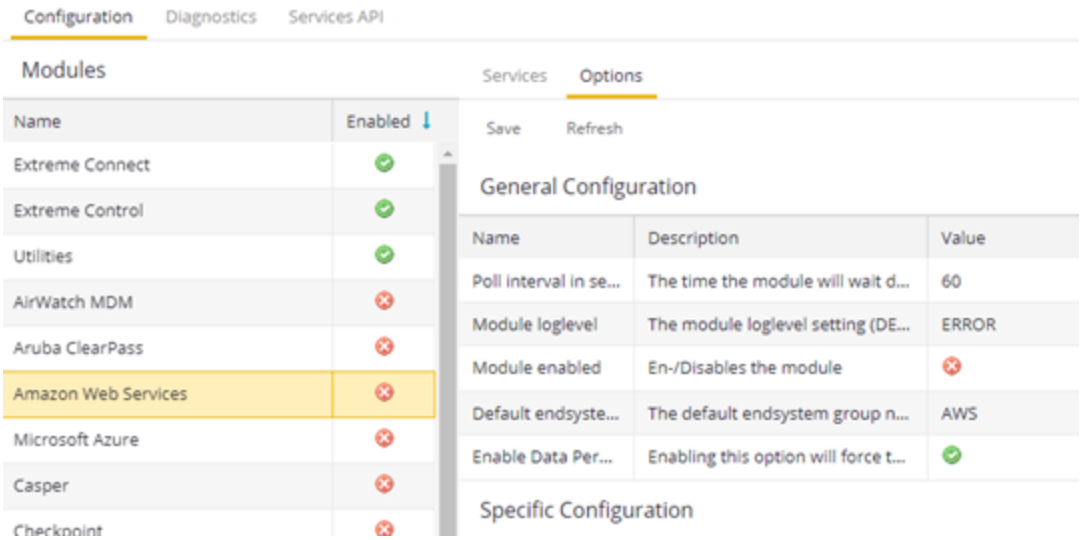
appVersion
The application version of the module.

platformId
The platform ID of the module.

accessKey
The key used to communicate with the module server.

Options

The Options tab allows you to determine the information you want the module to gather from end-systems in ExtremeCloud IQ Site Engine, as well as the module's access control behavior on the network.



Left Panel

The left panel of the tab shows all of the modules available in the **Connect** tab.

The **Enabled** column indicates whether the module is enabled:

- Check icon ( ) — Module enabled on your network.
- X icon ( ) — Module not enabled on your network.

Right Panel

Use the following tabs to configure the data in the right panel:

Save
Select the **Save** button to save your changes to any of the configurations on the tab.

Refresh
Select the **Refresh** button to update the **Options** tab with any changes you made.

The right panel displays two tables.

- **General Configuration** — Allows you to configure certain general ExtremeCloud IQ Site Engine criteria.
- **Specific Configuration** — Allows you to configure module-specific functionality.

Each module you select in the left panel displays different configurations, depending on the functionality available when using the module.

Name
The name of the configuration. This column cannot be edited.

Description
A brief description of the configuration and how it affects ExtremeCloud IQ Site Engine. This column cannot be edited.

Value

The specific value related to the configured option. For example, for the General Configuration entry "Poll interval in seconds," the Value is the number of seconds you configure for the poll interval. Select the down arrow to the right of each field to change the value configuration.

Verification

In order to verify whether ExtremeConnect is successfully pushing data from 3rd party data sources to ExtremeCloud IQ Site Engine:

1. Open ExtremeCloud IQ Site Engine's Control > End-Systems tab.
2. Find an end-system updated by ExtremeConnect and navigate to the custom field – the field displays vmName=MyVirtualMachine;vmGuestFullName=Ubuntu 5…" or something similar, depending on your data sources. The information displayed here differs a bit depending on the module that reports the data to ExtremeCloud IQ Site Engine.
3. Make sure that the end-system list is actually displaying the custom field that you have chosen during installation.

NOTE: You can rename the Custom field on the Administration > Options > Access Control tab.

Data Center/Cloud Integration

The various integrations for Data Center/Cloud focus on the automation of provisioning highly mobile end-systems like virtual machines or providing user information for virtual desktops. Depending on the capabilities of the 3rd party product, the automation can include the creation of virtual networks and VLAN configuration within the respective product.

- Citrix XenServer
- Citrix XenDesktop
- Microsoft Intune
- Google G Suite
- Microsoft System Center Virtual Machine Manager (SCVMM)
- Microsoft Hyper-V
- VMware vSphere
- VMware View

Citrix XenServer

The XenServer integration offers provisioning of virtual machines in the network as well as automating the creation of virtual networks based on end-system access groups. In addition, data within ExtremeCloud IQ Site Engine is enriched for each end-system and conversely made available within XenCenter (=management tool for XenServer environments).

Module Configuration

Service Configuration	Description
Username	Username used to connect to the XenServer's web service. Read/Write/Execute permissions required.
Password	Password used to connect to the XenServer's web service.
XenCenter Webservice URL	Web service url of the XenSever
XenCenter Server IP	IP address of the XenServer.

General Module Configuration	
Poll interval in seconds	Number of seconds between connections to the XenServer.
Module log level	Verbosity of the module. Logs are stored in ExtremeCloud IQ Site Engine.log file.
Module enabled	Whether or not the module is enabled.
Push update to remote service	If this is set to "true", data from other modules will be pushed to the service.

General Module Configuration	
Update local data from remote service	If this is set to “true”, data from the remote service will be used to update the internal end-system table.
Default end-system group:	The default end-system group name to use if it is not set dynamically.
Enable Data Persistence	Enabling this option will force the module to store end-system, end-system group and VLAN data to a file after each cycle. If this option is disabled, the module will forget all data after a service restart, but in order to clean already existing data, the corresponding .dat files have to be deleted.

Service Specific Configuration	
Custom field to use	The custom field within Extreme Control to update the information for end-systems retrieved from XEN (valid values: 1-4).
Outgoing data format	The format of the Extreme Control data (like last seen time, switch IP, switch port, etc.) that is written to the description fields of the VMs within XEN. You can customize the appearance and what information you want to include/exclude from there.
Format of the incoming data	The format of the data that is received from XEN and written to the custom field.
Use global end-system groups	This feature enables the module to use the global end-system groups of the Extreme Connect. This will enable the XEN module to use the end-system groups retrieved from the Extreme Control module and assign XEN VMs to these end-system groups.
Network deletion	If this option is enabled, networks created by end-system groups will be deleted if the end-system group does not exist anymore or sync is disabled. Any connected VM will be rerouted to the Deletion Group below.
Deletion Group	If the “Network Deletion” feature is enabled, this setting will define the catchall network for VMs that have been connected to a XEN network after it has been deleted in ExtremeCloud IQ Site Engine. For example: If you have a XEN network “VM Test” that is managed by Extreme Connect and you delete the corresponding end-system group in ExtremeCloud IQ Site Engine, this feature will make sure that all VMs that are connected to “VM Test” will be disconnected from it and automatically reconnected to the XEN network defined with this setting. This feature is meant to provide a fallback network for all VMs that have been connected to Extreme Connect managed XEN networks.

Service Specific Configuration	
Destroy NIC Bonds	If enabled, Extreme Connect will automatically destroy (remove) a bonding of 2 or more NICs on the Citrix XenServer in case the last network that used this bond has been removed using the ExtremeCloud IQ Site Engine group configuration. Example: Let's assume you have created a new end-system group using multiple NICs with "nic=eth0:eth1", Extreme Connect will create - A bond over eth0 + eth1 with a default naming schema and - A new external network connected to that bond named as your end-system group. Now you create a second end-system group also using the same NIC definition "nic=eth0:eth1". This will only create a new external network connected to the already existing bond and called according to your end-system group. If you now delete (or set "sync=false") one of these end-system groups, only the external Xen network will be removed, not the bond since it is in use by the other network. If you then also delete the other end-system group, the corresponding external network will be deleted and the bond between eth0 and eth1 will be destroyed.

Verification

1. Select a virtual machine.
2. Select the "General" tab on the right side of the screen.
3. At the top of the "General" tab there is a description field that will contain the corresponding data from ExtremeCloud IQ Site Engine. If this data is correct, then the integration is verified.

Citrix XenDesktop

The integration with XenDesktop is a one-way integration: information on virtual desktops is retrieved from XenDesktop and used within ExtremeControl but no data nor configuration is written from ExtremeControl towards XenDesktop.

Module Configuration

The table below describes the configuration options available for the XendDesktop OFConnect module (config file: XenDesktopHandler.xml)

Service Configuration	Description
Adapter IP	The IP address on which the Extreme XenDesktop adapter is running (this is configurable within the adapter's config file). It should be running on the same IP as your XenDesktop server.
Adapter Port	The TCP port on which the Extreme XenDesktop adapter is running (this is configurable within the adapter's config file).
Pre-Shared Key	The key used to encrypt traffic from and to the adapter running on the XenDesktop server. This must match the configured pre-shared key from the adapter's config file.

General Module Configuration	
Poll interval in seconds	The wait time between two polls. The module will contact the XenDesktop adapter and request the latest data on the VDI infrastructure, then wait for this interval to pass and then poll the adapter again.
Module log level	Verbosity of the module. Logs are stored in ExtremeCloud IQ Site Engine's server.log file.
Module enabled	Whether or not the module is enabled.
Update local data from remote service	If this is set to "true", data from the remote service will be used to update the internal end-system table.
Default end-system group	The default end-system group name to use if it is not set dynamically.
Enable Data Persistence	Enabling this option will force the module to store end-system and end-system group data to a file after each cycle. If this option is disabled, the module will forget all data after a service restart, but in order to clean already existing data, the corresponding .dat files have to be deleted.

Service Specific Configuration	
Custom field to use	The custom field within ExtremeCloud IQ Site Engine to update the information for end-systems retrieved from the adapter running on the XenDesktop server (valid values: 1-4).
Format of the incoming data	The format of the data that is received from the adapter running on the XenDesktop server and written to the custom field.

Adapter Installation

OFConnect retrieves data from the XenDesktop server using an adapter. This adapter needs to be installed and configured prior to enabling the corresponding module within OFConnect. The adapter consists of a Java executable file (.jar) and a configuration file. To install the adapter:

1. Install Windows .NET Framework 3.5 SP1 or above, Windows Powershell 2.0 and the latest Java Runtime Environment on the XenDesktop server.
2. Locate the file "Datacenter Manager XenDesktop Adapter.zip" on the Extreme Control server in the directory../jboss/server/default/deploy/fusion_jboss.war/XenPlugin/ (it can also be downloaded via browser at https://Extreme Control-IP:8443/fusion_jboss/XenPlugin/ Datacenter%20Manager%20XenDesktop%20Adapter.zip).
3. Copy the executable jar file (DCM_XENDESKTOP_ADAPTER_<version>.jar) and the configuration file (DCM_XENDESKTOP_ADAPTER.config) into a separate directory, created under "Program Files/Extreme Networks/XenDesktop Adapter" directly on the XenDesktop server.
4. Edit the configuration file according to your environment. The configuration file contains an explanation of all settings. You can also find them listed below.
5. Save and close the configuration file.
6. Start the adapter manually by opening a cmd shell or Powershell,
7. Navigate into the installation directory and use the following command: java –jar DCM_XENDESKTOP_ ADAPTER_<version>.jar.
8. Check the log file to validate proper functionality.
9. Check the end-system list in ExtremeControl to see data for the XenDesktop virtual machines coming into the custom column you've configured within the XenDesktopHandler.xml config file.
10. After successfully verifying the integration, you will need to ensure that the DCM_XENDESKTOP_ ADAPTER_1.00.jar file is getting started on Windows server startup automatically. Stop the adapter currently running within the cmd/Powershell window.
11. Configure the auto-start for the .jar file (this depends on your Windows Server version) and restart your XenDesktop server, when appropriate, in order to test the auto-start of the .jar file (you should see a java process running in the process tree).

Adapter Configuration

The table below lists the configuration options for the XenDesktop agent.

Configuration Option	Description
NETSIGHT_IP	The IP address of the ExtremeCloud IQ Site Engine server.
NETSIGHT_ USERNAME	The username to authenticate against the ExtremeCloud IQ Site Engine server.
NETSIGHT_ PASSWORD	The password to authenticate against the ExtremeCloud IQ Site Engine server.

Configuration Option	Description
LOG_LEVEL	Set the log level of the adapter to one of the following values: ERROR, WARN or DEBUG. If not set, the default will be WARN.
IP	IP address for the web service (=agent) to listen on.
PORT	TCP Port for the web service to listen on - must NOT be used by any other application on this server!
XENDESKTOP_ SERVER	The host/DNS name of the XenDekstop Deliver Controller to connect to. So far this has only been tested with this adapter and the XD Deliver Controller running on the same server although remote connections might work as well. Example: XenDesktop5 or with FQDN: XenDesktop5.test.local.
PRE_SHARED_KEY	The pre-shared key used for the communication between the adapter and OFConnect. This must match the key entered when installing the OFConnect XenDesktop module.
IS_PRE_SHARED_ KEY_ENCRYPTED	If set to 'false' the adapter assumes that the 'PRE_SHARED_KEY' configured above is not encrypted - on the first start the adapter will automatically encrypt the key and set this value to “true”. If you want to change this key at a later stage, change the key above, set this value back to 'false' and restart the adapter service.
ENABLE_PUSH_ USER_TO_ NETSIGHT	If set to "true" the adapter will use web service calls to ExtremeCloud IQ Site Engine to push the user name for each virtual desktop session to the corresponding end-system in ExtremeCloud IQ Site Engine/ExtremeControl. If configured properly in ExtremeControl, this will cause a re-authentication of the user on this virtual desktop and assign a user-based policy.
ENABLE_PUSH_ DATA_TO_ NETSIGHT	If set to "true" the adapter will push end-system data back to the corresponding module within OFConnect/ExtremeCloud IQ Site Engine. This will enable you to retrieve data on the virtual desktop within ExtremeCloud IQ Site Engine/OFConnect and display it within the end-system table inside of ExtremeControl

Verification

To verify proper functionality, validate the data within the custom field configured to use for the XenDesktop integration in your end-system list (in ExtremeControl).

You will only see the username being set accordingly if you enable the following option within the adapter’s config file: ENABLE_PUSH_USER_TO_NETSIGHT=true

You will only see the additional information (within the custom column that you’ve specified in your OFConnect XenDesktopHandler config file) if you’ve enabled the following option within the adapter’s config file:

ENABLE_PUSH_DATA_TO_NETSIGHT=true

Be aware that the username from XenDesktop can also be used to automatically assign a policy to each user as you could do with any 802.1X or Kerberos username. So make sure you’ve configured your rule set in ExtremeControl correctly before enabling this feature.

Microsoft Intune

IMPORTANT: Microsoft plans to deprecate support for the API calls this module requires. For details and the schedule, see https://learn.microsoft.com/en-us/mem/intune/protect/network-access-control-integrate.

The Microsoft Intune integration requires registering a Microsoft Azure application. The Azure application acts as a proxy to execute REST API calls on behalf of ExtremeConnect. This information is used in the Intune module tab.

Module Configuration

The table below lists the configuration options for the Intune agent.

Configuration Option	Description
Client ID:	Application client ID
Password:	Application client secret
Tenant:	Tenant ID to retrieve specific customer devices
Redirect URL:	URL where the user is redirected.
Code	Generated oAuth authorization code.

Service Configuration

The table below lists the configuration options for the Intune server.

Configuration Option	Description
Poll interval:	Time period between queries to the Intune NAC web service
End system group for managed business mobile devices:	ExtremeControl end-system group that corporate-owned devices belong to
End system group for managed personal mobile devices:	ExtremeControl end system group that personal devices belong to
Default end system group for managed mobile devices:	ExtremeControl end-system group that unknown devices belong to
Update Kerberos username:	Enables or disables the option to update end-system username
Update device type:	Enables or disables the option to update end-system device type
Notify user when quarantined:	Enables or disables the option to notify user when an end-system is quarantined based on assessment scoring
Enable assessment:	Enables or disables the option to use the ExtremeControl assessment agent

Register Azure Application

An Azure application is required to access Microsoft's Intune NAC API. The application requires permission from an administrator to access device information from Intune.

1. Login the Azure portal https://portal.azure.com.
2. Select **Azure services > App registrations**.
3. Create a new application, select **New registration**.
4. On the **Register an application page**, enter the application name, type, and sign-on URL. The sign-on URL is the redirection page after the permissions are accepted. Select **Register**.

   The registration is created and displays on the **App Registrations** page.
5. From the **App Registrations** page, in the **Connect** row, note the Application (Client) ID that generated after the registration. This Application ID is used in the service configuration. In the following example, the Application ID is **4c88c31c-7c8e-4cc7-8949-abd4d0106b5c**.

6. From the **Display Name** list, select **Connect**..

   The **Connect** details page displays.

7. From the left menu, select **API permissions**. One the **API permissions** page, select **Add permission**. From the **Request API permissions** dialog, select **Microsoft Graph**.

8. From the **Microsoft Graph** dialog, select **Delegated Permissions > DeviceManagementManagedDevices**. Enable **DeviceManagementManagedDevices.Read.All** and select **Add Permissions**.

9. From the **Connect > API Permissions** page, verify the permissions you created:

10. To generate the secret, from the left menu select **Certificates and Secrets**. Select **New Client Secret**. Edit the fields and select **Add**.

    In the following example, the description is **Secret**, the duration is expire in **2299**, and the generated secret is **/@T=mXIEhBQG2ODMhgDnxu[wle3p7Ha0**. The generated secret is used in the service configuration. Note: The best practice is to configure the duration to a lower value, such as one or two years.

    To copy the key to the clipboard, use the clipboard icon. To delete the key, use the trash icon.

11. To generate the oAuth authorization code, create a special authentication URL with an administrator account using the following format:

    ```
    https://login.microsoftonline.com/{tenant_
    id}/oauth2/v2.0/authorize?client_id={client_application_id}&response_
    type=code&redirect_uri={redirect_URL}&response_
    mode=query&scope=openid%20offline_
    accessDeviceManagementManagedDevices.Read.All&state={random_value}
    ```

    Replace {*tenant_id}* with the tenant name used in the service configuration. In this example, the tenant is extremeconnect.onmicrosoft.com.

    Replace *{client_application_id}* with the application's ID used in the service configuration. In this example, the application ID is 4c88c31c-7c8e-4cc7-8948-abd4d0106b5c.

    Replace *{redirect_URL}* with the URL that was configured in the application. In this example, the URL is https://nms.demo.com:8443.

    Replace *{random_value}* with any random string. In this example, the string is 12345.

    Using the example values, the authorization URL with the application specific field is:

    ```
    https://login.microsoftonline.com/extremeconnect.onmicrosoft.com/oauth2/
    v2.0/authorize?client_id=4c88c31c-7c8e-4cc7-8948-abd4d0106b5c&response_
    type=code&redirect_uri=https://nms.demo.com:8443&response_
    mode=query&scope=openid offline_
    accessDeviceManagementManagedDevices.Read.All&state=12345
    ```

12. Open a browser, enter the URL and accept the authorization request.
13. After the request is accepted, the authorization code displays in the browser address field. Note the authorization code, which is the value between the code and state tags. The authorization code is used in the service configuration and expires in 10 minutes.

    In the example above, the full URL is as follows, with the authentication code in Bold text:

    https://nms.demo.com:8443/?code=**OAQABAAIAAABHh4kmS_aKT5XrjzxRAtHzDDNMGhrNMMTkKyCFCYDJ0UNkr4ATgX8pRgOEA8Lo20Q73t5KZUe2b_pWA1XZal2yUJin53XrS_ozXlN2btRw4rbVVvAz9M5aLVXLg5VmHBYV0_86Fz2SdaKvOa017PDiN1JgvZHjXwLva6baxvBEpVj1a8e7Tw68AhOo8IEmRycDuCWN1mrLp_Z-C9XTIqqPrnrOFx9__nfSpcrb23ZF7Ak5kEPUE5Tp7JLPTFVlQpS99p4mbTZ26atey8cw439aO7uVopemFk8n2rfk_SHFSlIlPESkbjpYH6Oz8h53T6Q2UqiQLda2AYmX1qoJGEZbnAw65PdHHstK0PNX27bDry31zUD5CPOO7X76Q6_G6R91yqrWvu_Gq_N9moBIictsdVWxyb3dhKXIv3aMoBZkkurvfT8HDbS4lNsvNtqStJ5HWflnd5iCGbitMkD4LRl2zPmbnrvH5ItCFHvUhEeLsVQB_GYOsyyC6x264JizBI2vu9pPKT5Ch0Mc8zNsX7fYlOOgBTjdf15AaRV7sR2zqTSvFCuaeEr9RJAlmrnFjIfzBccEnnNWxunbT2Wo-4YKgnn2wLLX1wPr73iJpYVB6oUyiADJNtStVmlERDhaXoimPDieV8k4xfZrYIAA**&state=12345&session_state=fdb2c5b8-a316-4646-99e9-c16c329aed5a
14. From ExtremeControl, select the service configuration to view the code, the authentication code is similar to the example.

Verification

1. Enroll the device with Microsoft Intune.
2. Connect to test SSID, and wait for the resynchronization poll to occur.
3. Verify the end system in ExtremeControl displays the device information from Intune.

Policy Configuration

To support the previous workflow, the device in unregistered state must use HTTPS to communicate with the Intune server and the Apple Push service with Apple.

Some configurations require downloading an agent to be registered by Intune, so Google Play and Apple App Store access must be provided. If this is the case, policies must be adapted to provide connectivity to the agent.

The following policies (or more generic ones) are needed to allow Intune registration:

1. Allow HTTPS to Microsoft Intune network.
2. Allow TCP 5223 to 17.0.0.0/8:TCP:5223, Apple Push service.
3. Allow TCP/UDP 5228 to 173.194.0.0/16, Google Play login.
4. Allow HTTPS to 74.125.0.0/16, Google Play Downloads.

Google G Suite

Combining the ExtremeControl solution with Google's G Suite helps network and security administrators ensure that only registered Chrome OS devices are able to use the network and its resources. The solution also pulls extensive device data from G Suite and updates the end-systems in ExtremeControl to provide network administrators with a unique view of Chrome OS data within a single management interface.

The solution currently only support Chrome OS devices.

Module Configuration

The table below lists the configuration options for the Google GSuite agent.

Configuration Option	Description
Service Account ID:	Email address of the service account to use for authentication. You can find your service account ID within your Google API Manager project (https://console.developers.google.com/projectselector/apis/credentials?pli=1) where you configured/created your service account when you go into the account details. Example: gsuiteserviceaccount2@extreme-gsuite-test.iam.gserviceaccount.com
Service Account User:	Email address of a user account from your G Suite account / domain. This is used for Connect to know to which domain to connect to. Example: kurt@extremetest.net

Service Configuration

The table below lists the configuration options for the Google GSuite server.

Configuration Option	Description
Poll interval:	The time (in seconds) the module will wait after each run. For example, if you want to run the synchronization one time per hour you can configure '3600' here.
Default end-system group for all devices from G Suite:	The default end-system group name where we assign all G Suite devices to in ExtremeControl. If you don't want end-systems from G Suite to be assigned to this default group, configure a group name which doesn't exist in ExtremeControl or disable the group assignment feature on the "Extreme Control" module. Default: Chrome Devices
Format of the incoming data for devices from G Suite:	Format of the data that gets stored in the custom data field. You can choose and combine any of the available variables: nwAdapterType, mac, annotatedAssetId, annotatedLocation, annotatedUser, recentUsers, currentUser, deviceId, etag, firmwareVersion, kind, lastEnrollmentTime, lastSync, model, notes, orderNumber, orgUnitPath, osVersion, platformVersion, serialNumber, status, supportEndDate, willAutoRenew. But be aware that G Suite might update the "lastSync" and "lastEnrollmentTime" values for each device very regularly and Connect is calling ExtremeCloud IQ Site Engine's API to refresh that value in all end-systems custom fields. Depeding on your poll interval this might put a lot of stress onto the ExtremeCloud IQ Site Engine server and it is thus recommended to _NOT_ use these variables in large environments. It should only be used if the poll interval is very low (like a few times per day) and the number of end-systems isn't too high (below 1000). Default: user=#currentUser#, recentUsers=#recentUsers#, annotatedUser=#annotatedUser#, adapterType=#nwAdapterType#; OS=#osVersion#, firmware=#firmwareVersion#
End-system group for decommissioned devices:	The default end-system group for devices which existed in G Suite but have been deleted. If you want to explicitly identify those devices and even authorize them differently (since they are no longer managed by G Suite anymore and that could pose a threat) you can configure the group they should automatically be moved to here and enable the corresponding feature below. Make sure you manually create this end-system group in ExtremeControl.

Configuration Option	Description
Remove device from other groups on decommission:	Enable this to move devices which have been deleted from G Suite to the ExtremeControl end-system group configured by the corresponding option above. If disabled, devices won't be automatically move to this group but rather stay with their existing group membership(s). Default: false
Delete custom data in EMC for decommissioned devices:	If a device is deleted in G Suite the end-system's custom data field in ExtremeCloud IQ Site Engine will be cleared as well. On the one hand this will keep your data clean in ExtremeControl, but it can also be helpful to see the (old) G Suite data for those end-systems which were managed by G Suite. Default: false
Overwrite the existing username with the one acquired from G Suite:	If set to "true" the username for devices retrieved from G Suite will overwrite the username which is already in ExtremeControl. If no username could be retrieved from G Suite for a given end-system, then no change is performed in ExtremeControl. Be aware that this might mess up existing NAC processes if you are already retrieving and using the username through some other mechanism like 802.1X or Kerberos snooping --> this will be overwritten! Default: false

Google APIs

You will need to create a service account in the Google APIs management site: https://console.developers.google.com

That service account provides Connect with a credentials that enables it to authenticate and authorize against the Google Admin SDK that is used to pull data from your G Suite domain.

1. Access the API Console Credentials page: https://console.developers.google.com/project/_ /apis/credentials
2. Select your project (or create a new one) from the drop-down list.
3. On the Credentials page, select the Create credentials drop-down, then select Service account key.
4. From the Service account drop-down, select an existing service account or create a new one.
5. For Key type, select the P12 key option, then select Create. The file automatically downloads to your computer.
6. Rename the downloaded credentials file to “gSuiteCredentials.p12“ and copy it to your ExtremeCloud IQ Site Engine server (using WinSCP for example) to this location `/usr/local/Extreme_Networks/NetSight/wildfly/standalone/configuration/connect/gSuiteCredentials.p12`
7. Go into the details on your newly created Credentials and note down the “Client-ID” (number) [Symbol] this will be needed later on to authorize these credentials on your G Suite domain

Google Admin

If not already done, create a Google G Suite account and connect it with your domain. For test accounts, use: https://gsuite.google.com/signup/basic/welcome.

You will need to authorize the Extreme Connect application to provide it with access to your domain and two scopes. The basic process is described at https://developers.google.com/identity/protocols/OAuth2ServiceAccount?#delegatingauthority

To delegate domain-wide authority to a service account, first enable domain-wide delegation for an existing service account in the Service accounts page (https://console.developers.google.com/permissions /serviceaccounts) or create a new service

account (https://developers.google.com/identity/protocols/OAuth2ServiceAccount?#creatinganaccount) with domain-wide delegation enabled.

Then, an administrator of the G Suite domain must complete the following steps:

1. Access the G Suite domain's Admin console.
2. Select Security from the list of controls. If you don't see Security listed, select More controls from the gray bar at the bottom of the page, then select Security from the list of controls. If you can't see the controls, make sure you're signed in as an administrator for the domain.
3. Select Show more and then Advanced settings from the list of options.
4. Select Manage API client access in the Authentication section.
5. In the Client Name field, enter the service account's Client ID. You can find your service account's client ID in the Service accounts page.
6. In the One or More API Scopes field, enter the list of scopes that your application should be granted access.
7. Enter these two scopes for the API client that you authorize for Connect: https://www.googleapis.com/auth/admin.directory.device.chromeos, https://www.googleapis.com/auth/admin.directory.user.readonly

   The first one enables Connect to view and manage your Chrome OS devices' metadata, and the second one enables Connect to view users on your domain.
8. Select Authorize.
9. Remember to enable "domain-wide authority delegation" as described in the link above.

User Privileges

Ensure that the configured user is configured to have at least the privileges to manage Chrome OS devices as shown below. This privilege is needed to retrieve data on Chrome OS devices.

Verification

You should verify that data from all devices managed by G Suite is imported to ExtremeControl. Navigate to the end-system table under the "Connect" tab and display the custom data field which you have configured for the G Suite module. You might need to make the corresponding column visible first. If you enabled the corresponding features you should also see the username retrieved from G Suite.

You can also verify whether all devices managed by G Suite have been assigned to configured end-system group in ExtremeControl (if you created such a group and configured it within the "G Suite" module).

Deleting G Suite Devices

To test this workflow, simply "de-provision" a device from G Suite and wait for the next Connect synchronization. Then verify that

1. This device's custom field has been emptied (if this feature has been enabled in the config file).
2. This device is now member of the ExtremeControl end-system group for decommissioned devices (if this feature has been enabled).
3. This device does not appear in the end-system list that is displayed at the bottom of the Connect management web site (tab: G Suite). This means that the device has been deleted in the internal list as well.

Microsoft System Center Virtual Machine Manager (SCVMM)

The SCVMM integration offers provisioning of virtual machines into ExtremeControl end-system groups based on the virtual interfaces to which each VM is connected. Data within ExtremeCloud IQ Site Engine is enriched for each end-system and conversely made available within SCVMM. The VMM is a central Microsoft server that enables management of multiple Hyper-V servers from one console.

Note: The SCVMM server requires an adapter agent to be installed and configured prior to enabling the corresponding module within Extreme Connect. The adapter file is provided by Extreme Networks.

Module Configuration

The table below describes the configuration options available for the SCVMM OFConnect module (config file: SCVMMHandler.xml)

Service Configuration	Description
ADapter IP	IP Address of the Virtual Machine Manager adapter.
Adapter Port	Port where the Virtual Machine Manager adapter is listening on.
Pre-Shared Key	The pre-shared key used to communicate with the SCVMM adapter.

General Module Configuration	
Poll interval in seconds	Number of seconds between connections to the adapter running on the SCVMM server.
Module loglevel	Verbosity of the module. Logs are stored in ExtremeCloud IQ Site Engine's server.log file.
Module enabled	Whether or not the module is enabled.
Push update to remote service	If this is set to "true", data from other modules will be pushed to the service.
Update local data from remote service	If this is set to "true", data from the remote service will be used to update the internal end-system table.
Default end-system group	The default end-system group name to use if it is not set dynamically.
Enable Data Persistence	Enabling this option will force the module to store end-system, end-system group and VLAN data to a file after each cycle. If this option is disabled, the module will forget all data after a service restart, but in order to clean already existing data, the corresponding .dat files have to be deleted.

Service Specific Configuration	
Custom field to use	The custom field within ExtremeCloud IQ Site Engine to update the information for end-systems retrieved from the adapter running on the SCVMM server (valid values: 1-4).
Outgoing data format	The format of the ExtremeCloud IQ Site Engine data (like last seen time, switch IP, switch port, etc.) that is written to the description fields of the VMs within the SCVMM management console. You can customize the appearance and what information you want to include/exclude from there.
Format of the incoming data	The format of the data that is received from the adapter running on the SCVMM server and written to the custom field.
Use network name as end-system group	If this is set to true, the name of the portgroup /network will be used as the name for the end-system group (Note: Only data before the first _ will be used).

Adapter Installation

OFConnect is retrieving and setting datato/from a Virtual Machine Manager (VMM) server using an adapter. This adapter needs to be installed and configured prior to enabling the corresponding module within OFConnect. The adapter consists of a Java executable file (.jar) and a configuration file. To install the adapter:

1. Install the latest Java Runtime Environment, .NET framework and Windows Powershell 2.0 on the SCVMM server.
2. Acquire the file “Datacenter Manager SCVMM Adapter.zip” from GTAC or by contacting your local Extreme representative.
3. Copy the executable jar file (DCM_SCVMM_ADAPTER_<version>.jar) and the configuration file (DCM_ SCVMM_ADAPTER.config) into a separate directory created under “Program Files/Extreme Networks/SCVMM Adapter” directly on the SCVMM server.
4. Edit the configuration file according to your environment. The configuration file contains an explanation of all settings and you can also find them listed below.
5. Save and close the configuration file.
6. Start the adapter manually first by opening a cmd shell or Powershell, navigate into the installation directory and use the following command: java –jar DCM_SCVMM_ADAPTER_<version>.jar.
7. Check the log file to validate proper functionality.
8. Check the end-system list in ExtremeControl to see data for the SCVMM virtual machines coming into the custom column you’ve configured within the SCVMMHandler.xml config file.
9. After you have successfully verified the integration, ensure that the DCM_ SCVMM _ADAPTER_ <version>.jar file is getting started on Windows server startup automatically. Stop the adapter currently running within the cmd/Powershell window, configure the auto-start for the .jar file (this depends on your Windows Server version) and restart your SCVMM server when appropriate in order to test the auto-start of the .jar file (you should see a java process running in the process tree).

Adapter Configuration

The table below lists the configuration options for the SCVMM agent.

Configuration Option	Description
LOG_LEVEL	Set the log level of the adapter to one of the following values: ERROR, WARN or DEBUG. If not set, the default will be WARN.
IP	IP address for the web service (=agent) to listen on
PORT	TCP Port for the web service to listen on - must NOT be used by any other application on this server!
SCVMM_DLL	Location (path + file name) of Microsoft.SystemCenter.VirtualMachineManager.dll Example: C:\Program Files\Microsoft System Center Virtual Machine Manager 2008 R2\bin\Microsoft.SystemCenter.VirtualMachineManager.dll
PRE_SHARED_KEY	The pre-shared key used for the communication between the adapter and OFConnect. This must match the key entered when installing the OFConnect SCVMM module.
IS_PRE_SHARED_KEY_ENCRYPTED	If set to “false” the adapter assumes that the 'PRE_SHARED_KEY' configured above is not encrypted - on the first start the adapter will automatically encrypt the key and set this value to “true”. To change this key at a later stage, change the key above, set this value back to “false” and restart the adapter service
SCVMM_SERVER	The DNS name of the Virtual Machine Manager server to connect to. So far this has only been tested with this adapter and the VMM server running on the same server although remote connections might work as well.

Verification

Within the SCVMM management console, add the description field/column to the overview list of all VMs. You should see network related information retrieved from ExtremeCloud IQ Site Engine/ExtremeControl within this column as well as additional data from SCVMM within the end-system list in ExtremeControl.

Microsoft Hyper-V

The Hyper-V integration offers provisioning of virtual machines into ExtremeControl end-system groups based on the virtual interfaces to which each VM is connected. Data within Access Control engine is enriched for each end-system and conversely made available within Hyper-V. When integrating with multiple Hyper-V servers you can either add each of those servers as a new entry within this module’s config (list of services/agents to connect to) or use the integration with System Center Virtual Machine Manager.

Note: The Hyper-V server requires an adapter agent to be installed and configured prior to enabling the corresponding module within Extreme Connect. The adapter file is provided by Extreme Networks.

Module Configuration

The table below describes the configuration options available for the Hyper-V OFConnect module (config file: HyperVHandler.xml)

Service Configuration	Description
Adapter IP	IP Address of the Hyper-V adapter.

Service Configuration	Description
Adapter Port	Port where the Hyper-V adapter is listening on.
Pre-Shared Key	The pre-shared key used to communicate with the Hyper-V adapter.

General Module Configuration	
Poll Interval in seconds	Number of seconds between connections to the adapter running on the Hyper-V server.
Module loglevel	Verbosity of the module. Logs are stored in ExtremeControl engine's server.log file.
Module Enabled	Whether or not the module is enabled.
Push update to remote service	If this is set to “true”, data from other modules will be pushed to the service.
Update local data from remote service	If this is set to “true”, data from the remote service will be used to update the internal end-system table.
Default end-system group	The default end-system group name to use if it is not set dynamically.
Enable Data Persistence	Enabling this option will force the module to store end-system, end-system group and VLAN data to a file after each cycle. If this option is disabled, the module will forget all data after a service restart, but in order to clean already existing data, the corresponding .dat files have to be deleted.

Service Specific Configuration	
Custom field to use	The custom field within ExtremeControl engine to update the information for end-systems retrieved from the adapter running on the Hyper-V server (valid values: 1-4).
Outgoing data format	The format of the ExtremeControl engine data (like last seen time, switch IP, switch port, etc.) that is written to the description fields of the VMs within the Hyper-V management console. You can customize the appearance and what information you want to include/exclude from there.
Format of the incoming data	The format of the data that is received from the adapter running on the Hyper-V server and written to the custom field.
Use network name as end-system group	If this is set to “true”, the name of the portgroup /network will be used as the name for the end-system group (Note: Only data before the first _ will be used).

Adapter Installation

Connect retrieves and sets data from and to a Hyper-V server using an adapter. This adapter needs to be installed and configured prior to enabling the corresponding module within ExtremeCloud IQ Site Engine. The adapter consists of a Java executable file (.jar) and a configuration file and uses a Powershell module as a prerequisite. To install the adapter manually:

1. The adapter utilizes a Powershell module that needs to be downloaded and installed prior to installing the adapter. Download the module here: http://pshyperv.codeplex.com/releases/view/62842#DownloadId=219013
2. Right-click the zip file and UNBLOCK.
3. Copy the zip file to the following location: C:\Windows\System32\WindowsPowerShell\v1.0\Modules
4. Unzip and install the HyperV module using the “install.cmd” file.
5. Bring up Powershell and enter "Set-ExecutionPolicy Unrestricted"

6. Run the command “Import-Module HyperV” and make sure that no errors occur. If this doesn’t load the module you can insert the folder “<folderwhereyouunzippedthedownloadedfile>\Hyper-V” into your PATH environment variable so Windows knows from where to load the module.
7. As a final test run “get-command -module HyperV” and check if this prints out the available Hyper-V commands.
8. Install the latest Java Runtime Environment.
9. Create a dedicated folder (example: “C:\Program Files\Extreme Networks\HyperV Adapter”) and copy the two files (DCM_HYPERV_ADAPTER_<version>.jar and DCM_HYPERV_ADAPTER.config) into it
10. Edit the configuration file DCM_HYPERV_ADAPTER.config according to your environment.
11. You are now ready to start the adapter by double-clicking the file DCM_HYPERV_ADAPTER.jar or running it within a shell using “java –jar DCM_HYPERV_ADAPTER.jar”. Verify the log file that should have been created in the same folder where the jar file is located. The adapter is automatically started when the Windows Server starts up.
12. Repeat these steps on all Hyper-V servers that you want to integrate with ExtremeCloud IQ Site Engine.

Adapter Configuration

The table below lists the configuration options for the Hyper-V agent.

Configuration Option	Description
LOG_LEVEL	Set the log level of the adapter to one of the following values: ERROR, WARN or DEBUG. If not set, the default will be WARN.
IP	IP address for the web service (=agent) to listen on.
PORT	TCP Port for the web service to listen on - must NOT be used by any other application on this server.
PRE_SHARED_ KEY	The pre-shared key used for the communication between the adapter and OFConnect. This must match the key entered when installing the OFConnect Hyper-V module.
IS_PRE_ SHARED_KEY_ ENCRYPTED	If set to 'false' the adapter assumes that the 'PRE_SHARED_KEY' configured above is not encrypted - on the first start the adapter will automatically encrypt the key and set this value to 'true'. If you want to change this key at a later stage, change the key above, set this value back to 'false' and restart the adapter service.

Verification

Within the Hyper-V management console, select a virtual machine. You should see the corresponding data from ExtremeCloud IQ Site Engine in the “Notes” field on the bottom of the page.

VMware vSphere

The Vmware vSphere integration offers provisioning of virtual machines in the network as well as automating the creation of virtual networks based on end-system access groups. In addition, data within ExtremeCloud IQ Site Engine is enriched for each end-system and conversely made available within vSphere.

Module Configuration

Configuration Option	Description
Username	Username used to connect to the vSphere web service. Read/Write/Execute permissions required.
Password	Password used to connect to the vSphere web service.
VMware Webservice URL	Web service URL of the VMware vSphere server.
Module enabled	Enables and Disables Module.

- Outgoing data format: The format of the Extreme Control data (like last seen time, switch IP, switch port, etc.) that is written to the description fields of the VMs within VMware or XEN. You can customize the appearance and what information you want to include/exclude from there. Hint: For the VMware vSphere client the annotation field is limited in size. The default outgoing format is very close to the maximum string length for this field. If you want to add additional information to this field consider replacing it with some of the existing default value.
- Format of the incoming data: The format of the data that is coming from VMware or XEN and that is written to the custom field.
- Create Private VLAN Entries: If set to false, the Datacenter manager will not automatically create any pVLAN entries on dvSwitches even if you configured any. This feature is disabled per default and needs to be enabled manually if needed.
- Create Portgroups from End-system Groups: If set to true, the Datacenter manager will automatically create new portgroups within VMware based on the Extreme ExtremeControl engine end-system groups and your other configuration.
- Update Portgroup VLAN IDs: Only useful if the setting above is set to true. If you change the "vlan=XXXX" value within an end-system group this setting will automatically also change your portgroup VLAN IDs accordingly.
- Use Global End-system Groups: Only if this is set to true, the VMware module will have access to the global end-system groups that are provided by the Extreme Control module within the main module. This is necessary if you want to automatically create portgroups based on ExtremeControl end-system groups.
- Enable NAC Plugin: Using this option, the automatic ExtremeControl engine Plugin Extension registration can be disabled.
- NAC Plugin URL: The URL of the configuration file for the Extreme Datacenter manager plugin for VMware. This is used by vCenter server to tell any connecting vCenter clients from where to download the Extreme plugin.
- Enable Custom Attributes: En-/Disables the creation and updates of Custom Attributes for vCenter Servers.
- Custom Attributes Data Format: This text field enables the configuration of Custom Attributes for vCenter Servers. Connect will create and update these attributes for each VM and enable for searching and sorting for this data within vCenter. Each attribute has to be configured on a single line and follow the format: NAME=VALUE where NAME is the name of the Custom Attribute and VALUE is a free text that can utilize all variables that are available in the "Outgoing data format" option. If a VM should use more than one network interface, the data for each variable is presented as "NIC1DATA/NIC2DATA/...".

- Deletion Group: Name of the portgroup that a VM will be redirected to if it's current endsystem group is deleted.
- Port Group Import: Enables the automatic creation of endsystemgroups in Extreme Control based on port groups. The port group name will be used for the endsystem group. Be aware that the delimiter also applies here. In the default configuration, the text after the last delimiter will be truncated from the name.
  i.e. MyPortGroup_VLAN1_dvSwitch0 will be imported as MyPortGroup_VLAN1 in Extreme Control. VLAN IDs will be updated if they change.
- Automatic Enforce after import: Enables the automatic enforcement of all appliances and the policy domain (only for extended import) if a portgroup was imported.
- Extended PortGroup Import: Also creates an ExtremeControl Configuration and policy profiles during PortGroup Import. Requires the options for ExtremeControl Configuration, Policy Domain and Forward as Tagged also to be defined. Be aware that the truncated port group name will also be used as the VLAN name and must adhere to naming limitations.
- Enable PortGroup Import Removal: Delete the ExtremeControl Configuration and/or End-System Group if the portgroup is deleted.

Stop then start the ExtremeCloud IQ Site Engine services (refer to Extreme Connect Installation section for instructions).

Verification

Within the vSphere Client, select a virtual machine and then on the “Summary” tab on the right side. At the bottom of this tab there should be an annotations field that should contain the corresponding data from ExtremeCloud IQ Site Engine (for example, information on the switch port and switch IP to which this VM is physically connected).

VMware View

The integration of VMware View does not require any special tool or software to integrate. The virtual desktops need to be configured to use 802.1x and users have to use the View Client to access those desktops via PCoIP in order to enable user-based authentication. Any Extreme switch with a reasonable amount of multi-user authentication capacity is suitable to authenticate each virtual desktop individually and apply a policy based on the username.

In addition to that, standard Extreme Connect operation can be used to provision a ExtremeControl rule for the connected portgroup of each VM, if user authentication via 802.1x is not available.

See the VMware View VDI documentation for further information regarding the setup procedure.

ExtremeConnect Security Configuration

[ExtremeXOS/Switch Engine Identity Manager]

[ExtremeXOS/Switch Engine Configuration]

Fortinet FortiGate

iBoss Web Security

Lightspeed Rocket Web Filter

McAfee ePO

Palo Alto Networks

Distributed IPS

Check Point User ID

ExtremeXOS/Switch Engine Identity Manager

The ExtremeXOS/Switch Engine Identity Manager solution provides the network administrator with end-system visibility in Mobile IAM. This visibility will give insight on who, when, and where the user is connected to the network.

Module Configuration

Configuration Parameter	Value
Server	< IP Address(es)of ExtremeControl Engine(s)> (semi-colon delimited)
Password	< ExtremeControl Engine Shared Secret > (default is ETS_TAG_SHARED_SECRET)
Module Enabled	True

ExtremeCloud IQ Site Engine NAC Manager Configuration

1. Using a web browser access the ExtremeCloud IQ Site Engine launch page at the following URL: http://<ExtremeCloud IQ Site Engine Server IP>:8080
2. Select “NAC Manager” to launch the NAV Manager application and login using an ExtremeCloud IQ Site Engineadministrator credential.
3. Select the “Switches” tab and select “Add Switch”.
4. If the ExtremeXOS/Switch Engine switch has not previously been added as a device in the ExtremeCloud IQ Site Engine Console, select “Add Switch”. Otherwise go to step 8.
5. In the “Add Device” window enter IP address of switch and select a SNMP profile from the drop down list, or create a new profile by selecting “New” if needed. Enter a nickname for the device (optional) then select “OK”.
6. From the device list select the switch and using the drop-down list, select a primary NAC gateway for the switch, set “Gateway RADIUS Attributes to Send” to “Extreme Netlogin – VLAN ID” and ‘RADIUS Accounting’ to ‘Enabled”. Leave remaining configurations set to their default setting. Select “OK”.
7. Select the “Enforce All” icon to open the “ExtremeControl Engine Enforce” window.
8. Select the configured ExtremeControl Engine from the list and select “Enforce”.
9. When enforce is finished select “Close” to close the window
   Note: ExtremeControl configurations are used to manage end user connection experience and can

control network access based on authentication, time and location. The following section is a basic sample configuration that will authenticate all devices and place them in the same VLAN for devices connected to the switch. Production configuration should be customized based on business needs and security requirements. Refer to ExtremeCloud IQ Site Engine ExtremeControl User's Guide for additional information on creating custom rules.

10. Select the "Configuration" tab and select "NAC Configuration: Default"
11. In the "NAC Configuration: Default" window select the "Add new rule" icon
12. Enter a name for the rule, then using the pull down menu Select "MAC" for Authentication Method.
13. Using the pull down menu Select "New" to create a new location group.
14. In the "Add Location Group" window enter a Name for the location group then select the "Add Item" icon
15. In the "Add Location Entry" window enter an entry description and select the switch using the selection button . Leave "Interface" to "Any" (all ports), then select OK.
16. Select OK to close the "Add Location Group" window, then select OK to close the "Edit Rule" window. Note: The newly created rule displays in the ordered list of rules. If needed, move the rule up or down the list. Rules will be applied to an end-system based on the first rule it matches.
17. Select OK to close the "NAC Configuration" window.
18. Select the "Enforce All" icon to open the "ExtremeControl Engine Encorce" window.
19. Select the configured ExtremeControl engine from the list and select "Enforce".

ExtremeXOS/Switch Engine Configuration

Specific Network Login, IDM related and XML Notification Client configurations are required on the ExtremeXOS/Switch Engine switch. Identity Management with ExtremeXOS/Switch Engine and ExtremeCloud IQ Site Engine/NAC use only a subset of ExtremeXOS/Switch Engine IDM features. These features including Kerberos and LLDP identity detection. ExtremeXOS/Switch Engine FDB, IPARP, IPSecurity DHCP Snooping and Netlogin detection methods are not used.

Note: SSH module must be installed on the ExtremeXOS/Switch Engine switch to use the XML notification feature on HTTPS. If the SSH module is not currently installed you must first download and install the separate Extreme Networks SSH software. When the SSH module is installed, a server certificate is created that the HTTPS server can use.

Refer to Secure Socket Layer section of the ExtremeXOS/Switch Engine Concepts Guide for configuration guidelines of the HTTP server and to generate the secure certificate on the ExtremeXOS/Switch Engine switch.

RADIUS Netlogin Configuration

1. Set the ExtremeControl engine server as the primary RADIUS server and configure the shared-secret. Shared-secret must match shared-secret configured on the ExtremeControl engine for this device.

   a. configure radius netlogin primary server <ExtremeControl IP> client-ip <switch IP address> vr <vr>
   b. configure radius netlogin primary shared-secret <shared secret>
2. Configure ExtremeCloud IQ Site Engine server as the primary RADIUS server and shared-secret for netlogin. Shared-secret must match shared-secret configured on ExtremeCloud IQ Site Engine for this device.
   a. configure radius-accounting netlogin primary server <NAC IP> client-ip <switch IP address> vr <vr>
   b. configure radius-accounting netlogin primary shared-secret <shared secret>
3. Enable RADIUS and RADIUS accounting on switch
   a. enable radius netlogin
   b. enable radius-accounting netlogin

Network Login (Netlogin) Configuration

1. Create authentication vlan required for netlogin and configure it the netlogin authentication vlan.
   a. create vlan nvlan
   b. configure netlogin vlan nvlan
2. Enable MAC-based netlogin on the switch and on the edge ports where users and devices will connect.
   a. enable netlogin mac
   b. enable netlogin ports <ports> mac
3. Configure the netlogin port mode for MAC-based vlan. This enables support for devices on the netlogin same port to be assigned to different vlans using MAC-based vlans.
   a. configure netlogin ports <ports> mode mac-based-vlans
4. Configure netlogin to accept and authenticate all client MAC addresses. Only MAC addresses that have a match are sent for authentication and the “default” authenticates all MAC addresses.
   a. configure netlogin add mac-list default

Identity Management Configuration

1. Enable Identity Management on switch and add edge ports where users and end system devices will connect.
   a. enable identity-management
   b. configure identiy-management add ports <ports>
2. Disable the identity-management detection methods that are not used on the edge ports where users and end system devices will connect.
   a. configure identity-management detection off fdb ports <ports>
   b. configure identity-management detection off iparp ports <ports>

c. configure identity-management detection off ipsecurity ports <ports>

d. configure identity-management detection off netlogin ports <ports>

LLDP Configuration

Enable LLDP on the edge ports where users and end system devices will connect.

a. enable lldp ports <ports>

XML Notification Configuration

The ExtremeXOS/Switch Engine XML Notification feature is used to send IDM events to ExtremeCloud IQ Site Engine server.

1. Create and configure a XML notification target.
    a. Create xml-notification target
    b. create xml-notification target ExtremeCloud IQ Site Engine url https://<ExtremeCloud IQ Site Engine IP>:8443/fusion_jboss/XosIDM vr <VR>
2. Configure credentials that XML notification will use to access the web services on ExtremeCloud IQ Site Engine. (After entering the command you will be prompted for password)
    a. configure xml-notification target ExtremeCloud IQ Site Engine user <ExtremeCloud IQ Site Engine admin username>
3. Add ExtremeXOS/Switch Engine IDM module (idMgr) to the XML notification target in order to receive events from IDM and send them to the configured url (ExtremeCloud IQ Site Engine server web service)
    a. configure xml-notification target ExtremeCloud IQ Site Engine add idMgr
4. Enable the XML notification target.

Verification

Verify that the configuration is complete by connecting a domain client or LLDP-enabled device to the switch. The device should be identified by ExtremeCloud IQ Site Engine MAC manager and displayed End-System view in NAC managers and in Oneview.

Fortinet FortiGate

The Fortinet FortiGate integration provides a single sign-on solution and network access to end-systems by updating the FortiGate local user table and the use of RADIUS accounting.

Module Configuration

For the sso-Attribute key, profile is the default value. This field must match with the value set in the FortiGate CLI

FortiGate RADIUS server name: add the value configured for RADIUS server

Configuration Option	Description
FortiGate IP address	IP address or FQDN of the FortiGate firewall. Destination IP address of radius accounting packages.
RADIUS shared secret	Shared Secret for RADIUS communication from ExtremeCloud IQ Site Engine to FortiGate.
SSO Attribute Key	RADIUS attribute key (default value: profile).
ExtremeControl appliance	IP address of the Access Control Engine that sends accounting to the FortiGate IP address. This value is optional.

Extreme Control Configuration

1. Using a web browser access the ExtremeCloud IQ Site Engine launch page at the following URL: http://<ExtremeCloud IQ Site Engine Server IP>:8443
2. Navigate to Control → Access Control → Configurations → Profiles to open the list of NAC profiles.
3. Create a profile you want to match to the firewall to group users.
4. The RADIUS attribute Value references the RADIUS User Group. The group is defined by the NAC Profile.
5. Connect to the FortiGate interface.
6. Navigate to System → Network → interfaces. Enable "Listen for radius accounting messages"
7. Navigate to System → Feature Visibility → Security Features. Enable "Endpoint Control".
8. Go to User & Device → Authentication → RADIUS Server.
9. Create a new server and add Extreme Control server as RADIUS Server.
10. Enter the IP address and Shared Secret.
11. Check the Include in every user group box.
12. Select Single Sign-on. Add an RSSO_AGENT type RADIUS SSO.
13. Go to Authentication → Single Sign-on and create a new agent.
14. Check on the web interface that the RADIUS Server is configured correctly.
15. Configure RSSO_AGENT through the CLI.
16. For RADIUS attributes expected by the FortiGate firewall, modify the default values for the attributes required by the Connect module: Execute "config user radius" and "get RSSO\ Agent", check that "sso-attribute-key" has value profile and "rsso-endpoint-attribute" has value User-Name.
17. In User & Device → User → User Group, create a User Group.

iBoss Web Security

The iBoss integration provides a single sign-on solution and web content filtering capabilities based on the end system's active directory membership and network location.

Module Configuration

Configuration Options	Description
Server	IP address of the iBoss appliance
Port	iBoss web service port, default is 8015
Password	iBoss authentication key
Delimiter	Delimiter used to specify a location in the Mobile IAM rule name
Max calls	Maximum calls to iBoss appliance per second, default is 5
Max threads	Maximum active processes/calls to the iBoss appliance, default is 8
Strip username	Remove Windows or email domain from the username
Module enabled	True

This section details the steps necessary to install, configure, and test integration between Active Directory, iBoss, and Mobile IAM in a hypothetical K-12 educational environment.

The installer must have technical understanding of the Extreme Networks Mobile IAM solution and the skills required to implement a typical LDAP-integrated deployment of Mobile IAM.

Integration of iBoss and Mobile IAM is accomplished by:

1. Defining needed user groups in Active Directory
2. Defining the various locations requiring differentiated access
3. Configuration of the iBoss appliance
4. Installation and configuration of the Extreme Connect Integration services
5. Configuration of NAC

Defining Groups in Active Directory

When considering an integration project, first determine the various user populations for which you want to define access, and then place those populations into separate AD groups.

Defining Locations

When you have determined the various end user populations and created/populated the AD groups, next determine what locations require differentiated access for each group.

Listing this location information by user group in a table is most helpful for visualization. Example of listing location by user group in the table below:

AD Group	Location
All Students	Instructional Areas
All Students	Cafeteria
All Students	Gym
All Staff	Instructional Areas
All Staff	Everywhere Else

Configuring the iBoss Appliance

There are three areas to configure on the iBoss appliance to integrate with Active Directory and Mobile IAM beyond the standard configuration needed for standard iBoss operation.

Part A – Configure LDAP Settings

1. Open a web browser and go to https://<IP address of appliance > to present the appliance logon screen. Provide the necessary credentials and select the 'Login' button.
2. Select 'LDAP Settings' under Network Settings to configure the Active Directory settings. The LDAP settings page is divided into three sections. The top section contains global settings for the appliance. The default settings should work fine and do not need to be edited.
3. The middle section of this page is where you define the AD domain controller iBoss will use by specifying the LDAP parameters required for communication to that domain controller. Complete this section and then select the 'Add' button to save the server definition.
4. Select 'Done' to save the changes and complete the LDAP configuration.

Part B – Configure AD Plugin

1. Select the 'AD Plugin' screen from the home page.
2. Navigate to the bottom half of the screen where it says 'Registered AD Servers/NAC Agents'. In this screen, add a description of the ExtremeCloud IQ Site Engine server and its IP address so the iBoss server will listen to updates sent by the NAC servers.
3. The default settings can be used for Filtering Group and subnets unless told differently by support. When these settings are saved, this section is complete.

Part C – Configure Filters

A filter group is a set of network controls that define what website content categories, programs, QoS settings, and more are allowed or not allowed to pass through the engine for a given connection. Filter groups are applied to end system traffic on an individual basis.

1. Access the Filter Group definition pageby selecting 'Users' in the navigation menu on the left hand side of the page, then select the 'Groups' submenu link. There are five pages of definitions available for defining filter groups and each page section contains five filter group definitions, for a total of 25 available filter groups.
   Note: Filter group #1 is the default filter group and should remain unchanged.
2. Define a filter group for each AD Group/Location combination by specifying a name for each filter group using the format ADGroupName@Location. The @ symbol acts as a delimiter, so iBoss can separate the AD group name from the location name. The specified group name must be identical to the name of AD group as specified in Active Directory, and the location must be identical to the location name as defined in NAC. Spaces are allowed in both the AD group name and the name of the location.
3. Define the three AD group/location combinations for students. As there are only five filter group definitions on each page, each page of definitions must be saved separately before moving on to the next page.

4. When you have defined the first five filters, select the 'Save' button at the bottom of the page to save changes. Navigate to the next page of filter group definitions by selecting the arrow to the left of the drop-down list at the top of the page.
5. Add the remaining student group/location definition.
6. When this definition is added, be certain to select the 'Save' button at the bottom of the page to save your changes.

Configuration of NAC

The final step in configuring the integration of iBoss and Mobile IAM is to create the location definitions, set up NAC for Active Directory access via LDAP, and configure access rules for each AD group/location combination.

Recall our example table of groups and locations from Defining Locations:

AD Group	Location
All Students	Instructional Areas
All Students	Cafeteria
All Students	Gym
All Staff	Instructional Areas
All Staff	Everywhere Else

The first step is to create an LDAP user group in NAC to represent each AD group used for assigning access. Next create locations in NAC to represent the locations listed.

For this exercise we will create three NAC locations: Cafeteria, Gym, and Instructional Areas. We will not need a specific NAC location for everywhere else but instead will create a general rule to assign access for those end systems.

The name of the rule is significant and must be specified using this particular syntax. Name the rule by putting the AD group name this rule refers to on the left side of the "@" symbol, and the location this rule applies to on the right side. Since this rule applies to All Students in the Instructional Areas location, the rule name becomes "All Students@Instructional Areas".

Note: Failure to name your rules in this manner will prevent the integration from working properly.

Next, create the rule for All Students in the Cafeteria and All Students in the Gym using the same syntax.

Note: In all three cases we are assigning the same NAC profile to members of All Students.

Finally, create the two Staff access rules. The rule for All Staff in Instructional Areas follows the same format as the student rules. The final rule is different in how it is named; because there is no specific location information provided, we name the rule using just the name of the AD group itself.

Recall when we configured the filter groups in iBoss that we created a filter group with just the AD group name of All Staff. Because there is no location specified iBoss applies that filter group

to any end system registered to AD accounts that are members of All Staff that are not otherwise in a defined location. Naming the rule without the @ symbol or location name tells Extreme Connect to omit the location when making the call to iBoss. Using this naming syntax enables filter groups to be assigned to end systems based solely on AD group membership.

Because this rule is more general than the previous staff access rule, it must be located below the All Staff@Instructional Areas rule in the NAC configuration in order to work correctly.

Verification

1. Using two wireless clients, connect to a test SSID and authenticate using two different accounts.
2. Ensure each account is a member of different active directory groups.
3. Configure two iBoss filtering groups that match the AD groups that each test account are part of.
4. iBoss can display information about the filter groups it assigns to end systems from its web interface. Use both NAC Manager and the iBoss management interface to confirm our integration configuration.
5. Locate both end systems so they connect from the Instructional Areas location. From the Identity and Access tab of OneView we can see that the correct rules have been applied to each end system.
6. To see the corresponding information in iBoss, open the management interface and select 'Users' from the navigation menu on the left hand side of the page, then select the 'Computers' submenu item. Our information is listed in the 'Detected Computers' section of this page.

   Note that both NAC and iBoss list the same end system IP address, filter set name, and AD user name for each end system. This indicates that integration is working and our configuration is correct.

Lightspeed Rocket Web Filter

The Lightspeed integration provides a single sign-on solution and web content filtering capabilities based on the end system's active directory membership.

Module Configuration

Configuration Option	Description
Server	IP address of the Rocket Web Filter appliance
Password	RADIUS Shared Secret
Module Enabled	Enables and Disables Module
RADIUS interim message interval	Send a RADIUS interim message to keep the session active, in minutes
Include Calling-Station-ID	Include the Calling-Station-ID RADIUS attribute, calling station is set to the end system's MAC adding
Include Called-Station-ID	Include the Called-Station-ID RADIUS attribute, called station is set to the switch IP address
Ignore usernames that contain	Ignore usernames that contain the entered value, multiple values can be entered with a semi-colon delimiter
Ignore NAC profiles	Ignore end system's that are assigned a NAC profile, multiple values can be entered with a semi-colon delimiter

Configuring the Rocket Appliance

In addition to the standard configuration of the Rocket Web Filter appliance, steps are required to integrate with Active Directory and Mobile IAM. Only the steps necessary for integration will be covered in this document.

Configure LDAP Settings

1. Log in to the Rocket appliance, https://<IP address of Rocket Appliance>. This presents the appliance login screen. Provide the necessary credentials and select the Login button.
2. Select the Administration menu in the top right corner of the dashboard.
3. Scroll down to the Authentication Sources to configure the Active Directory settings.
4. Select + Add Authentication Source, within this menu to add the required fields.
5. When the Active Directory server is saved, verify it is listed in the Authentication Sources section.
6. Select the Test button to verify the Active Directory configuration.
7. Use a known valid domain username and password, select “Test User Login.” A Success message will appear upon a successful query.

Configure RADIUS Accounting

1. The RADIUS Shared Secret is a configurable field within the Rocket appliance.
2. The Shared Secret can be found by accessing the Web Filter menu and scrolling to the bottom of the page.
3. Input the desired Shared Secret to be used between the Lightspeed Systems Rocket Web Filter appliance and the Extreme Connect Lightspeed Systems module. Note the Shared Secret value for later configuration steps.

Configure Policy Management

The next items to configure are the Rule Sets that the Rocket Web Filter appliance assigns to end-systems. Rule Sets are lists of web site categories, keywords, and actions that control how users access the Internet.

1. A pre-defined Rule Set (Block All) is assigned to an Organizational Unit (OU=Solutions Eng,DC=testing,DC=local) that is defined in the previously added Active Directory Server.
2. To access the Policy Management section of the Rocket Appliance, select Web Filter then select Policy Management from the left column.
3. Verify that the Rule Set exists in the Rule Set section of Policy Management.
4. After verifying the Rule Set exists, a new Assignment is created to assign the Rule Set to an object. Navigate to Assignments then select New Assignment.
5. In the New Assignee window, select the Type of object to be used. To browse the Authentication

Source, the Search feature can be used to list all OU's available on the server.

6. Verify the Web Filter Rule in this new assignment at the bottom of the window.

McAfee ePO

IMPORTANT: McAfee ePO connect module has been deprecated due to API changes on the ePO.

The McAfee ePO integration offers end-system assessment via ePO, automatic anti-virus signature file update via ePO and quarantining end-systems via NAC.

Module Configuration

The table below describes the configuration options available for the McAfee ePO OFConnect module
(config file: McAfeeEPOHandler.xml)

Service Configuration	Description
Username	Username used to connect to the ePO API.
Password	Password used to connect to the ePO API.
Server	ePO Server IP
Port	ePO Server Port

General Module Configuration	
Poll interval in seconds	Number of seconds between connections to the adapter running on the SCVMM server.
Module loglevel	Verbosity of the module. Logs are stored in ExtremeCloud IQ Site Engine's server.log file.
Module enabled	Whether or not the module is enabled.
Update local data from remote service	If this is set to "true", data from the remote service will be used to update the internal end-system table. It is recommended to set this option to "true". You will also need to set this to "true" if you want to populate the username and device type from McAfee in NAC (see additional options below). Default: true.
Default end-system group	The default end-system group name where we assign all McAfee devices to in NAC. If you don't want end-systems from McAfee to be assigned to this default group, configure a group name which doesn't exist in NAC.

General Module Configuration	
Enable Data Persistence	Enabling this option will force the module to store end-system, end-system group and VLAN data to a file after each cycle. If this option is disabled, the module will forget all data after a service restart, but in order to clean already existing data, the corresponding .dat files have to be deleted.

Service Specific Configuration	
Custom field to use:	The number of the custom data field for each end-system to store the data retrieved from ePO. Available values are: 1, 2, 3 or 4. Default: 1.
Format of the incoming data:	Format of the data that gets stored in the custom data field. You can chose and combine any of the available variables: ipAddress, macAddress, osType, osServicePackVersion, nodeName, userName, datVersion, lastUpdate. But be aware that ePO might update the "lastUpdate" value for each device very regularly and OF Connect is calling ExtremeCloud IQ Site Engine's web services to refresh that value in all end-systems custom fields. Depending on your poll interval this might put a lot of stress onto the ExtremeCloud IQ Site Engine server and it is thus recommended to _NOT_ use this variable here. It should only be used if the poll interval is very low (like one time per day) and the number of end-systems isn't too high (below 1000). Dfault: NodeName=#nodeName#; OS=#osType# (#osServicePackVersion#); User=#userName#; DAT Version=#datVersion#
End-system group for decommissioned devices:	The default end-system group for devices that existed in ePO but have been deleted. If you want to explicitly identify those devices and even authorize them differently (since they are no longer managed by ePO and that could pose a threat) you can configure the group they should automatically be moved to here and enable the corresponding feature below. Make sure you manually create this end-system group in NAC
Remove device from other groups on decommission:	Enable this to move devices which have been deleted from ePO to the NAC end-system group configured by the corresponding option above. If disabled, devices won't be automatically move to this group but rather stay with their existing group membership(s). Default: false
Delete custom data in EMC for decommissioned devices:	If a device is deleted in ePO the end-system's custom data field in ExtremeCloud IQ Site Engine will be cleared as well. Default: false.

Service Specific Configuration	
Overwrite the existing username with the one acquired from McAfee ePO:	If set to "true" the username for devices retrieved from ePO will overwrite the username that is already in IAM. If no username could be retrieved from ePO for a given end-system, then no change is performed in IAM. Default: false.
Overwrite the existing device type for devices with the one acquired from McAfee EPO:	If set to "true" the device type (operating system) retrieved from ePO will overwrite the device type that is already in IAM. If no operating system could be retrieved from ePO for a given end-system, then no change is performed in IAM. Default: false.
Max DAT version difference between ePO and client before triggering client update task:	Max DAT version difference between ePO and client before triggering client update task: Setting this value to 0 will disable this feature. Default: 1.
Max DAT version difference between ePO and client before generating a ExtremeCloud IQ Site Engine event	This feature can be used to create ExtremeCloud IQ Site Enginet alarms based on these events. These alarms could be configured to alarm the via Email or trigger other mechanisms. Setting this value to 0 will disable this feature. Default: 4.
Max DAT version difference between ePO and client before quarantining client via NAC:	For example: If set to "7" and the difference between the DAT version on ePO's controller catalog and the client's DAT version is at least 7 then the value for the corresponding assessment test result will be set to 10 and “HIGH”. You can use your IAM assessment configuration to automatically push those end-systems to a quarantine role if required. Setting this value to 0 will disable this feature. Default: 0.
Name of the ePO client task that OFConnect uses to trigger a DAT version update for individual devices:	Use the exact name as defined in ePO. Ddefine a client task in ePO that will update a client's DAT file (and maybe even more like the agent version, etc.). It will also find any client tasks where the configured name is part of. Default: Update Agent.
Time before client update task is aborted by EPO	Number of minutes after which the EPO server should abort the client update task. This value is sent to the EPO server when running the "clienttask.run" web service call as an addtional parameter ("abortAfterMinutes"). Setting this value to 0 disables this feature - the parameter won't be used when making the web service call. Default: 10 minutes.

Service Specific Configuration	
Max number of client update tasks triggered per client per day	To avoid triggering too many EPO client update tasks you can set this limit to a non-zero value. We will stop triggering EPO client update tasks after the configured maximum number of retries has been reached for the current day. As soon as the next day starts (first run after midnight), the count of retries per MAC address is automatically reset to zero and client update tasks will be triggered again as long as the device is still out of date (see dat_file_max_ difference_before_trigger_update_task) or the maximum for that day has been reached again. Setting this value to 0 disables this feature →the code will trigger a client update task on each cycle as long as the device is out of date. Default: 1 update task per client per day
Max number of ExtremeCloud IQ Site Engine events generated per client per day	To avoid generating too many events you can set this limit to a non-zero value. We will stop generating ExtremeCloud IQ Site Engine events after the configured maximum number of retries has been reached for the current day. As soon as the next day starts (first run after midnight), the count of retries per MAC address is automatically reset to zero and events will be generated again as long as the device is still out of date (see dat_file_max_difference_ before_generating_netsight_event) or the maximum for that day has been reached again. Setting this value to 0 disables this feature →the code will generate a event on each cycle as long as the device is out of date - no matter how many cycles/triggers per day. Default: 1 event per day
Enable Assessment:	If this is set to “true”, assessment data for all devices managed by ePO will be made available to the assessment adapter. The data will be updated on each cycle. Default: false.
Request an immediate re-assessment of an end-system if its DEVICEOUTOFDATE value changed:	If this is set to “true”, a re-assessment of each end-system where its DEVICEOUTOFDATE value changed (either from "true" to "false" or the other way round) will be requested from IAM. This will ensure that if, for example, an end-system has been pushed to Quarantine since its DAT file version was out-of-date but now it has updated the DAT version, it will immediately be re-assessed and authorized properly. If this feature is disabled, it might take hours/days for the end-system to update its NAC policy/authorization depending on the IAM assessment configuration for this end-system. This feature is only used if the assessment feature is also enabled. Default: true.

Service Specific Configuration	
Use XAPI to trigger a reauth and thus also a re-assessment of an end-system:	If this is set to true, a re-assessment of an end-system will not be performed via a web service call but rather executed directly on the access switch of the end-system. This will be executed via XAPI so "enable web http(s)" needs to be configured on eachExtremeXOS/Switch Engine switch. This will execute the command 'clear netlogin state mac-address' with the MAC of the end-system to immediately trigger a re-auth. The re-auth then triggers a re-assessment of the end-system which should then immediately change its authorization state from ACCEPT to QUARANTINE or vise versa. This feature is only used if the reassess_endsystem feature is also enabled.
Use HTTPS for XAPI calls:	Enable this to use HTTPS instead of HTTP for any XAPI communication with all ExtremeXOS/Switch Engine switches. If enabled, you will also need to install the SSH mod on all ExtremeXOS/Switch Engine switches and configure "enabled web https". This option is only used if the reauthenticate_endsystem_ using_xapi feature is also enabled.
Username to connect to any ExtremeXOS/Switch Engine switch if no CLI credentials are provided within ExtremeCloud IQ Site Engine:	If the feature reauthenticate_endsystem_using_xapi is enabled, the solution will need to authenticate on all ExtremeXOS/Switch Engine switches to perform re-authentication of end-systems. It will try to retrieve the corresponding username and password from the configured CLI credentials fromExtremeCloud IQ Site Enginebut if there aren't any for a particular switch, then this default value will be used
Password to connect to any ExtremeXOS/Switch Engine switch if no CLI credentials are provided within ExtremeCloud IQ Site Engine:	If the feature reauthenticate_endsystem_using_xapi is enabled, the solution will need to authenticate on all ExtremeXOS/Switch Engine switches to perform re-authentication of end-systems. It will try to retrieve the corresponding username and password from the configured CLI credentials fromExtremeCloud IQ Site Enginebut if there aren't any for a particular switch, then this default value will be used.
Name of the ePO client task that Connect uses to trigger an agent wake up:	Use the exact name as defined in ePO. Define a client task in ePO that will wake up a client's agent. This is required to Connect to wake up the agent on quarantined end-systems for which a client update task has been triggered. By default, ePO agents only report their DAT version to the ePO server one time per hour. Therefore, Connect will only realize that an end-system has updated to the latest DAT Version after quite a long time and thus that end-system might be quarantined for quite a long time. Sending the latest DAT version to the ePO server through an agent wake up task will improve the behavior and get end-systems out of their quarantine state quicker

Service Specific Configuration	
Time before the agent wake up client task is triggered after a quarantine event and update task trigger:	In case an end-system was quarantined by NAC the code is triggering an ePO client update task. This task will try to update the DAT version on the end-system through the ePO agent. This process might take a few minutes. After a successful update, the ePO agent is not immediately reporting the current client DAT version back to the ePO server - it will only report this using its standard poll interval which is typically set to run one time per hour. Setting this value to 0 disables this feature. Default: 0.

Verification

Any data (including assessment data) will only be updated during the configured update intervals. Any data retrieved from ePO and any action triggered in direction to ExtremeCloud IQ Site Engine are handled by the ExtremeControl Handler, which has its own update interval and needs to pickup any changes/updates from ePOHandler and push it to ExtremeCloud IQ Site Engine. Depending on the number of changes/actions during one cycle and the number of end-systems managed, you will need to provide some time before you validate the data in ExtremeCloud IQ Site Engine.

Data Import to IAM

There are multiple areas to verify when data on all devices managed by ePO is imported to IAM.

The first option is to use OneView's end-system table under the "Identity and Access" tab and display the custom data field which you have configured for the McAfeeEPOHandler. If you enabled the corresponding features you should also see the username retrieved from ePO and a more detailed Device Type also retrieved from ePO.

Another option is to use the general "Search" tab and search for an end-system which is managed by ePO. It should find the end-system and display ePO data as shown below.

Assessment

If it its DAT file is running out-of-date and the corresponding assessment features are enabled, a healthy device did not update to the latest ePO DAT version and is thus running a DAT version which is older than X versions configured in the ePO handler config file. When Extreme Connect recognizes the outdated DAT file it will populate that fact to the assessment adapter and also try to trigger the corresponding client update script on the EPO server. That update task will only be triggered for end-systems that are in ACCEPT or QUARANTINE state to avoid trying to update end-systems that are disconnected, rejected or in error state. If IAM triggers an assessment for this end-system before the device could be updated, it will recognize that the device is out-of-date and needs to be quarantined.

At this stage, the device has a policy (or VLAN) so it is unable to harm other network devices or services but still allows the ePO server to contact and update it.

After ePO has successfully updated the device and the next OF Connect update cycle has run, the assessment adapter will receive the updated info (from OF Connect) that the device is no

longer out-of-date. OF Connect will then immediately trigger a re-assessment within IAM which will lead to re-authorizing the device into its proper policy (VLAN) since the new assessment result showed that the device is compliant and the DAT is not out-of-date anymore.

End-systems which contain the keyword "Server" in their operating system name (as retrieved from EPO) will receive a test score of 6.0 instead of 10.0 for the DEVICEOUTOFDATE test and thus won't be quarantined. This is due to the fact that most customers don't want to quarantine server systems and EPO offers a solution called MOVE which protects virtual servers without applying a DAT file to each server (→DAT version will always be 0 although these systems are protected by EPO).

Handling Deleted ePO Devices

To test this workflow remove/delete a device from ePO and wait for the next OF Connect synchronization. Then verify that:

1. The device's custom field has been emptied (if this feature has been enabled in the config file)
2. The device is now member of the IAM end-system group for decommissioned devices (if this feature has been enabled in the config file)
3. The device does not appear in the end-system list that is displayed at the bottom of the OF Connect management web site (tab: McAfee ePO). This means that the device has been deleted in the internal list as well

Palo Alto Networks

The Palo Alto integration consists of multiple solutions. The user ID solution notifies Palo Alto of IP to username mapping. The distributed IPS solutions monitor a log file and can take action on an end-system based on the severity of the log message. It is recommended to use the Distributed IPS instead of the Palo Alto Distributed IPS moving forward.

Module Configuration

Configuration Option	Description
Username	Palo Alto username
Password	Palo Alto password
Server	Palo Alto IP address
Version	Palo Alto software version
User-ID (UID) enabled:	Enable user-ID integration
User-ID server:	User-ID agent IP address(es)
User-ID port:	User-ID agent port, default is 5006
User-ID domain:	Default username domain or NAC profile to domain mapping(s)
User-ID concurrent message:	Send concurrent User-ID messages to Palo Alto, this option should be disabled for lower end Palo Altos
User-ID vsys:	Palo Alto vsys to update, default is vsys1

Configuration Option	Description
User-ID multi-user message:	Send multiple User-ID mappings in 1 message. It is recommended to enable this option to lessen processing load on the Palo Alto
User-ID multi-user timer:	Time to queue User-ID mappings before sending Palo Alto User-ID message, increasing the timer will increase the number of User-ID mappings
User-ID strip email domain:	Remove email domain from the username
User-ID strip domain name:	Remove Windows domain from the username
User-ID strip domain username delimiter:	Remove all characters after the delimiter in the username
User-ID append to domain username:	Append string to username
User-ID timeout:	Palo Alto User-ID timeout
User-ID ignore usernames that contain:	Ignore usernames that contain the entered value, multiple values can be entered with a semi-colon delimiter
User-ID ignore NAC profiles:	Ignore end system's that are assigned a NAC profile, multiple values can be entered with a semi-colon delimiter
Distributed IPS (DIPS) enabled:	Enable distributed IPS integration
Distributed IPS syslog regular expression:	Regular expression match before action can be taken on an end-system
Distributed IPS syslog file	Syslog file path
Distributed IPS blocked list severity	Severity level needed to add an end-system to the blocked list
Distributed IPS SNMP authentication type	SNMPv3 authentication type
Distributed IPS SNMP authentication password	SNMPv3 authentication password
Distributed IPS SNMP privacy type	SNMPv3 privacy type
Distributed IPS SNMP privacy password	SNMPv3 privacy password
Module enabled:	Enable the Palo Alto solution

Distributed IPS

The distributed IPS solution monitors log files for events or opens a port on the ExtremeCloud IQ Site Engine server and listens for events. When an event is received, action can be taken to add the threat to an end system group.

Module Configuration

Configuration Option	Description
Name	Event name, this is the default threat name used in the end system group description
Regex	Event regular expression string
File	File, full path, to monitor for events
Port	Port number to open and listen for events on, opening a port can increase vulnerability on the ExtremeManagement server
Protocol	Port number protocol
Sender filter	Process events only from specific IP addresses to prevent spoofing, this field is used in conjunction with the port and protocol
End system group	End system group to add the threat to
End system group type	End system group type, MAC or IP
MAC address regular expression	MAC address regular expression, it is recommended to not change this value
IP address regular expression	IP address regular expression, it is recommended to not change this value
Threat name regular expression	Threat name regular expression, the default regular expression will match a group of words surrounded by double quotes or a group of words without spaces. Example formats that will match the regular expression: “This is a threat 123” This_is_a_threat_123 This-is-a-threat-123 ThisIsAThreat123 This_is_a_Threat(123)

It is recommended to find keywords in the regular expression string and use those keywords as unique identifiers.

The event must contain either the MAC or IP address of the threat. When a MAC address based end system group is used and the threat MAC address is not in the event, a lookup will be done to resolve the threat’s IP address and vice versa for an IP based end system group.

Common wildcards that will be used are:

\w = match a character

\d = match a number

\s = match a space

. = match any character

* = match 0 or more

+ = match 1 or more

Examples of event messages and their regular expression:

Example 1. Checkpoint event message

loc=4220 filename=fw.log fileid=1402093147 time= 6Jun2014 16:01:57 action=block orig=r77 i/f_dir=outbound i/f_name=eth1 has_accounting=0 product=Anti Malware web_client_type=Chrome resource=http://sc1.checkpoint.com/za/images/threatwiki/pages/TestAntiBotBlade.html src=Winsvr2012 s_port=49600 dst=23.203.225.174 service=http proto=tcp session_id=<53924865,00000002,b17361d1,c0000001> Protection name="Check Point - Testing Bot" malware_family=Check Point Confidence Level=5 severity=2 malware_action=Communication with C&C site rule_uid={AE831485-A9C8-4681-BE8F-0E2E66904BDB} Protection Type=URL reputation malware_rule_id={27CC0EC6-7CBE-F54E-AFE0-F46162CEB057} protection_id=00233CFEE refid=0 log_id=9999 proxy_src_ip=Winsvr2012 scope=Winsvr2012 __policy_id_tag=product=VPN-1 & FireWall-1[db_tag={8119E2B3-79E5-4747-80E6-6756E42EE86D};mgmt=r77;date=1402094422;policy_name=Standard] origin_sic_name=cn=cp_mgmt,o=r77..pcfxuu Suppressed logs=1 sent_bytes=0 received_bytes=0 packet_capture_unique_id=192.168.10.189_maildir_sent_new_time1402095718.mail-4230074710-508316721.localhost packet_capture_time=1402095718 packet_capture_name=src-192.168.10.189.eml UserCheck_incident_uid=80E6C145-7AB6-D2C5-1DC5-A500F1473A70 UserCheck=1 portal_message= Your computer is trying to access a malicious server. It is probably infected by malware. For more information and remediation, contact your help desk. Select here to report an incorrect classification. Activity: Communication with C&C site URL: http://sc1.checkpoint.com/za/images/threatwiki/pages/TestAntiBotBlade.html Reference: F1473A70 UserCheck_Confirmation_Level=Application frequency=1 days

In the above example, "Check Point - Testing Bot" is the threat name and 192.168.10.189 is the threat IP address.

Regular expression:

Protection name=$threatName malware_family.* packet_capture_name=src-$threatIpAddress

The regular expression contains unique identifiers to avoid ambiguity or incorrect matches. "Protection name=" precedes the threat name and "malware_family" follows the threat name. A wildcard (.*) is used to match against multiple characters after "malware_family."

Simulating an event with the above message will generate the following log message in the ExtremeManagement server:

Regular expression match -> {$threatIpAddress=192.168.10.189, $threatName="Check Point - Testing Bot"}

Example 2. Watchguard event message

Jun 13 13:42:18 10.148.1.254 local1.info Jun 13 13:42:18 QA_LAB_FB 80BE052F336C0 http-proxy[1631]: msg_id="1AFF-0034" Deny 1-Trusted 0-External tcp 192.168.10.180 21.37.51.86 33444 80 msg="ProxyDrop: HTTP APT detected" proxy_act="HTTP-Client.Anti-X" host="fishherder.dyndns.org" path="/tmp/lastline-demo-sample.exe" md5="dd0af53fec2267757cd90d633acd549a" task_ uuid="235ee8f1185e4337986a0a46eb370595" threat_level="high" (HTTP-Proxy-00)

In the above example, "ProxyDrop: HTTP APT detected" is the threat name and 192.168.10.180 is the threat IP address.

Regular expression:

External tcp $threatIpAddress .* msg=$threatName proxy_act

Simulating an event with the above message will generate the following log message in the ExtremeManagement server:

Regular expression match -> {$threatIpAddress=192.168.10.180, $threatName="ProxyDrop: HTTP APT detected"}

Example 3. Palo Alto event message

Aug 25 15:51:28 PA-5060-1 -PaloAlto: -threatIpAddress 192.168.10.179 -threatName "Apache Wicket Unspecified XSS Vulnerability(36041)" –severity critical

In the above example, "Apache Wicket Unspecified XSS Vulnerability(36041)" is the threat name and 192.168.10.180 is the threat IP address.

Regular expression:

PaloAlto: -threatIpAddress $threatIpAddress -threatName $threatName

Simulating an event with the above message will generate the following log message in the ExtremeManagement server:

Regular expression match -> {$threatIpAddress=192.168.10.179, $threatName="Apache Wicket Unspecified XSS Vulnerability(36041)"}

Check Point User ID

The Check Point user ID integration updates the Check Point gateway with the username IP mapping of end systems that connect to the ExtremeControl engine(s).

Module Configuration

Module Configuration	Description
Server	Check Point IP address
Password	Check Point shared secret
Ignore usernames that contain	Ignore usernames that contain the entered value, multiple values can be entered with a semi-colon delimiter

Module Configuration	Description
Ignore NAC profiles	Ignore end system's that are assigned an ExtremeControl profile, multiple values can be entered with a semi-colon delimiter
Session timeout	API user mapping timeout, in hours

Sample server log output:

```
2017-02-16 12:32:41,937 DEBUG [com.enterasys.fusion.modules.CheckPointHandler]
Sending -> https://10.224.1.252/_IA_MU_Agent/idasdk/add-identity post
{"shared-secret":"mysharedsecret","requests":[{"ip-
address":"192.168.10.181","user":"doe, john","session-timeout":3600}]}
2017-02-16 12:32:42,278 DEBUG [com.enterasys.fusion.modules.CheckPointHandler]
Response -> {
"responses" : [
{
"ipv4-address" : "192.168.10.181",
"message" : "Association sent to PDP."
}
]
}
```

Connect Mobility Configuration

AirWatch

Fiberlink MaaS360

JAMF Capser

MobileIron

Sophos Mobile Control

Citrix XenMobile

AirWatch

The AirWatch integration offers provisioning of mobile devices in the network based on device ownership and also provides assessment data within the network access control process. In addition, data within ExtremeCloud IQ Site Engine is enriched for each end-system and offers comprehensive reporting capabilities within OneView.

Module Configuration

Server Configuration	Description
Username	Username used to contact the MDM provider. Must have access rights to the respective API.

Server Configuration	Description
Password	Password used to contact the MDM provider.
AirWatch Server IP	IP or hostname of the MDM server.
AirWatch Webservice URL	Base URL to connect to the API of the service.
AirWatch Tenant Code	API key provided by AirWatch to access a specific customer configuration.

General Module Configuration	
Poll interval in seconds	Number of seconds between connections to the MDM provider.
Module loglevel	Verbosity of the module. Logs are stored in ExtremeCloud IQ Site Engine's server.log file.
Module enabled	Whether or not the server is enabled.
Push update to remote service	If this is set to true, data from other modules will be pushed to the service.
Update local data from remote service	If this is set to "true", data from the remote service will be used to update the internal end-system table.
Default end-system group	The default end-system group name to use if an end-system is not approved yet.
Enable Data Persistence	Enabling this option will force the module to store end-system, end-systemGroup and VLAN data to a file after each cycle. If this option is disabled, the module will forget all data after a service restart, but in order to clean already existing data, the corresponding .dat files have to be deleted.

Service Specific Configuration	
Custom field to use	The number of the custom data field for each end-system to store the service specific incoming data.
End-system group for Managed Business Mobile Devices	The default end-system group for corporate mobile devices.
End-system group for Managed Personal Mobile Devices	The default end-system group for personal mobile devices.
End-system group for Decommissioned Mobile Devices	The default end-system group for decommissioned mobile devices.
Enable Remote Wipe	If this option is enabled, devices will be wiped if they are moved to the MDM Remote Wipe End-system Group. • off – disabled • enterprise - always perform an enterprise wipe (only deletes corporate data) • adaptive - will perform an enterprise wipe if the device was an employee-owned device and a full wipe if it was a company device • full - always perform a full wipe regardless of ownership
Enable Quarantine Notification	If this is set to "true", the device will be notified via the selected mode if it is quarantined
Quarantine Notification Text	Message sent in the quarantine notification to the user.
Enable Assessment	If this is set to "true", assessment data will be made available to the assessment adapter.

Assessment Plugin Map	
Plugin Name	The Plugin ID Name.
Data Field	The AirWatch Data Field being retrieved in this test
Force Reassessment	Force Re-Assessment on content change.

Assessment Plugin Map	
Format of the incoming data	Format of the data that gets stored in the custom data field SYNTAX The end-system is currently #mdmManaged# Available Variables: • id • udid • serialnumber • imei • assetnumber • name • locationgroupid • locationgroupname • username • useremailaddress • ownership • platformid • platform • modelid • model • operatingsystem • lastseen • enrollmentstatus • compromisedstatus • compliancestatus • lastcompliancecheckon • lastcompromisedcheckon • lastenrolledon • macaddress • iscompromised • dataprotectionenabled • blocklevelencryption • filelevelencryption • ispasscodepresent • ispasscodecompliant

Assessment Plugin Map	
Update Kerberos username for end-systems	If this is set to “true”, the username will be updated for each end-system and a Kerberos re-authentication is triggered.
Update custom fields for end-systems	If this is set to “true”, the custom field data will be updated for each end-system.
Update devicetype for end-systems	If this is set to “true”, the device type data will be updated for each end-system.

Variables available for custom field string are defined in the AirWatch API documentation.

Note: Look and feel of the MDM interface can change depending on customer’s customizations.

Create an API User

Under AirWatch user management, all users and administrator users have access to the web services API. The process below explains how to create a generic user with Full Access:

Note: Any user with role ‘API’ can access the API; a new user role can be created that only grants access to the API and restricts all other access.

1. From the main Dashboard, select Menu > Accounts > Administrators.
2. From the list of users, select Add > Add User, or edit one of the existing users.
3. Select Basic next to User Type.
4. Provide the user credentials.
5. Add a role, and then select Save.
   The user and password provided in the previous screen must be provided to MDM connect in the corresponding AirWatch plugin configuration file.
6. An additional parameter to obtain for the connectivity with AirWatch´s servers is the Tenant Code. This can be obtained from AirWatch’s interface in Configuration > System Settings > System > Advanced > API > REST API:
   The API key is the value that must be provided to the AirWatch module as Tenant Code

Creating a Compliance Profile

The basic variable provided by the Assessment Adaptor is the compliance status. This variable (TestID 100002) contains whether or not the mobile device with that security profile applied is compliant or not with the security requirements specified by the profile.

This variable can be taken as a global indicator of compliance with the security rules of the enterprise. Other variables can be taken into account to provide fine grained access control to the network. From NAC you can decide to use the variable PASSCODEPRESENT (TestID 100028) to verify if a device has defined a password and quarantine devices that don’t have a password during the grace period for the security policy.

AirWatch differentiates between Compliance Profiles and Device Profiles. Compliance Profiles define security rules that the device must comply with like:

- Installed applications
- Cellular use
- Encryption
- Version of OS
- Change of SIM

A Device Profile defines a set of configurations that the device must have in order to be considered compliant like:

- Password length
- SSID lists
- Exchange servers
- General restrictions in the device like enabling SIRI, Youtube, Screen Capture, iCloud etc…
- Installed Certificates
- APNs

Some of these can be configured by the MDM itself when the profile is applied; some of them require user intervention and will probably define a grace period until they trigger a security action if the configuration hasn't been performed, e.g. the password change mentioned before.

Device and Compliance Profiles are assigned by device type, location group, ownership, etc.

Example: Define a Compliance Profile for an application.

1. Select **Add** > **Compliance Policy**.
   The wizard to create a new policy displays, select application list, the desired operation (contains) and define the name of the application (e.g., verybadapp).
2. Select **Next** if you have finished, or select **+** to add more rules to this profile.
3. The next screen will offer several remediation options, like removing or changing the device profile, notifying the user, executing a command, etc. Choose to notify the user cc'ing our systems administrator.
4. Select **Next** to select the device mapping.
   In the device assignment choose which devices will be checked against this profile. You can choose Platform, Manager, Ownership of the device, etc.
5. Selecting **Next** advances to the summary screen.
   Now you have the chance to give a name to the compliance policy and check how many of the currently enrolled devices will pass or fail our test.
6. To enable the policy, select **Finish** and **Activate**.

Integrating AirWatch MDM in Mobile IAM's Workflow

Every time a new user is created in AirWatch MDM, the user receives an email or SMS with instructions to register his device

By following the link in the email, the user will be presented with AirWatch's login screen and the possibility to register his or her device in the MDM system.

To integrate this workflow into Extreme Networks Mobile IAM registration workflow, enable registration in Extreme Networks Mobile IAM and link to AirWatch MDM registration page from Mobile IAM captive portal.

After registration is enabled in Mobile IAM, the administrator can manage the different messages that the user receives during the registration process.

1. Enable web registration in NAC configuration and go to the Portal Options.

2. Select Common Page Settings > change link next to Message Strings.

3. Look for the string 'RegistertoObtainAccess'.

To obtain network access, you must complete the Self Registration form.

We will change that string to contain a string similar to:

```
<h3>BYOD Self-Registration</h3>You can also register your personal device, taping here:
<form action="https://apidev-ds.awmdm.com/DeviceManagement/Enrollment"
method="GET">
<p></p>
GroupID
<select name="AC">
<option value="SE101">SE101</option>
</select>
<p></p>
<input type="submit" name="submit "value="Register your mobile device"></form>
<p></p>
```

This code will create a button that will connect to AirWatch registration page. Make sure that the url (https://apidev-ds.awmdm.com/DeviceManagement/Enrollment) is the same url being used in your deployment.

This code creates a selection for the user to select the location groups he's been assigned in case that there are several to choose.

In the example above, the option is SE101. If there is only one location group in your deployment, you can hide this content with the following code:

```
<h3>BYOD Self-Registration</h3>You can also register your personal device, taping here:
<form action="https://apidev-ds.awmdm.com/DeviceManagement/Enrollment"
method="GET">
<p></p>
<input type=″hidden″ name="AC" value="SE101">
<p></p>
<input type="submit" name="submit "value="Register your mobile device"></form>
<p></p>
```

The new look of the mobile registration page is changed to reflect this new code.

In this situation, the user can provide their data in the standard Mobile IAM registration form and register as a guest to the network without control of the MDM. Or they can register the mobile device tapping in the new button and being redirected to AirWatch registration page.

4. When the device has been successfully registered with AirWatch, the Extreme Connect MDM plugin will import its data into Mobile IAM. Devices classified in MDM as Corporate owned will be place in the end-system group 'Mobile Devices Business' and the devices classified as Personal will be added to the group 'Mobile Devices Personal' (or the group defined to that end during installation or the plugin configuration, see above in installation and post installation tasks).
5. The Mobile IAM ruleset must be adapted to reflect those groups and act accordingly depending on the newly registered devices.

Note: Devices registered by an MDM system can have an important lag until they are added to the corresponding groups. This behavior is not a malfunction of the MDM itself or the Extreme Connect MDM plugin. Due to the diversity of OSes and connectivity profiles, there is no way to know in advance when a newly registered device will provide all the data needed by the MDM software to complete the registration. It can take up to several minutes from the registration to the final landing in one of the above-mentioned groups and obtaining full access to the network.

Policy Configuration

To support the previous workflow, the device in unregistered state must be able to communicate via HTTPS with AirWatch servers and via the apple push service with Apple. Android devices require downloading an agent to be registered by AirWatch so Google Play access must be provided as well in this state.

The following policies (or more generic ones) are needed to enable Airwatch registration:

- Allow HTTPS to 12.150.127.0/24 AirWatch network
- Allow TCP 5223 to 17.0.0.0/8:TCP:5223, Apple Push service
- Allow HTTPS to 74.125.0.0/16, Google Play Downloads
- Allow TCP/UDP 5228 to 173.194.0.0/16, Google Play login

Fiberlink MaaS360

The Fiberlink MaaS360 integration requires Fiberlink authentication credentials and other account settings. This information is used in the Fiberlink MaaS360 module tab.

Module Configuration

Configuration Option	Description
Username	MaaS360 web service username
Password	MaaS360 web service password
API URL	MaaS360 web service URL, use https://services.fiberlink.com unless told otherwise by Fiberlink
Billing/Account ID	MaaS360 billing/account ID
Application ID	Application ID used to contact MaaS360 web service, use com.networks.extreme unless told otherwise

Configuration Option	Description
Application Version	Use 1.0 unless told otherwise
Platform ID	Use 3 unless told otherwise
Access Key	Do not edit this value unless told otherwise
Server	Set value to localhost

Account Billing ID: the account billing ID is used to identify the Fiberlink MaaS360 account. To find the account billing ID, log into the Fiberlink MaaS360 management page.

Service Configuration

Configuration Option	Description
Poll interval	Time period between queries to the MaaS360 web service
End system group for managed business mobile devices	Mobile IAM end-system group that corporate owned devices will be part of
End system group for managed personal mobile devices	Mobile IAM end system group that personal owned devices will be part of
Default end system group for managed mobile devices	Mobile IAM end-system group that unknown devices will be part of
Remote wipe end system group	Mobile IAM end-system group that will be used to remotely wipe a mobile device
Enable remote wipe	Enable/disable remote wipe option
Update Kerberos username	Enable/disable option to update end-system username
Update device type	Enable/disable option to update end-system device type
Notify user when quarantined	Enable/disable option to notify user when end-system is quarantined based on assessment scoring
Enable assessment	Enable/disable option to use Mobile IAM assessment agent

Verification

1. Enroll new device with MaaS360.
2. Verify device is now being managed by MaaS360.
3. Connect to test SSID, wait for re-synchronization poll to occur, and verify end system in Mobile IAM has device information from MaaS360.

Policy Configuration

To support the previous workflow, the device in unregistered state must be able to communicate via HTTPS with MaaS360 servers and via the Apple push service with Apple.

Some configurations require downloading an agent to be registered by MaaS360 so Google Play and Apple appStore access must be provided as well in this state. If this is the case, policies must be adapted to provide connectivity to the Agent.

The following policies (or more generic ones) are needed to enable MaaS360 registration:

- Allow HTTPS to MaaS360 network
- Allow TCP 5223 to 17.0.0.0/8:TCP:5223, Apple Push service

- Allow TCP/UDP 5228 to 173.194.0.0/16, Google Play login
- Allow HTTPS to 74.125.0.0/16, Google Play Downloads

JAMF Capser

The JAMF Casper integration offers provisioning of mobile devices in the network based on Casper group membership and also provides assessment data within the network access control process. In addition, data within ExtremeCloud IQ Site Engine is enriched for each end-system and offers comprehensive reporting capabilities within OneView.

Module Configuration

Service Configuration	Description
Username	Username used to contact the MDM provider. Must have access rights to the respective API.
Password	Password used to contact the MDM provider.
Server IP	IP or hostname of the MDM server.

General Module Configuration	
Poll interval in seconds	Number of seconds between connections to the MDM provider.
Module loglevel	Verbosity of the module. Logs are stored in ExtremeCloud IQ Site Engine's server.log file.
Module enabled	Whether or not the server is enabled.

Service Specific Configuration	
Custom field to use	The number of the custom data field for each end-system to store the service specific incoming data.
Full Re-Sync Interval	The time after which a full data re-sync will be performed. This will also update data on devices, which are already synchronized.
Format of the incoming data for iPhones	Format of the data that gets stored in the custom data field SYNTAX EXAMPLE: OS Version=#osVersion#; Last Inv. Update=#lastInventoryUpdate#; Is Managed=#isManaged#; User=#userName#; Real Name=#realName#; Email=#email# Available Variables: ipAddress, mac, osVersion, lastInventoryUpdate, isManaged, modelDisplay, userName, realName, email, isSecurityDataProtection, isSecurityBlockLevelEncryptionCapable, isSecurityFileLevelEncryptionCapable, isSecurityPasscodePresent, isSecurityPasscodeCompliant, isSecurityPasscodeCompliantWithProfile

Service Specific Configuration	
Format of the incoming data for computers	Format of the data that gets stored in the custom data field SYNTAX EXAMPLE: OS=#osName# (#osVersion#); User=#userName#; Real Name=#realName#; Email=#email#; Phone=#phone# Available Variables: macAddress, alternateMacAddress, osName, osVersion, ipAddress, userName, realName, email, phone
Default end-system group for all iPhones	The default end-system group name to use if it is not set dynamically for all iPhones.
Default end-system group for all computers	The default end-system group name to use if it is not set dynamically for all computers.
End-system group for decommissioned devices	The default end-system group for decommissioned devices.
Overwrite the existing username for iPhones/iPads with the one acquired from CASPER	If set to "true" the username for iPhones/iPads retrieved from CASPER will overwrite the username that is already in NAC. If no username could be retrieved from CASPER for a given end-system, then no change is performed in NAC. Be aware that this might conflict with existing NAC processes if you are already retrieving and using the username through some other mechanism like 802.1X or Kerberos snooping --> this will be overwritten.
Overwrite the existing username for MACs with the one acquired from CASPER	If set to "true" the username for MACs retrieved from CASPER will overwrite the username that is already in NAC. If no username could be retrieved from CASPER for a given end-system, then no change is performed in NAC. Be aware that this might conflict with existing NAC processes if you are already retrieving and using the username through some other mechanism like 802.1X or Kerberos snooping --> this will be overwritten.
Overwrite the existing device type for iPhones/iPads with the one acquired from CASPER	If set to "true" the device type (iOS) retrieved from CASPER for iPhones/iPads will overwrite the device type which is already in NAC. If no operating system could be retrieved from CASPER for a given end-system, then no change is performed in NAC. Be aware that this might conflict with existing NAC processes if you are already retrieving and using the device type through some other mechanism like DHCP snooping --> this will be overwritten. This feature should improve your current method for end-systems managed by CASPER.
Overwrite the existing device type for MACs with the one acquired from CASPER	If set to "true" the device type (iOS) retrieved from CASPER for Macs will overwrite the device type that is already in NAC. If no operating system could be retrieved from CASPER for a given end-system, then no change is performed in NAC. Be aware that this might conflict with existing NAC processes if you are already retrieving and using the device type through some other mechanism like DHCP snooping --> this will be overwritten. This feature should improve your current method for end-systems managed by CASPER.
Overwrite the existing device type for Advanced Search computers with the one acquired from CASPER	If set to "true" the device type (operating system) retrieved from CASPER for Advanced Search computers will overwrite the device type which is already in NAC. If no operating system could be retrieved from CASPER for a given end-system, then no change is performed in NAC. Be aware that this might mess up existing NAC processes if you are already retrieving and using the device type through some other mechanism like DHCP snooping --> this will be overwritten. This feature should improve your current method for end-systems managed by CASPER.
Import data on iPhones and iPads from CASPER	If set to "true" the module will retrieve data on all iPhones and iPads managed by Casper and push it into NAC. You must set this option to “true” if you want the MDM assessment adapter to work since this data is delivered to the assessment adapter via a file.
Import data on computers (MACs) from CASPER	If set to "true" the module will retrieve data on all MACs managed by Casper and push it into NAC.

Service Specific Configuration	
Max number of days that the last inventory update for iPhones is allowed to be old	For example: If set to "5" the module will alarm (if assessment is enabled) if an iPhone's last inventory update is older than 5 days.
Write assessment relevant data to an external file or not	If this is set to “true”, assessment data for iPads/iPhones will be made available to the assessment adapter

Note: The default end-system group for iPhones (Casper iPhones) and Computers (Casper MACs) are not automatically created in the ExtremeControl End-System Groups lists. If these groups are required, you must create and configure the groups manually for Casper integration to operate successfully. To allow records retrieved from Casper to update End-System groups in ExtremeControl, the Description field for the End-System Group must be configured with the following text:

```
sync=true,casperPriority=<value>
```

The sync allows Casper data to be synchronized to the End-System group. The casperPriority override allows a MAC record that is returned from Casper in two or more End-System groups to be added to the correct group by priority value.

For example: If the end-system MAC is a member of GroupA, GroupB, GroupC and GroupB has "sync=true,casperPriority=1", then the MAC address is added to GroupB and not added to the other groups. If casperPriority is not configured and the MAC is a member of more than one group, the MAC is added to all groups.

Assessment Map Entry #	
Plugin Name	The Plugin ID Name
Data Field	The MDM Data Field being retrieved in this test.
Force Reassessment	Force Re-Assessment on content change.

Verification

To verify proper functionality validate the data within the custom field configured to use for the Casper integration in your end-system list (in Control > End-Systems). For each iPhone, iPad or MAC you should see information which is retrieved from Casper. If you have enabled the feature to sync Casper devices (iPhones/iPads/MACs) to end-system groups in ExtremeControl based on the group name in Casper matching the end-system group name in ExtremeControl, you can verify this functionality by opening one of the groups and validating if the correct end-systems (=MAC addresses) are listed there.

As the Casper integration is a one-way integration there is nothing to verify on the Casper server. The Casper integration is not pushing data or modifying any configuration on the Casper server.

MobileIron

The MobileIron integration offers provisioning of mobile devices in the network based on device ownership and also provides assessment data within the network access control process. In

addition, data within ExtremeCloud IQ Site Engine is enriched for each end-system and offers comprehensive reporting capabilities within OneView.

Module Configuration

Service Configuration	Description
Username	Username used to contact the MDM provider. Must have access rights to the respective API.
Password	Password used to contact the MDM provider.
MobileIron Server IP	IP or hostname of the MDM server.
MobileIron Webservice URL	Base URL to connect to the API of the service.

General Module Configuration	
Poll interval in seconds	Number of seconds between connections to the MDM provider.
Module loglevel	Verbosity of the module. Logs are stored in ExtremeCloud IQ Site Engine's server.log file.
Module enabled	Whether or not the server is enabled.
Push update to remote service	If this is set to “true”, data from other modules will be pushed to the service.
Update local data from remote service	If this is set to “true”, data from the remote service will be used to update the internal end-system table.
Default end-system group	The default end-system group name to use if an end-system is not approved yet.
Enable Data Persistence	Enabling this option will force the module to store end-system, end-systemGroup and VLAN data to a file after each cycle. If this option is disabled, the module will forget all data after a service restart, but in order to clean already existing data, the corresponding .dat files have to be deleted.

Service Specific Configuration	
Custom field to use	The number of the custom data field for each end-system to store the service specific incoming data.
End-system group for Managed Business Mobile Devices	The default end-system group for corporate mobile devices.
End-system group for Managed Personal Mobile Devices	The default end-system group for personal mobile devices.
End-system group for Decommissioned Mobile Devices	The default end-system group for decommissioned mobile devices.

Service Specific Configuration	
Enable Remote Wipe	If this option is enabled, devices will be wiped if they are moved to the MDM Remote Wipe End-system Group. • off – disabled • enterprise - always perform an enterprise wipe (only deletes corporate data) • adaptive - will perform an enterprise wipe if the device was a employee owned device and a full wipe if it was a company device\ • full - always perform a full wipe regardless of ownership
Enable Quarantine Notification	If this is set to "true", the device will be notified via the selected mode if it is quarantined
Quarantine Notification Text	Message sent in the quarantine notification to the user.
Enable Assessment	If this is set to "true", assessment data will be made available to the assessment adapter.

Assessment Map Entry #	
Plugin Name	The Plugin ID Name.
Data Field	The MDM Data Field being retrieved in this test.
Force Reassessment	Force Re-Assessment on content change.
Format of the incoming data	Format of the data that gets stored in the custom data field SYNTAX The end-system is currently #mdmManaged# Available Variables: Refer to the MobileIron API Documentation for a full list of all available keywords.
Update Kerberos username for end-systems	If this is set to "true", the username will be updated for each end-system and a Kerberos re-authentication is triggered.
Update custom fields for end-systems	If this is set to "true", the custom field data will be updated for each end-system.
Update devicetype for end-systems	If this is set to true, the device type data will be updated for each end-system.

See MobileIron documentation for keywords available to use in custom field string.

Note: Look and feel of the MDM interface can change depending on customer's customizations.

Creating an API User

MobileIron provides a predefined user role for API access. Assigning the API role to a user automatically enables it to access the MDM API. A user with API access must be created to access MobileIrons API from the ExtremeCloud IQ Site Engine's interface.

1. From MobileIron's main interface select User Management and Add Local User.

Note: This step is not required if you plan to use an existing user or a user previously synchronized from a LDAP database.

2. Fill in the required fields and note the user ID and password for later use in ExtremeCloud IQ Site Engine configuration.
3. After creating a user, select it and select Assign Roles.

After registration is enabled in Mobile IAM, the administrator can manage the different messages that the user receives during the registration process.

1. 1. To perform this configuration, enable web registration in NAC configuration and go to Portal Options.
2. 2. In Portal Options, select Common Page Settings and then select the 'change' link next to Message Strings.
3. 3. Look for the string 'RegistertoObtainAccess'.
   To obtain network access, you must complete registration using the self registration form.
   We will change that string to contain something like:

<h3>BYOD Self-Registration</h3>You can also register your personal device, taping here: <form action="https://<Mobileironserver>/<customername>/ireg" method="GET"><input type="submit" name="submit "value="Register with MobileIron"></form>

This code will create a button that will connect to MobileIron's registration page. Make sure that the url https://<Mobileironserver>/<customername>/ireg is the same being used in your deployment.

4. The new look of the mobile registration page is changed to reflect this new code.
   In this situation, the user can provide his or her data in the standard Mobile IAM registration form and register as a guest to the network without control of the MDM. Or they can register the mobile device tapping in the new button and being redirected to MobileIron's registration page.
5. After providing the required credentials, the user will be prompted to install a configuration profile granting the MDM software the required permissions to manage the device.
6. After completing the registration, several profiles will be installed under General > Profiles.
   When the device has been successfully registered with MobileIron, the Extreme Connect MDM plugin will import its data into Mobile IAM. Devices classified in MDM as Corporate owned will be place in the end-system group 'Mobile Devices Business' and the devices classified as Personal will be added to the group 'Mobile Devices Personal' (or the group defined to that end during installation or the plugin configuration, see above in installation o post installation tasks).
7. The Mobile IAM ruleset must be adapted to reflect those groups and act accordingly depending on the newly registered devices.

Note: Devices registered by an MDM system can have an important lag until they are added to the corresponding groups. This behavior is not a malfunction of the MDM itself or the Extreme Connect MDM plugin. Due to the diversity of OSes and connectivity profiles, there is no way to know in advance when a newly registered device will provide all the data needed by the MDM software to complete the registration. It can take up to several minutes from the registration to the final landing in one of the above-mentioned groups and obtain full access to the network.

Policy Configuration

To support the previous workflow, the device in unregistered state must be able to communicate via HTTPS with MobileIron servers and via the apple push service with Apple.

Some configurations require downloading an agent to be registered by MobileIron so Google Play and Apple appStore access must be provided as well in this state. If this is the case, policies must be adapted to provide connectivity to the Agent.

The following policies (or more generic ones) are needed to enable MobileIron registration:

- Allow HTTPS to MobileIron network
- Allow TCP 5223 to 17.0.0.0/8:TCP:5223, Apple Push service
- Allow TCP/UDP 5228 to 173.194.0.0/16, Google Play login
- Allow HTTPS to 74.125.0.0/16, Google Play Downloads

Other Integration Options

The integration described in the previous section is one of many possible ways. The different methods will vary depending on specific requirements of the enterprise deploying the MDM-IAM integration.

Sophos Mobile Control

The Sophos Mobile Control integration requires authentication credentials and other account settings. This information is used in the Sophos MDM module tab and supports Mobile Control version 4.0.

Module Configuration

Configuration Option	Description
Customer	Customer name
Username	Web service username
Password	Web service password
Server	Server hostname or IP address. The server value is used to create the web service URL: https:<server>/mdmWebService

Service Configuration

Configuration Option	Description
Poll interval:	Time period between queries to the Sophos web service
End system group for managed business mobile devices	Mobile IAM end-system group that corporate owned devices will be part of
End system group for managed personal mobile devices	Mobile IAM end system group that personal owned devices will be part of
Default end system group for managed mobile devices	Mobile IAM end-system group that unknown devices will be part of
Remote wipe end system group	Mobile IAM end-system group that will be used to remotely wipe a mobile device
Enable remote wipe	Enable/disable remote wipe option
Update Kerberos username	Enable/disable option to update end-system username
Update device type	Enable/disable option to update end-system device type

Configuration Option	Description
Notify user when quarantined	Enable/disable option to notify user when end-system is quarantined based on assessment scoring
Enable assessment	Enable/disable option to use Mobile IAM assessment agent

Verification

1. Enroll new device with Sophos.
2. Connect to test SSID and wait for re-synchronization poll to occur.
3. Verify end system in ExtremeControl has device information from Sophos.

Policy Configuration

To support the previous workflow, the device in unregistered state must be able to communicate via HTTPS with Sophos server and via the Apple push service with Apple.

Some configurations require downloading an agent to be registered by Sophos so Google Play and Apple appStore access must be provided as well in this state. If this is the case, policies must be adapted to provide connectivity to the Agent.

The following policies (or more generic ones) are needed to enable Sophos registration:

- Allow HTTPS to Sophos network
- Allow TCP 5223 to 17.0.0.0/8:TCP:5223, Apple Push service
- Allow TCP/UDP 5228 to 173.194.0.0/16, Google Play login
- Allow HTTPS to 74.125.0.0/16, Google Play Downloads

Citrix XenMobile

The XenMobile integration requires authentication credentials and the XenMobile server base URL. This information is used in the XenMobile module tab.

Module Configuration

Configuration Option	Description
Username	Web service username
Password	Web service password
Server	Base URL of XenMobile server. Base URL is used to create the web service URL i.e. <base URL>/xenmobile/api/v1/device/filter

Service Configuration

Configuration Option	Description
Poll interval	Time period between queries to the XenMobile web service
End system group for managed business mobile devices	Mobile IAM end-system group that corporate owned devices will be part of
End system group for managed personal mobile devices	Mobile IAM end system group that personal owned devices will be part of

Configuration Option	Description
Default end system group for managed mobile devices	Mobile IAM end-system group that unknown devices will be part of
Remote wipe end system group	Mobile IAM end-system group that will be used to remotely wipe a mobile device
Enable remote wipe	Enable/disable remote wipe option
Update Kerberos username	Enable/disable option to update end-system username
Update device type	Enable/disable option to update end-system device type
Notify user when quarantined	Enable/disable option to notify user when end-system is quarantined based on assessment scoring
Enable assessment	Enable/disable option to use Mobile IAM assessment agent
Format of the incoming message	Format of the custom data string. Available fields are: id serialnumber imei username ownership devicename devicemodel devicetype operatingsystem lastseen enrollmentstatus compliancestatus macaddress jailbroken

Verification

1. Enroll new device with XenMobile.
2. Connect to test SSID, wait for re-synchronization poll to occur.
3. Verify end system in ExtremeControl has device information from XenMobile.

Policy Configuration

To support the previous workflow, the device in unregistered state must be able to communicate via HTTPS with the XenMobile server and via the Apple push service with Apple.

Some configurations require downloading an agent to be registered by XenMobile so Google Play and Apple appStore access must be provided as well in this state. If this is the case, policies must be adapted to provide connectivity to the Agent.

The following policies (or more generic ones) are needed to enable XenMobile registration:

- Allow HTTPS to XenMobile network
- Allow TCP 5223 to 17.0.0.0/8:TCP:5223, Apple Push service
- Allow TCP/UDP 5228 to 173.194.0.0/16, Google Play login
- Allow HTTPS to 74.125.0.0/16, Google Play Downloads

ExtremeConnect Management / IT Operations Configuration

FNT Command

Glue Networks Gluware Control

Microsoft System Center Configuration Manager (SCCM)

Aruba ClearPass

FNT Command

The FNT Command integration offers two main functionalities:

1. Mapping of patch panel information from Command to end-systems and switch ports in ExtremeCloud IQ Site Engine/Control. Data within ExtremeCloud IQ Site Engine is enriched for each end-system and offers comprehensive reporting capabilities within OneView.
2. Exporting of ExtremeCloud IQ Site Engine data to FNT Command: this will export all switches, their modules, ports, GBICs and connected end-systems to Command's ADG database.

Module Configuration

Configuration Option	Description
Username	Username used to connect to the Command Oracle DB
Password	Password used to connect to the Command Oracle DB
ServerIP	IP Address of the Command Oracle DB
Server Port	TCP port of the Command Oracle DB. Default: 6201
Command Service Name	The "SERVICE_NAME" to access the Oracle DB view/table called "MEDMGR.CTFL2D_SWITCH_2_OUTLET". Refer to your Oracle DB administrator to get the service name specific to your FNT Command installation.

General Module Configuration	
Poll interval in seconds	The time (in seconds) the module will wait after each run. Since the data on patch field connections/locations is relatively static it often does not require updating every 60 seconds and it is recommended to increase the value for the poll interval. This will also decrease the processing load on the ExtremeCloud IQ Site Engine server. Recommendation: 3600 seconds (one time per hour) but this depends on the size of your infrastructure and your requirements.

General Module Configuration	
Module loglevel	Verbosity of the module. Logs are stored in ExtremeCloud IQ Site Engine's server.log file.
Module enabled	Whether or not the module is enabled.
Push update to remote service	If this is set to “true”, data from other modules will be pushed to the service.
Update local data from remote service	If this is set to “true”, data from the remote service will be used to update the internal end-system table.
Default end-system group	The default end-system group name to use if it is not set dynamically.
Enable Data Persistence	Enabling this option will force the module to store end-system custom field and group membership data into a file after each cycle. If this option is disabled, the module will forget all data after a service restart, but in order to clean already existing data, the corresponding .dat files have to be deleted. It is important to enable this feature, especially in large environments, so that OF Connect doesn’t need a full re-sync of all data everytime you restart your ExtremeCloud IQ Site Engine server. Default: True.

Service Specific Configuration	
Custom field to use	The number of the custom data field for each end-system to store the data retrieved from Command. Available values are: 1, 2, 3 or 4. Default: 1.
Format of the incoming data	Format of the data that gets stored in the custom data field. You can chose and combine any of the available variables: outletId (ID of the patch field), outletCampus, outletBuilding, outletFloor, outletRoom. Default: #outletId# / #outletCampus# / #outletBuilding# / #outletFloor# / #outletRoom#
Update NAC End-Systems with Command outlet data	If set to True the module will retrieve outlet data (outlet id, room, building, etc.) and map it to the corresponding end-systems/ports in NAC
Command DB table name containing outlet data for NAC import	The name of the Oracle DB table that contains the Command outlet data. This is required if you enable the feature update_ nac_endsystems_with_command_outlet_data so OFC knows which table to query to retrieve data about ports and their outlet data. Default: medmgr.CTFL2D_SWITCH_2_OUTLET
Push ExtremeCloud IQ Site Engine Devices to Command Auto-Discovery Gateway	If set to 'true' the module will push ExtremeCloud IQ Site Engine switch data (IP, firmware, type, descriptor, etc.) to Command's Auto-Discovery Gateway. The module updates the corresponding database tables. The Auto-Discovery Gateway itself manages the import of the data to Command automatically

Service Specific Configuration	
Push NAC End-Systems to Command Auto-Discovery Gateway	If set to 'true' the module will push all NAC end-systems to Command's Auto-Discovery Gateway. It will then try to "connect" these end-systems to switches and ports exported from ExtremeCloud IQ Site Engine. This option is only available if the option push_netsight_devices_to_command_adg has also been enabled. The module updates the corresponding database tables. The Auto-Discovery Gateway itself manages the import of the data to Command automatically.
Autodiscovery Gateway DB TCP Port	The TCP port where the Autodiscovery Gateway database is running on. Default: 1521
Autodiscovery Gateway DB Username	The username to connect to the Autodiscovery Gateway database. Default: command
Password	Password used to connect to the Autodiscovery Gateway database. Default: command
The Map to use when exporting ExtremeCloud IQ Site Engine/NAC data to Command's ADG	Specify the map which should be used to export ExtremeCloud IQ Site Engine (switches) and NAC (end-systems) data to ADG. The map needs to be configured correctly in order for ADG to proerply map the incoming device types to existing, well-known device types. Default: 1
Automatically process ExtremeCloud IQ Site Engine data pushed to ADG	If set to 'true' the module will automatically call the AutomatedProcessomg.sh script at the end of each synchronization cycle. This will trigger the ADG to immediately import the new data from ExtremeCloud IQ Site Engine. This is currently only supported on ADG Linux installations.
Username to connect to the ADG server via SSH and execute automated processing script	The user name to connect to the ADG server via SSH and execute the AutomatedProcessing.sh script. Make sure the user can remotely login via SSH and has the necessary privileges to execute the script located in your tomcat folder under /webapps/command/axis/WEB-INF. This is only relevant if the option adg_enable_automated_processing has been enabled.
Password to connect to the ADG server via SSH and execute automated processing script	The password to connect to the ADG server via SSH and execute the AutomatedProcessing.sh script. This is only relevant if the option adg_enable_automated_processing has been enabled
Username for the automated processing script (Command user)	The Command user name will be provided as a parameter to the AutomatedProcessing.sh script. Make sure the user has the necessary rights within Command to perform the changes which the script triggers. This is only relevant if the option adg_enable_ automated_processing has been enabled.
Password for the automated processing script (Command user)	The Command password will be provided as a parameter to the AutomatedProcessing.sh script. This is only relevant if the option adg_enable_automated_processing has been enabled.

Service Specific Configuration	
Tenant (=Mandant) ID for the automated processing script (Command tenant)	The Command tenant (=Mandant) to use for the user provided above. This will be used as a parameter to the AutomatedProcessing.sh script. This is only relevant if the option adg_enable_automated_processing has been enabled.
User group ID for the automated processing script (Command user group name)	The name of the Command user group to use for the user provided above. This will be used as a parameter to the AutomatedProcessing.sh script. This is only relevant if the option adg_enable_automated_processing has been enabled.
Full file path on the ADG server for the script to trigger automated processing	The full file path (path and file name) of the AutomatedProcessing.sh script. This script will be triggered on the ADG server via SSH to automatically start the data import. This is only relevant if the option adg_enable_automated_ processing has been enabled. Default: /usr/share/tomcat7/webapps/command/axis/WEB-INF/AutomatedProcessing.sh
Maximum number of end-systems per web service request to EMC	Specify the maximum number (as integer) of end-systems that Fusion will query per request from the ExtremeCloud IQ Site Engine server. This setting enables you to split large end-system queries into smaller badges. Example: There are 10.000 end-systems in ExtremeCloud IQ Site Engine/NAC. You set this max_ endsystem_per_request value to 1000. Then Fusion will perform 10 calls to the ExtremeCloud IQ Site Engine API and retrieve 1000 end-systems per call. Default: 1000.
Timeout per web service request to EMC	Specify the timeout in seconds (as integer) for each web service call to ExtremeCloud IQ Site Engine. Since these calls are handled by the TaskScheduleHandler you need to calculate a value as follows: Take the setting for poll_interval_seconds from your TaskScheduleHandler.xml config file and add a couple of seconds for the expected time it takes for the http transaction to complete. Example: 3 seconds poll interval for the TaskScheduleHandler plus a timeout of 7 seconds for the http request to be performed --> 10 seconds. Default: 10
The ID of the tenant to query Command outlet data for	Specify the Command tenant ID ("Mandant ID") which will be used to filter Command outlet data. This will help reduce the amount of data OFC has to process when importing Command outlet data and matching it to end-systems in NAC. This is only relevant if the option update_nac_endsystems_with_command_ outlet_data has been enabled.

Service Specific Configuration	
Default username for switch CLI access	The default username to connect to any switches' which don't have CLI credentials stored within ExtremeCloud IQ Site Engine. This username is only used if there are no CLI credentials defined for a switch in ExtremeCloud IQ Site Engine. Otherwise the ExtremeCloud IQ Site Engine CLI username takes priority. This is used to gather port optic info fromExtremeXOS/Switch Engine switches using a Telnet connection.
Default password for switch CLI access	The default password to connect to any switches' which don't have CLI credentials stored within ExtremeCloud IQ Site Engine. This password is only used if there are no CLI credentials defined for a switch in ExtremeCloud IQ Site Engine. Otherwise the ExtremeCloud IQ Site Engine CLI password takes priority. This is used to gather port optic info from ExtremeXOS/Switch Engine switches using a Telnet connection.

Verification

1. Login to OneView and verify the incoming data from FNT within the custom data field in the end-system table.
2. Pick a few end-systems and validate that their location data in NAC's custom field is correct according to Command data.

Glue Networks Gluware Control

The Gluware Control integration enables the option to publish Policy Domain configuration to Gluware. The policies are translated into ACL definitions that can be deployed to managed nodes of different manufacturers.

Module Configuration

The table below describes the configuration options available for the Gluware Control module (config file: GlueNetHandler.xml)

Configuration Option	Description
Username	Username used to connect
Password	Password used to connect
Webservice URL	Webservice URL of Gluware Control
Company	Tenant Company Name
Organization	Tenant Organization Name

General Module Configuration	
Poll interval in seconds	The time (in seconds) the module will wait after each run. Since the data on patch field connections/locations is relatively static it often does not require updating every 60 seconds and it is recommended to increase the value for the poll interval here. This will also decrease the processing load on the ExtremeCloud IQ Site Engine server. Recommendation: 3600 seconds (one time per hour) but this depends on the size of your infrastructure and your requirements.
Module loglevel	Verbosity of the module. Logs are stored in ExtremeCloud IQ Site Engines server.log file.
Module enabled	Whether or not the module is enabled.
Push update to remote service	If this is set to “true”, data from other modules will be pushed to the service.
Update local data from remote service	If this is set to “true”, data from the remote service will be used to update the internal end-system table.
Default end-system group	The default end-system group name to use if it is not set dynamically.
Enable Data Persistence	Enabling this option will force the module to store end-system custom field and group membership data into a file after each cycle. If this option is disabled, the module will forget all data after a service restart, but in order to clean already existing data, the corresponding .dat files have to be deleted. It is important to enable this feature, especially in large environments, so that OF Connect doesn’t need a full re-sync of all data everytime you restart your ExtremeCloud IQ Site Engine. Default: True.

Service Specific Configuration	
Naming Convention	Only policy roles matching the naming convention format will be published (.+ for all)
Provision Switches	Automatically provision switches on enforce
Switches	Name of switch nodes to provision (seperated by ;)

The module will publish every policy domain to Gluware Control that has a matching jboACL object name. (i.e. to publish “Default Policy Domain”, create a new jboACL with the name “Default Policy Domain”).

After the data was published, the description of the ACL will be changed to “Created by Extreme Connect” and contain an Access List for every policy role present in the policy domain.

Note: Support for policy rules depends on the underlying switch hardware. Gluware Control only supports L3-L4 IP policy rules with Accept and Deny actions and only those will be published from the policy domain.

Cisco ACL Support in NAC Manager

Please see ExtremeCloud IQ Site Engine and ExtremeControl - Cisco Switch Integration Guide.

Verification

1. Login to Gluware Control and select Domain **Objects** > **jboAcls**.
2. Select the ACL that matches the policy domain in ExtremeCloud IQ Site Engine and verify that the Access Lists match with the policy roles.
3. ACLs are published automatically, but you can deploy to switches manually if automatic provisioning is not enabled.

To verify the configuration on a switch:

1. Select **Nodes** > **lanSwitch** and connect to the desired switch.
2. In addition to present default ACLs, Gluware will create one ACL matching the Policy Role in name with all rules below it. The rule precedence matches with the default precedence found in Extreme Control.

Microsoft System Center Configuration Manager (SCCM)

The Microsoft SCCM integration is a one-way integration offering end-system data retrieval from SCCM on managed devices. This data enriches each end-system data set within ExtremeCloud IQ Site Engine and offers comprehensive reporting capabilities.

Note: The SCCM server requires an adapter agent to be installed and configured prior to enabling the corresponding module within Extreme Connect. The adapter file is provided by Extreme Networks.

Module Configuration

The table below describes the configuration options available for the SCCM OFConnect module (config file: SCCMHandler.xml)

Service Configuration	Description
Adapter IP	IP Address of the SCCM adapter
Adapter Port	Port where the SCCM adapter is listening on
Pre-Shared Key	The pre-shared key used to communicate with the SCCM adapter

General Module Configuration	
Poll interval in seconds	Number of seconds between connections to the adapter running on the SCCM server.
Module loglevel	Verbosity of the module. Logs are stored inExtremeCloud IQ Site Engine's server.log file.
Module enabled	Whether or not the module is enabled.
Update local data from remote service	If this is set to “true”, data from the remote service will be used to update the internal end-system table.
Default endsystem group	The default end-system group name in NAC to assign all MAC addresses found in SCCM. Use a non-existing group name if you don’t want this module to assign all SCCM MAC addresses into any NAC end-system group.
Enable Data Persistence	Enabling this option will force the module to store end-system and end-system group data to a file after each cycle. If this option is disabled, the module will forget all data after a service restart, but in order to clean already existing data, the corresponding .dat files have to be deleted.

Service Specific Configuration	
Custom field to use	The custom field in ExtremeCloud IQ Site Engine to update the information for end-systems retrieved from the adapter running on the SCCM server (valid values: 1-4).
Format of the incoming data	The format of the data which is received from the adapter running on the SCCM server and written to the custom field. Syntax example: Netbios Name=#netbiosName#; User=#lastLogonUserDomain#\#lastLogonUser#; OS=#operatingSystem# (#servicePack#); Manufacturer=#computerManufacturer# Model=#computerModel# Available Variables: path, mac, netbiosName, lastLogonUserDomain, lastLogonUser, operatingSystem, servicePack, computerManufacturer, computerModel
Overwrite the existing username with the one acquired from SCCM	If set to "true" the username retrieved from SCCM will overwrite the username that is already in NAC. If no username could be retrieved from SCCM for a given end-system, then no change is performed in NAC. Be aware that this might mess up existing NAC processes if you are already retrieving and using the username through some other mechanism like 802.1X or Kerberos snooping → this will be overwritten.
Overwrite the existing device type with the one acquired from SCCM	If set to "true" the device type (Windows operating system) retrieved from SCCM will overwrite the device type which is already in NAC. If no operating system could be retrieved from SCCM for a given end-system, then no change is performed in NAC. Be aware that this might mess up existing NAC processes if you are already retrieving and using the device type through some other mechanism like DHCP snooping → this will be overwritten. But in most cases this feature should improve your current method (at least for Windows machines managed by SCCM) since the quality of the information retrieved from SCCM is usually very good.

Adapter Installation

ExtremeConnect is retrieving data from an SCCM server using an adapter. This adapter needs to be installed and configured prior to enabling the corresponding module within ExtremeConnect. The adapter basically consists of a Java executable file (.jar) and a configuration file. There is currently no dedicated installer for the adapter so it's recommended that you follow these steps in order to install the adapter manually:

On the SCCM server:

1. Create a user account which the Extreme Networks adapter should use to access data on the SCCM server.
2. Install the latest Java Runtime Environment.
3. One the SSCM server, create a dedicated folder (example: C:\Program Files\Extreme Networks\SCCM Adapter) and copy the two files: FUSION_SCCM_ADAPTER_<version>.jar and FUSION_SCCM _ ADAPTER.config) into it.
4. Start the adapter by selecting the file FUSION_SCCM _ADAPTER.jar or running it within a shell using "java –jar FUSION_SCCM _ADAPTER.jar". AProvide at least the following access rights to this user account:

5. Verify the log file which should have been created in the same folder, where the jar file is located.
6. Make sure that the adapter is automatically started when the Windows Server starts up.

Adapter Configuration

The table below lists the configuration options for the SCCM agent.

Configuration Option	Description
LOG_LEVEL	Set the log level of the adapter to one of the following values: ERROR, WARN or DEBUG. If not set, the default will be WARN.
IP	IP address for the web service (=agent) to listen on
PORT	TCP Port for the web service to listen on - must NOT be used by any other application on this server!
SCCM_SERVER	The DNS name of the Configuration Manager server to connect to. So far this has only been tested with this adapter and the SCCM server running on the same server although remote connections might work as well.
SCCM_SITE_CODE	The name of the 'Site' to connect to within Configuration Manager. Example: SCCM_SITE_CODE=mysite
SLEEP_INTERVAL	Set the sleep interval in seconds - the main adapter will update all computer data from SCCM and then sleep for these many seconds before running the next update to retrieve the latest data.
PRE_SHARED_KEY	The pre-shared key used for the communication between the adapter and OFConnect. This must match the key entered when installing the OFConnect Hyper-V module
IS_PRE_SHARED_KEY_ENCRYPTED	If set to 'false' the adapter assumes that the 'PRE_SHARED_KEY' configured above is not encrypted - on the first start the adapter will automatically encrypt the key and set this value to 'true'. If you want to change this key at a later stage, change the key above, set this value back to 'false' and restart the adapter service

Verification

To verify that the data on Windows-based end-systems could be retrieved from SCCM:

1. Check the custom field within NAC's end-system table and make sure you see info on data like the netbios name, user name, detailed operating system info, etc.
2. If enabled, you will also see a more detailed operating system information within the Device Type column.
3. If enabled, you will also see the last logged on use information within the Username column.

Aruba ClearPass

The Aruba ClearPass integration is a one-way integration offering end-system data retrieval from ClearPass. ClearPass end-systems will be created and updated within ExtremeCloud IQ Site Engine. That end-system data can then be synced to Extreme Analytics and thus be mapped to flow data (username, device type, policy profile).

Note

Mapping end-system data from ClearPass to flow data within Extreme Analytics requires a correctly configured IP resolution within ClearPass since the mapping is done based on the end-system's IP address.

Module Configuration

The table below describes the configuration options available for the Aruba ClearPass module (config file: ArubaClearpassHandler.xml)

Service Configuration	Description
Server	IP Address of the Aruba ClearPass server
Port	Port of the Aruba ClearPass server API service – usually 443
Access-Token	1. Login to Aruba ClearPass Guest 2. Go to Administration [Symbol] API Services [Symbol] API Clients 3. Select "Create an API Client" 4. Use these settings: • Enabled: true • Operator Profile: Read-Only Administrator • Grant Type: Client Credentials • Access Token Lifetime: choose a high value (long lifetime) here. Example: 52 weeks 5. Select "Create API Client" The new client config will be shown in a list – select that list item and select "Generate Access Token" [Symbol] copy the HTTP authorization token which is located after the "Bearer" part of the HTTP authorization header. Example: Bearer 01279b5134e633f8df3a36b145657f4f35133f16

General Module Configuration	
Poll interval in seconds	Number of seconds between connections to the Aruba ClearPass server.
Module loglevel	Verbosity of the module. Logs are stored in ExtremeCloud IQ Site Engine's server.log file.
Module enabled	Whether or not the module is enabled.
Update local data from remote service	If this is set to "true", data from the remote service will be used to update the internal end-system table.
Default endsystem group	The default end-system group name in NAC to assign all MAC addresses found in ClearPass. Use a non-existing group name if you don't want this module to assign all ClearPass MAC addresses into any NAC end-system group.
Enable Data Persistence	Enabling this option will force the module to store end-system and end-system group data to a file after each cycle. If this option is disabled, the module will forget all data after a service restart, but in order to clean already existing data, the corresponding .dat files have to be deleted.

Service Specific Configuration	
Custom field to use	The custom field within ExtremeCloud IQ Site Engine to update the information for end-systems retrieved from ClearPass (valid values: 1-4).
Format of the incoming data	Format of the data that gets stored in the custom data field: Syntax example: user=#user#, domain=#domain#, online=#online#, updatedAt=#updatedAt#, roles=#roles# Available variables from Aruba Clearpass: ipAddress, user, domain, spt, deviceCategory, deviceFamily,deviceName, online, updatedAt, roles
HTTP socket timeout in seconds (Clearpass API)	HTTP socket timeout in seconds for all HTTP connection sockets to the Clearpass API. Enables the http client to timeout the established connection if there is no response from the ClearPass server after the configure amount of seconds
Enable device type overwrite	Enable this to use the device family/type retrieved from ClearPass to overwrite the device family/type in Extreme Access Control
End-system group for decommissioned Clearpass end-points	If an end-point gets deleted from Clearpass its corresponding end-system will be pushed to this end-system group
Remove end-systems from other groups on decommission	Enable this to remove a device from all other groups when it is moved to the decommission group
Delete custom data in Extreme Management Center or decommissioned devices	If an end-point gets deleted from Clearpass the corresponding end-system's custom data field in ExtremeCloud IQ Site Engine will be cleared
EMC Server	Hostname or IP of the ExtremeCloud IQ Site Engine server. Needed to import Clearpass end-points.
EMC Port	HTTPS port of the ExtremeCloud IQ Site Engine service. Default: 8443
EMC Username	Username to connect to the ExtremeCloud IQ Site Engine server.
EMC Password	Password to connect to the ExtremeCloud IQ Site Engine server.

Configure NAC + Analytics Integration

Ensure to enable the feature that exchanges EAC data with flow data:

Verification

The end-system data from ClearPass will be visible within the ExtremeCloud IQ Site Engine end-system list and the Analytics flow data.

Within the end-system table you should see data on all ClearPass end-systems within the configured custom field:

Plus usernames and device types if available through ClearPass.

As soon as you update the user and device type fields for ClearPass sourced end-systems in ExtremeCloud IQ Site Engine the information in the Analytics “Application Flows” tab displays as well:

ExtremeCloud IQ Site Engine Fields Updated

The following end-system table fields in ExtremeCloud IQ Site Engine are updated by the Aruba Clearpass integration:

- ipAddress
- user
- domain
- spt
- deviceCategory
- deviceFamily
- deviceName
- online
- updatedAt
- roles

Connect Convergence Configuration

Avaya Easy Management

Polycom CMA

Microsoft Lync / Skype For Business

Analytics

Avaya Easy Management

The Avaya Easy Management integration is a one-way integration offering end-system data retrieval from Avaya on phones. This data enriches each end-system data set within ExtremeCloud IQ Site Engine and offers comprehensive reporting capabilities within OneView.

Module Configuration

Service Configuration	Description
Username	Username used to connect to the Avaya SQL Anywhere 9 DB
Password	Password used to connect to the Avaya SQL Anywhere 9 DB
Avaya DB Server IP	IP Address of the Avaya SQL Anywhere 9 DB Server
Avaya DB Server Port	TCP port of the Avaya SQL Anywhere 9 DB Server

General Module Configuration	
Poll interval in seconds	Number of seconds between connections to the Avaya DB.
Module loglevel	Verbosity of the module. Logs are stored in ExtremeCloud IQ Site Engine's server.log file.

General Module Configuration	
Module enabled	Whether or not the module is enabled.
Update local data from remote service	If this is set to true, data from the remote service will be used to update the internal end-system table.
Default end-system group	The default end-system group name to use for all phones retrieved from Avaya.
Enable Data Persistence	Enabling this option will force the module to store end-system and end-system group data to a file after each cycle. If this option is disabled, the module will forget all data after a service restart, but in order to clean already existing data, the corresponding .dat files have to be deleted.

Service Specific Configuration	
Custom field to use	The custom field withinExtremeCloud IQ Site Engineto update the information for endsystems retrieved from Avaya Easy Management (valid values: 1-4).
Format of the incoming data	Format of the data that gets stored in the custom data field. Syntax: Number: #phoneNumber#; User: #UserDefinedField1#; Hardware: #hardwareVersion#; Software: #swVersion#; Gatekeeper: #currentGatekeeperAddress#; Status: #status# Available Variables: mac, status, ipAddress, currentGatekeeperAddress, phoneNumber, swVersion, hardwareVersion, UserDefinedField1
Use global endsystem groups	This feature enables the module to use the global endsystem groups of the OneFabric ConnectExtreme Connect.

Verification

To verify proper functioning of the Avaya Easy Management integration, validate that data on Avaya phones has been published within NAC's/OneView's custom field within the end-system list.

Polycom CMA

The Polycom CMA integration is a one-way integration offering end-system data retrieval from Polycom for managed devices. This data enriches each end-system data set in ExtremeCloud IQ Site Engine and offers comprehensive reporting capabilities within OneView.

Required configuration within the Polycom CMA Web Management: navigate to Admin → SNMP Settings and enable SNMPv3:

- Transport: UDP
- Authentication Type: SHA
- Encryption Type: AES 128 Bit

The other values can be customized to your environment. SNMP community and V3 Context Name are not evaluated.

The integration has been tested with Polycom CMA 5.5.0.ER19 but should work with older versions from 5.3.0 upwards. Both CMA 4000/5000 are supported, as well as the complete

HDX and VVX 1500 line of end-points. There is no software dependency on the endpoint devices as long as they are monitored by the CMA

Module Configuration

Service Configuration	Description
Server	Polycom CMA Server IP
Password	Password used to connect to the Avaya SQL Anywhere 9 DB
SNMPv3 Security Name	SNMPv3 Security Name
SNMPv3 Auth Passphrase	SNMPv3 Auth Passphrase
SNMPv3 Privacy Passphrase	SNMPv3 Privacy Passphrase

General Module Configuration	
Poll interval in seconds	Number of seconds between connections to the Polycom CMA.
Module loglevel	Verbosity of the module. Logs are stored in ExtremeCloud IQ Site Engine's server.log file.
Module enabled	Whether or not the module is enabled.
Update local data from remote service	If this is set to “true”, data from the remote service will be used to update the internal end-system table.
Default endsystem group	The default end-system group name to use for all managed devices retrieved from Polycom CMA.
Enable Data Persistence	Enabling this option will force the module to store end-system and end-system group data to a file after each cycle. If this option is disabled, the module will forget all data after a service restart, but in order to clean already existing data, the corresponding .dat files have to be deleted.

Service Specific Configuration	
Custom field to use:	The custom field within ExtremeCloud IQ Site Engine to update the information for endsystems retrieved from Polycom CMA (valid values: 1-4).
Format of the incoming data:	Format of the data that gets stored in the custom data field. Syntax: Endpoint ID: #endPointID#, Status: #status#, Type: #type# Available Variables: endPointID, macAddress, status, type

Verification

If you configured a valid NAC end-system group to assign Polycom devices:

1. Verify that the MAC address of your Polycom end-points are now member of that end-system group in NAC.
2. Verify that for each Polycom device the end-point’s device type (HDX or VVX) and the end-point’s status (offline/online) has been imported.

Microsoft Lync / Skype For Business

The Microsoft Skype for Business (formerly known as Lync) integration offers dynamic call prioritizations and comprehensive reporting capabilities within OneView.

Before installing and configuring the OFConnect integration for MS Skype for Business:

1. Install the Skype for Business SDN API which can be retrieved from Microsoft: http://www.microsoft.com/en-us/download/details.aspx?id=44274
2. Make sure to point the Skype for Business SDN management service to your ExtremeCloud IQ Site Engine server (where ExtremeConnect is installed).
3. Read the corresponding solution guide for further details.

Module Configuration

Service Configuration	Description
Skype for Business SDN Management Service IP	IP Address of the Skype for Business SDN management service.

General Module Configuration	
Poll interval in seconds	The time the module will wait during each run.

Caution	
During each run (cycle) the module will perform various steps some of which are putting extra load on the ExtremeCloud IQ Site Engine server. It is not recommended to set this value below 600 seconds (=10 minutes). The larger the ExtremeCloud IQ Site Engine environment (=number of NAC end-systems, switches, access points, etc.) the higher this value should be. Setting this value too high though (for example: 7200 seconds = 2 hours) will lead to the fact that administrators won't be able to analyze call reports for up to 2 hours before those calls have ended.	
Module log-level	Verbosity of the module. Logs are stored in ExtremeCloud IQ Site Engine's server.log file.
Module enabled	Whether or not the module is enabled.
Enable Data Persistence	Enabling this option will force the module to store end-system data to a file after each cycle. If this option is disabled, the module will forget all data after a service restart, but in order to clean already existing data, the corresponding .dat files have to be deleted.

Service Specific Configuration	
Custom field to use	This field is not yet used by this integration so keep set to the default of 1.
ExtremeCloud IQ Site Engine Request Timeout	Timeout in seconds the module waits until it declares a web service call to ExtremeCloud IQ Site Engine as timed-out.

Service Specific Configuration	
Time to wait for a quality update from Skype for Business	When a Skype for Business call finishes Skype for Business sometimes sends a 'QualityUpdate' shortly after the end of the call. We should be able to retrieve call quality information from this message. This timeout value defines the minimum number of seconds the module waits before it declares a call as fully ended (with or without the existence of a QualityUpdate info).
Enable audio call prioritization	Enable this to prioritize audio streams (connections/flows) for all Skype for Business calls if possible. If this is disabled, no audio streams for any Skype for Business call will be prioritized, either via XAPI or via ODL. You will still be able to access the OneView reports but no dynamic ACLs/QoS profiles will be created in the infrastructure for the audio flows. Default: true
Enable video call prioritization	Enable this to prioritize video streams (connections/flows) for all Skype for Business calls if possible. If this is disabled, no video streams for any Skype for Business call will be prioritized, either via XAPI or via ODL. You will still be able to access the ExtremeCloud IQ Site Engine reports but no dynamic ACLs/QoS profiles will be created in the infrastructure for the video flows. Default: true
Enable application sharing call prioritization	Enable this to prioritize application sharing streams (connections/flows) for all Skype for Business calls if possible. If this is disabled, no application sharing streams for any Skype for Business call will be prioritized, either via XAPI or via ODL. You will still be able to access the OneView reports but no dynamic ACLs/QoS profiles will be created in the infrastructure for the application sharing flows. Default: true
QoS Profile for audio calls	The name of the QoS profile used on the ExtremeXOS/Switch Engine access switches to prioritize audio calls. This profile must be pre-configured on each access switch manually before using it.
QoS Profile for video calls	The name of the QoS profile used on the ExtremeXOS/Switch Engine access switches to prioritize video calls. This profile must be pre-configured on each access switch manually before using it.
QoS Profile for application sharing calls	The name of the QoS profile used on the ExtremeXOS/Switch Engine access switches to prioritize application sharing calls. This profile must be pre-configured on each access switch manually before using it.
DSCP value for audio calls	The DSCP value to apply to audio call packets on access switches. This value can be picked up by all switches on the path between caller and callee to provide end-to-end QoS for audio calls. Default: 46
DSCP value for video calls	The DSCP value to apply to video call packets on access switches. This value can be picked up by all switches on the path between caller and callee to provide end-to-end QoS for video calls. Default: 36
DSCP value for app sharing calls	The DSCP value to apply to app sharing call packets on access switches. This value can be picked up by all switches on the path between caller and callee to provide end-to-end QoS for app sharing calls. Default: 26
Default username for web access toExtremeXOS/Switch Engine switches	The default username to connect to ExtremeXOS/Switch Engine switches' HTTP(S) interface (xapi). This username is only used if there are no CLI credentials defined for a switch inExtremeCloud IQ Site Engine. Otherwise theExtremeCloud IQ Site Engine CLI username takes priority. This setting is only used if the OpenDaylight option is disabled.

Service Specific Configuration	
Default password for web access to ExtremeXOS/Switch Engine switches	The default password to connect to ExtremeXOS/Switch Engine switches' HTTP(S) interface (xapi). This password is only used if there are no CLI credentials defined for a switch in ExtremeCloud IQ Site Engine. Otherwise theExtremeCloud IQ Site Engine CLI password takes priority. This setting is only used if the OpenDaylight option is disabled.
Hard timeout (in minutes) for Skype for Business calls	The number of minutes after which a Skype for Business call is considered as ended even if no ended notification has been received from Skype for Business in the meantime. If the configured amount of minutes have passed between the start of a call and now this call will be considered ended → any prioritization will be removed from the infrastructure, the call data will be removed from the in-memory list and reporting data will be created for OneView reporting. This feature handles cases where for some reason the Skype for Business front-end or SDN management servers have been down or communication has been blocked and thus OneFabric Connect didn't receive the 'call ended' notifications for one or more active calls. This setting is only used if the OpenDaylight option is disabled. When using an OpenDaylight controller, the corresponding flows will timeout automatically. Default: 360 (=6 hours).
Use Skype for Business call timestamp instead of local ExtremeCloud IQ Site Engine time	The Skype for Business front-end servers typically report the call start and end timestamps in UTC time - no matter for which timezone each FE server is configured. If this option is set to 'true', these timestamps are used for ExtremeCloud IQ Site Engine reporting but also to decide when to end a call (and remove its corresponding prioritizations) using the configured value for "call_hard_timeout_in_minutes". If you enable this option you need to ensure that your ExtremeCloud IQ Site Engine server is also running on UTC timezone otherwise the OneView reports will be off and the hard timeout functionality for call prioritization won't work properly. It is recommended to keep this option set to 'false' -→ in this case, the Skype for Business timestamps will be ignored and the local ExtremeCloud IQ Site Engine timestamp will be used at the moment the Skype for Business notifications arrive at your ExtremeCloud IQ Site Engine server. Default: false.
Number of days to store call reporting data	The number of days to store data on Skype for Business calls in the Derby DB. Calls that predate than the configured number of days will automatically be purged from the DB and won't appear in the OneView reports anymore. A higher value will have a negative impact on the overall performance of this module and the OneView reports. Default: 30. Purging is performed every night during the first run of the MSSkype for BusinessSDNHandler module after midnight. So if you set the interval for this module to 600 seconds purging will happen somewhere between midnight and 00:10:00 (0:10 AM).
Enable the cleanup routine for obsolete Skype for Business-related ACLs on ExtremeXOS/Switch Engine switches	Enable this to run an automated cleanup process one time per night/week. It will connect to all your ExtremeXOS/Switch Engine switches via Telnet or XAPI (depending on firmware support) and try to identify obsolete Skype for Business-related dynamic ACLs. If found, it will remove those ACLs from all ports and delete the ACLs from the switch afterwards. Set the interval for this process using the next setting cleanUpObsoleteACLsOnXosSwitchesInterval. This setting is only applicable if the OpenDaylight option is disabled. When using an OpenDaylight controller, the corresponding flows will timeout automatically.
Interval for cleanup routine for obsolete Skype for Business-related ACLs on ExtremeXOS/Switch Engine switches	If the feature cleanup_obsolete_acls_from_xos_switches is enabled, use this setting here to define the interval, which will be used for the cleanup routine. Two available options: daily or weekly. The default is weekly.

Service Specific Configuration	
Enable the clean-up routine for obsolete Skype for Business-related ACLs on EOS switches	Enable this to run an automated clean-up process one time per night/week. It will connect to all your EOS switches via Telnet and try to identify obsolete Skype for Business-related policy ACLs. If found, it will delete the ACLs from the switch. Set the interval for this process using the next setting cleanUpObsoleteACLsOnEosSwitchesInterval.
Interval for clean-up routine for obsolete Skype for Business-related ACLs on EOS switches	If the feature cleanup_obsolete_acls_from_eos_switches is enabled, use this setting here to define the interval which will be used for the clean-up routine. Two available options: daily or weekly. The default is weekly.
Gateway Switches	A list of switches that are located at the edge of your network where all external Skype for Business calls pass through. If an external Skype for Business call is detected, a dynamic ACL to prioritize this call's ingressing flow will be created on all switches on this list on their ANY interface. This will enable QoS for external calls as they enter your network at those gateway switches. Ensure that these switches support the required number of dynamic ACLs for the ANY interface. If you don't want to enable this feature simply keep on empty with 127.0.0.1 in the list. If you manually modify this list make sure to keep the "id" values for all entries consistent and unique. Example entry: <gateway_switch_entry desc="Gateway Switch Entry" id="1" type="Entry"> <info>A Gateway Switch Entry</info> <value>127.0.0.1</value> </gateway_switch_entry>
Skype for Business Front-End Server IP addresses	A list of all Skype for Business front-end server IP addresses. If you want to prioritize conference calls but you cannot (or don't want to) enable any end-system tracking mechanism (RADIUS authentication, ExtremeXOS/Switch Engine IDM, OneController plugin) feature on your data center switches where your Skype for Business front-end servers are connected to, provide the list of all your FE server IPs here. When calls from or to your FE servers are seen, they will be prioritized on all gateway switches listed within the feature list "Gateway Switches". Ensure that the list of gateway switches contains all switches where your FE servers are connected. If you don't want to enable this feature simply keep a single entry with IP 127.0.0.1 and ID 1 in the list. If you manually modify this list make sure to keep the "id" values for all entries consistent and unique. This setting is only applicable if the OpenDaylight option is disabled.
Use HTTPS for XAPI calls	Enable this to use HTTPS instead of HTTP for any XAPI communication with all ExtremeXOS/Switch Engine switches. If enabled, you will also need to install the SSH mod on all ExtremeXOS/Switch Engine switches and configure "enabled web https". This setting is only applicable if the OpenDaylight option is disabled. Default: false
Use OpenDaylight controller instead of XAPI for call prioritization	Enable this to use an Open Daylight controller to locate Skype for Business call end-points in the network infrastructure and prioritize audio/video calls using OpenFlow. When enabled, you will also need to configure the OpenDaylight server using various settings below. If this is disabled, it will use theExtremeCloud IQ Site Engine API and XAPI on ExtremeXOS/Switch Engine switches to located end-points and prioritize calls. Default: false
IP address of the Open Daylight controller	ExtremeCloud IQ Site Engine IP of the Open Daylight controller. This configuration only is valid when the option use_opendaylight is set to true.

Service Specific Configuration	
TCP/HTTP port of the Open Daylight controller	The HTTP port on which the Open Daylight REST API is provided. At the moment, only HTTP is supported. This configuration only is valid when the option use_opendaylight is set to true. Default: 8181.
Username to connect to the Open Daylight controller API	The given user should have admin rights to be able to create new flows and search for host. This configuration only is valid when the option use_ opendaylight is set to true.
Password to connect to the Open Daylight controller API	The password for the given user. This configuration only is valid when the option use_opendaylight is set to true.
Idle timeout for flows created via Open Daylight controller	The idle timeout in seconds for newly created flows. All flows created via the Open Daylight controller to prioritize Skype for Business calls will use this idle timeout setting. Set this to 0 to disable this feature. Default: 300.
Hard timeout for flows created via Open Daylight controller	The hard timeout in seconds for newly created flows. All flows created via the Open Daylight controller to prioritize Skype for Business calls will use this hard timeout setting. Set this to 0 to disable this feature. Default: 3600.
Prioritize Wifi Calls	When enabled, it is verified whether the source or destination Lync end-point are connected through an Extreme Identify wireless controller / AP. If that is the case, the corresponding call flow will be prioritized on the switchport where the corresponding Extreme Access Point is connected to. This feature is only available starting with Extreme Management Center version 6.3 and only in Bridged@AP modes. If your wifi topology is Bridged@Controller the call flows will still be prioritized on the corresponding switch access ports but it won't have any effect as the wifi client traffic is transparently tunneled through to the controller and the ACLs/flows/policies configured on the access switch will never match any of those packets. Ensure that LLDP is enabled on both your access switches and all access points. Also ensure that you have enabled device statistics collection for OneView for all access switches where AP's are connected to. Default: true
Prioritize real-time control protocol traffic	Audio and video are typically sent using RTP, which requires two UDP ports, one for the media and one for the control protocol (RTCP). Enable this feature to also prioritize the RTCP traffic/flows. They typcially use the RTP port number reported by the Lync API plus one. So for example, if Lync reports a UDP source port of 5000 for a specific call connection the code will prioritize traffic on both ports 5000 and 5001. Default: false

Verification

In order to verify that the integration is properly assigning dynamic ACLs to prioritize Skype for Business calls in the infrastructure:

1. Start a call between two Skype for Business end-points and keep it running/active
2. Use Telnet or SSH to connect to the switches where these Skype for Business end-points are currently connected (you can use the NAC end-system list to get the switches and ports of your Skype for Business end-points easily)
3. Perform a “show config acl” to list all ACLs currently active on the switch and validate that you see at least one ACL with a name similar to the following syntax: Skype for BusinessSrcA1234567890. The first piece indicates that this ACL has been dynamically created by OFConnect to prioritize a Skype for

Business call. The “Src” or “Dst” part indicates whether this ACL is used for the source or destination end-point of a call. The “A” or “V” indicates whether this ACL is used to prioritize the audio or video stream for the Skype for Business call. The rest of the name a part of the call ID retrieved from Skype for Business and thus makes this ACL name unique.

4. If you see two or even four ACL names starting with “Skype for Business…” this would indicate that both Skype for Business end-points are connected to the same switch and/or that this is an audio and video call and both streams get prioritized with unique ACLs.
5. Ensure those ACLs are bound to the correct ingress switch port.
6. In order to verify that the reporting capabilities are working as expected, login to OneView and launch the MS Skype for Business specific report found in the “Reports” tab on the left navigation pain under “VoIP →MS Skype for Business”. If this report is not visible, you might be missing the required xml reporting file.
7. Verify that you do see calls in the first tab of the report and the data seems correct.

Analytics

Reporting

ExtremeConnect offers a new set of reports focused around different generalized solution sets like Data Center Management and Mobile Device Management. In addition, end-system data will be propagated in a dedicated custom field across all modules. This field will contain labels to identify characteristics like “virtual” or “mobile” available to searches across the entire end system table in ExtremeCloud IQ Site Engine.

Data Center Manager (DCM) System Configuration

Extreme Connect Modules for data center applications leverage ExtremeCloud IQ Site Engine end-system groups to create and manage virtual portgroups within 3rd party hypervisors.

DCM Fabric Manager

End-System Groups

Private VLANs

DCM Fabric Manager

After installing Extreme Connect, ExtremeCloud IQ Site Engine NAC Manager offers a new configuration menu at **Tools** > **Management and Configuration** > **Data Center Fabric**.

The Fabric Manager assists in the creation of new end-system groups and the corresponding description string that will be used by Extreme Connect to create portgroups on remote systems.

While the parameters could also be edited manually in the end-system group menu, it is strongly recommended to use the wizard to avoid accidental misconfiguration.

The individual configuration options are:

Configuration Options	Description
approval=true|false	If you set this value to "true", end-system must be approved before it is added to this end-system group. Can be used for sensitive endsystem group like your DMZ group, for example, where you don't want any VMs to be assigned to without proper approval. VMs which are allocated to such end-system groups/vSwitch but have not yet been approved manually by an administrator will temporarily be pushed to the default group "VM Pending Approval".
sync=true|false	Only if you set this value to 'true' a new portgroup (VMware) or network (XEN) will be created automatically with the same name by the Datacenter manager.
VLAN ID	In order to define a VLAN ID for new VMware vSwitches/dvSwitches or XEN networks (this feature is not available for the Hyper-V module) you can use the following two formats: vlan=#static_vlan_id#: Setting this value to 'vlan=100', for example, will create a new portgroup (for VMware vSwitches) or network (XEN) and assign the VLAN ID 100 to it. For proper configuration you would then need to create an Extreme Control NAC rule which would bind this endsystem group to a policy which also assigns ("Contain to") the endsystem to VLAN 100 on the physical network. The VMware/XEN management will make sure that VMs within this portgroup/network will be tagged with VLAN ID 100. vlan=#primary_vlan_id#:#secondary_vlan_id#:isolated_or_community: This format is exclusively used for VMware to create a new private VLAN and corresponding dvSwitch. The primary and secondary vlan IDs used must not be the same! The third parameter can only be "isolated" or "community". VMs connected to isolated PVLANs are not able to communicate directly with each other – all communication will traverse the physical network. VMs connected to community PVLANs are able to communicate directly with each other through their dvSwitch. Example: "vlan=4000:4001:isolated".
switchgroup=#name#	This is a setting exclusively used for VMware. If you have 'sync=true' but don't set this switchgroup value it will automatically create a new portgroup for this endsystem group on ALL vSwitches. If you have vSwitches should, for example, only be used for management purpose you might not want the Datacenter manager to create such portgroups on those vSwitches. You can use the following pre-defined values to adjust this settings as follows. In addition to these pre-defined values you can also use Regular Expression to granularly define the vSwitches where you want the new portgroups to be created. vSwitchOnly: The new portgroup will only be created on all vSwitches, not on distributed virtual switches. dvSwichtOnly: The new portgroup will only be created on all distributed vSwitches, not on the vSwitches. includeAll: The new portgroup will be created on all vSwitches and distributed vSwitches. excludeAll: There will be no new portgroup created.
nic=#list of NICs#	This is a setting exclusively used for XEN. In order for the Datacenter manager to create a new network within XEN server it needs to know the physical interface used to attach this network to. This must be the name of the physical interface as seen by the operating system of the XEN servers. For both examples below, don't forget to also use the settings "sync=true" and "vlan=XXXX" – this will create a so called external XEN network and setting both the vlan ID and the physical NIC is mandatory for external networks. Setting only one of these two values will result in the creation of an internal network that will not have a VLAN ID nor a connection to the physical network.

Example 1: If you use your first interface (eth0) for management of the XEN server and you want to create a new XEN network which connects to the second physical interface, use "nic=eth1" for the corresponding end-system configuration.

Example 2: If you want to create a bond instead of a simple network you will need to provide a list of NICs that should be attached to this bond. You could use the following syntax: “nic=eth1,eth2”

Verification

To verify the configuration:

1. See which groups Extreme Connect is aware of at the “End-System Group” panel on the configuration page.

Note: The groups under “ExtremeCloud IQ Site Engine” lists the entire group inventory, while the list under “Extreme Connect” only lists those groups that are marked for synchronisation (sync=true).

2. If synchronisation is not enabled for a group, Extreme Connect will act as if that group does not exists when creating external portgroups/networks.

End-System Groups

After initial installation the following groups should be present in IAM:

End-system group for Disconnected Devices	Fusion Disconnected Systems
End-system group for Pending Approvals	Fusion Pending Approval

We have shown the default names for each group. These names can be changed during installation or in the configuration page.

These groups provide the ability to configure access rules for end-systems that qualify for any of these. The approval pending group will contain end-systems which are connected to a portgroup with the “approval=true” flag being set, before they are approved by an administrator.

The disconnected devices group will create a portgroup on the hyper visor for case that an end-system group is deleted, the portgroup/network deletion feature is enabled and the to-be-deleted portgroup/network has still VMs attached. These VMs will be moved to the Disconnected Systems portgroup and consequently show up in the end-system group of the same name.

Private VLANs

Private VLANs (pVLANs) currently only exist within VMware. In a standard VMware setup, all VMs connected to the same distributed vSwitch (dvSwitch) are allowed to talk to each other. With pVLANs it is possible to isolate VMs connected to the same dvSwitch from each other. This ways they cannot directly communicate with each other. Any communication between those isolated VMs must be carried out outside of the VMware environment over the physical network. This is a great way to control the traffic/applications used by these VMs (using Extreme Policies) and also, if needed, screen that traffic using Netflow technology.

Requirements

VMware vCenter sufficient license to use distributed vSwitches.

At least one distributed virtual Switch (dvSwitch)

Useful Information on pVLANs

The vCenter Server will manage multiple ESX hosts. A dvSwitch is a virtual Switch which exists on all your ESX servers managed by a vCenter Server and is unique to all of them. You cannot use pVLANs on normal vSwitches.

Note: the following section is only informational. The described tasks are automated via Data Center Manager!

To create pVLANs:

1. Create a new dvSwitch and navigate to its settings windows.
2. Choose the “Private VLAN” tab.
3. Create primary and secondary private VLANs. Every primary private VLAN ID must have one secondary VLAN ID with the same ID in promiscuous mode and then can have multiple other secondary VLAN IDs. The secondary VLANs can either be of type “isolated” or “community”. In isolated mode, the VMs connected to these secondary VLANs will not be able to communicate with other VMs on the same dvSwitch without being routed through the physical network. The community mode enables direct VM communication within the virtual network environment (dvSwitch). No secondary VLAN ID or static VLAN ID can be the same as any existing primary VLAN ID.
4. When these VMs communicate on the physical network, you will see the secondary private VLAN ID, not the primary one. For additional information, we attach the knowledge base article directly from VMware regarding this topic:
   http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=1010691

Promiscuous PVLANs have the same VLAN ID both for Primary and Secondary VLAN.

Community and Isolated PVLANs traffic travels tagged as the associated Secondary PVLAN.

Traffic inside PVLANs is not encapsulated (no Secondary PVLAN encapsulated inside a Primary PVLAN Packet).

Traffic between virtual machines on the same PVLAN but on different ESX hosts go through the Physical Switch. Therefore, the Physical Switch must be PVLAN aware and configured appropriately, to enable the secondary PVLANs to reach destination.

Switches discover MAC addresses per VLAN. This can be a problem for PVLANs because each virtual machine seems to be in more than one VLAN to the physical switch, or at least, it indicates that there is no reply to the request, because the reply travels back in a different VLAN. For this reason, it is a requirement that each physical switch, where ESX with PVLANs are connected, must be PVLAN aware.

In order to actually use these private VLANs you need to create a portgroup within the dvSwitch. Within the settings section of this portgroup you can configure the VLAN. Select "Private VLAN" as the type and then choose from those private VLANs you've configured before.

Note: If you configure a secondary private VLAN 201 and at the same time add the following string to an end-system group's description field within Extreme Control NAC manager "vlan=200:201:isolated", Datacenter manager will recognize this and create the appropriate config and add all VMs within this end-system group to that private VLAN dvSwitch.

Reference Setup

We've created a reference on how to deploy a pVLAN configuration. Goal of this setup was to create two VMs which are connected to the same dvSwitch within the same secondary isolated PVLAN which can only communicate with each other traversing the physical network. This has been extended to also traverse a routing instance. This way, one can create the same setup where the VMs are distributed over two physical ESX servers which are located in different routing networks.

Policy Domain Configuration

This section describes the setup of the different Policy Domains used for the different switching/routing layers. A short summary/overview before we dip into the details:

1. 1. Dynamic role at the S-Series in Layer 2 Mode (switching) assigns all traffic based on the source MAC of the VMs into the following VLANs:
    a. All traffic to the router (VRRP) MAC address contained into VLAN 4000
    b. All ARP traffic contained into VLAN 4001
    c. You can add additional rules
2. VLAN to Policy Map at the S-Series in Layer 3 Mode (routing) for PVLAN L3
    a. Is assigned to all traffic tagged with VLAN ID 4001 – no dynamic policy assignment based on the MAC addresses of the VMs
    b. Contains all ARP traffic to VLAN 4000 (all other traffic is already contained to 4000)
    c. Router interface within this VLAN 4000 is replying to the ARP requests with its own MAC address (local proxy ARP) and sends the reply in VLAN 4000
3. The VLAN 4000 and 4001 must be statically configured on the uplinks/trunk in between the physical switches

Policy Domain Layer 2 – Role VM PVLAN Access

All traffic coming from the VM is tagged with VLAN ID 4001 (the secondary PVLAN ID for the dvSwitch where this VM is connected to). The following role configuration has been implemented:

- Role level: VLAN 4000 tagged egress: to dynamically assign this VLAN to this port VLAN egress list so on the way back from the physical network to the VM the traffic will be tagged with VLAN 4000.
- Role level: TCI overwrite enabled
- Role level: Deny All traffic by default
- Rule: Contain packets to the backbone router's MAC address (00:00:5e:00:01:01) to VLAN 4000. This avoids inter-VM communication via broad- and multicasts
- Rule: Value 0x806 (ARP) contain to VLAN 4001: Only ARP traffic is kept in VLAN 4001 to make sure it is only broadcasted to the upstream of the Layer 2 switch where the router is connected (this router replies to the ARP broadcasts)

Policy Domain Core – Policy VM PVLAN L3

The core router is S-Series switch configured as a router. It receives the IP traffic on VLAN 4000 and the ARP broadcasts on VLAN 4001 from the VMs. This router has "local proxy ARP" enabled to reply with its own MAC address when it receives any ARP broadcast for any VMs (even residing on the same local subnet) since all traffic from the secondary PVLAN 4001 should be routed through this router and not travel directly between the VMs. The following configuration has been implemented:

- Role level: VLAN 4000 tagged egress: assign VLAN 4000 tagged egress for IP traffic back to the VMs
- Role level: TCI override enabled
- Role level: Role Mapping of VLAN ID 4001 to policy VM PVLAN L3
- Rule: Value 0x806 (ARP) contain to VLAN 4000: This is where we re-map the ARP traffic from 4001 to 4000 to have this router's interface within VLAN 4000 reply to that ARP broadcast with its own MAC address (local proxy ARP) – after this re-mapping is done, there is no more traffic on VLAN 4001

Mobile Device Management (MDM) System Configuration

In order to be used by Extreme Networks MDM Connector plugin, the MDM software must be configured to provide the data that is imported by IAM as assessment information or end-system data.

End-System Groups

After initial installation the following groups should be present in IAM:

Group for Managed Business Mobile Devices	Managed Mobile Devices Business
Group for Managed Personal Mobile Devices	Managed Mobile Devices Personal
Group for Decommissioned Mobile Devices	Managed Mobile Devices Decommissioned

We have shown the default names for each group. These names can be changed during installation or in the configuration page.

In addition to these a fourth group will appear for the 'wipe' functionality:

End-system group for Managed Devices Wipe	Managed Mobile Devices Wipe

These groups contain the inventory information coming from the MDM provider. End-systems will be classified in each group depending on the ownership information from the MDM provider.

The ‘decomissioned’ group is a placeholder for devices that have been unenrolled in the MDM provider. Typically, its treatment should be the same as unregistered users.

The ‘Wipe’ group is an exception to this rule, the group is only used to trigger a wipe notification to the MDM provider. The wipe signal will reset the configuration of the ensystem to its factory settings. This option is disabled by default.

ExtremeConnect Assessment Configuration

TheExtremeConnectAssessment Configuration includes Assessment Map Entries and the Assessment Adapter, which provide you with health tests and results for your Connect modules.

This Help topic provides information on the following:

Assessment MAP Entries

Assessment Adapter

Assessment MAP Entries

All modules except McAfee EMM currently use the assessment adapter to report health results toExtremeCloud IQ Site Engine. The assessment adapter creates 30 new assessment tests or PluginIDs to use by NAC. Each test is reported to NAC by a pluginID created as follows:

- base value = 100.000
- plugin id = base value + ENUM ID (i.e. OWNERSHIP -> 100.000 + 22 = 100.022)

The following is the complete list of tests and IDs:

- EXISTS(1)
- COMPLIANT(2)
- JAILBROKEN(3)
- AUTHORIZED(4)
- WIPED(5)
- UNINSTALLED(6)
- COMPROMISED(7)
- OSOUTOFDATE(8)
- POLICYOUTOFDATE(9)
- DEVICEOUTOFDATE(10)
- BLOCKED(11)

- INFECTED(12)
- LOST(13)
- RETIRED(14)
- UDID(15)
- SERIALNUMBER(16)
- IMEI(17)
- ASSETNUMBER(18)
- NAME(19)
- LOCATION(20)
- USER(21)
- OWNERSHIP(22)
- PLATFORM(23)
- MODEL(24)
- OSVERSION(25)
- PHONENUMBER(26)
- LASTSEEN(27)
- PASSCODEPRESENT(28)
- PASSCODECOMPLIANT(29)
- DATAENCRYPTION(30)

You can map each test to different variables in each MDM connector.

In JAMF Casper module's default configuration, the test EXISTS (pluginID 100001) is mapped to the value of the variable 'managed' in JAMF Casper's database.

NAC Manager can assign risk values and scores to each test using their pluginID. This is needed in order to quarantine devices based on their risk level.

Assessment Adapter

The assessment adapter infrastructure reports health results from ExtremeConnect modules to the NAC, if available. To make the assessment adapter available, it needs to be extracted. To extract the assessment adapter:

NOTE: This procedure expects the application to be installed in the default directory `/usr/local/Extreme_Networks/NetSight/`. If the application is not installed in this directory, please adjust the path in the procedure below.

1. Run the `connectAssessmentAdapter.sh` extraction script to extract the adapter on the XIQ-SE server.

   ```
   /usr/local/Extreme_Networks/NetSight/scripts/connectAssessmentAdapter.sh
   ```

   NOTE: The version of the Connect Assessment Adapter must match the version of the ExtremeCloud IQ Site Engine. Please extract the new version of the Connect Assessment Adapter after upgrading ExtremeCloud IQ Site Engine.

2. Launch the extracted assessment adapter using the following command.

   ```
   cd /usr/local/Extreme_
   Networks/NetSight/wildfly/standalone/deployments/Connect.ear/assessment/
   ./launchAS.sh &
   ```

   NOTE: McAfee Enterprise Mobility Management (EMM) uses a separate assessment plugin to gather data from the server and report it as health results to the ExtremeCloud IQ Site Engine server. This path points to the location of the `MDMAssessment.jar` that must be in this directory.

   ```
   /usr/local/Extreme_
   Networks/NetSight/wildfly/standalone/deployments/Connect.ear/assess
   ment/lib
   ```

3. Configure the OS to start the assessment adapter after the restart.

   ```
   echo –e '#! /bin/sh\n cd /usr/local/Extreme_
   Networks/NetSight/wildfly/standalone/deployments/Connect.ear/assessment/
   \n ./launchAS.sh &\n' >> /etc/rc.local
   ```

4. Before the assessment adapter can be used in ExtremeCloud IQ Site Engine, it has to be created as a valid assessment server.

   a. To add an Assessment Server:

      i. Select **Control > Access Control > Configuration > Profiles > Assessment > Default** or an assessment configuration

      ii. Select **Manage > Assessment Servers**

      iii. Select **Add**to add a new assessment server

      iv. Select **Close**

   b. In the new server dialog, provide the required data:

      - **Assessment Server IP**
        The IP Address of the ExtremeCloud IQ Site Engine server.
      - **Assessment Server Name**
        This can be any name to easily identify the server.

- **Assessment Server Port**
  If launched with the `launchAS` commands, the agent runs on server 8448.
- **Assessment Server Type**
  Select FusionAssessmentAgent. FusionAssessmentAgent converts health/compliance information from various ExtremeConnect modules and transforms the data to the health results in the end-system details.
- **Max Concurrent Scans**
  Leave this empty. This can be used to increase the capacity of the server. By default, the server allows 10 concurrent scans. In order to use this server for assessment purposes, the server must be in an assessment pool and the assessment pool must be used by an assessment configuration.

c. Create a scoring override for one or more of these test cases to quarantine end-systems in case they match a certain result string within their description field.

d. If you want to quarantine all iPads with an iOS version of 5.x, make sure you have enabled Use Quarantine Policy in the corresponding NAC profile and that the corresponding policy on the WLAN controller has a redirect configured within that policy that points to the NAC captive portal.

e. Enable Assisted Remediation within the NAC configuration in order for NAC to display the remediation/self-help page.

f. Customize your remediation portal if needed. For example, you can add a remediation link that allows users to register their devices on the MDM portal.

g. Another customization that is recommended is to define the Custom Remediation Actions to improve the user experience with the help texts on the remediation page.

Connect Configuration Troubleshooting

Troubleshooting VMware vSphere Configuration

Troubleshooting Citrix XenServer Configuration

Troubleshooting Adapters for XenDesktop, Hyper-V, SCVMM and SCCM Configuration

Troubleshooting Citrix XenDesktop Configuration

Troubleshooting Microsoft Hyper-V and Virtual Machine Manager Configuration

ExtremeCloud IQ Site Engine is not responding.

Restart the ExtremeCloud IQ Site Engine services. Change directory (cd) to `/usr/local/Extreme_Networks/NetSight/scripts`.

```
cd /usr/local/Extreme_Networks/NetSight/scripts
```

stop ExtremeCloud IQ Site Engine service by typing:

```
./stopserver.sh
```

Wait for the prompt and then start ExtremeCloud IQ Site Engine service by typing:

```
./startserver.sh
```

Is there a log file and where do I find it?

Extreme Connect logs within the JBoss context of the ExtremeCloud IQ Site Engine server. Find the server.log file either in the ../appdata/logs/ folder or simply by opening the server log from any ExtremeCloud IQ Site Engine Client.

What loglevels are available and how do I change them?

Every module of ExtremeConnect, including the main application itself have individual loglevel settings in their respective configuration file. The default level should be ERROR and it is strongly suggested to keep it at this level, except for troubleshooting issues. The loglevels are (from least to most talkative):

- ERROR
- WARN
- INFO
- DEBUG

I am getting a lot of errors and would like to turn logging completely off for a certain module.

In addition to the four loglevels used by all modules, Log4J also supports the FATAL loglevel which is currently not used by any module without Extreme Connect. In order to set a module to use this loglevel, the configuration file has to be edited manually as this option is not provided on the web page to avoid shutting down logging by mistake.

Some modules stop working after some time and report in the log that too many errors happened.

Each module is monitored by the main ExtremeConnect process regarding errors that happen during each run cycle (i.e. authentication errors). If a module produces more than 10 failures in a row, the module will be disabled to prevent any further errors. In order to restart a module, try to identify the problem source (i.e. remote server is not responding), remedy it and update the module configuration file. As soon as the timestamp of the configuration file is changed, the configuration will be reloaded and the failure counter is reset to zero until further failures happen. The counter will also be reset, if at least one successful cycle was completed in the meantime.

The logs always note local/remote data storages. What are these?

ExtremeConnect logs are always written from the ExtremeConnect perspective. Local means the ExtremeConnect service and remote relates to another service contacted (i.e. ExtremeControl, VMware,...). Each module has its own datastore in order to track changes and update local or remote data. Therefore, if certain information for an end-system is missing from a specific module, it is always a good start to look at the datastore and log for that particular module.

What happens to a module if an error occurs?

The error is logged and the run cycle for the module will go on or end, depending on the severity of the error. If an error should crash a module, a full stack trace will be logged and the module is terminated until the JBoss service has been restarted. All other modules are not affected by this and will continue running, even if they should not receive any further updates from other modules.

After JBoss has started, I don't see any data being updated for some minutes. Is there something wrong?

No, Extreme Connect will first start all modules and wait a bit to verify that everything is running correctly. After that, the modules will enter their run cycle and start retrieving data from various sources. Depending on the delay until the information is retrieved and the interval times of each module, this might take up to a couple of minutes.

Troubleshooting VMware vSphere Configuration with ExtremeConnect

Do I have to create a dedicated user for ExtremeConnect to access the vSphere webservice?

No, but it is recommended to do so as it will enable you to filter events and tasks more easily within the VMware Client.

What are the least permission requirements for the webservice user?

The account should have at least all necessary permissions to:

- register the ExtremeCloud IQ Site Engine Plugin Extension

- write data to VM annotation fields

- read data from VM configurations (MAC, Network)

Although ExtremeConnect seems to be running fine, I only see "n/a" in the annotation fields and no records via the ExtremeConnect plugin. Why is that?

Most likely, none of the MAC addresses of the VM is listed in the end-system table of the NAC Manager. Make sure that authentication (at least MAC Auth) is set up properly on the physical switch and that the VM is actually sending some traffic.

How often will Extreme Connect update the information within vSphere (annotations, switches…etc.)?

ExtremeConnect will check if the current remote data differs from its local. If so, it will update all data that is different on the remote service. This is especially true for the annotation field and it is generally recommended not to use variables like LastSeenTime in the annotation text, which will change very frequently and have a lot of updates as a result.

Is there any way to get rid of the event/task logs for every update that Extreme Connect performs within vSphere?

No. This functionality is handled by vSphere itself and ExtremeConnect has no means to stop it. vSphere offers a filtering mechanism that can be used to limit the information shown and help to find specific data more efficiently.

How does ExtremeConnect determine the name of the end-system group that a VM MAC address should be added to?

ExtremeConnect retrieves the name of the virtual network/portgroup in its default configuration and uses the part before the first underscore as the end-system group name. This corresponds to the naming convention used if ExtremeConnect is automatically creating portgroups from end-system groups. The format used there is always:

endSystemGroup_virtualSwitchName

The reason for this is the requirement within vSphere that two portgroups on the same host can not share the same name. Therefore, the (d)vSwitch name is appended to the end-system group name with an underscore. This also ensures that vMotion is possible for VMs on two hosts which also require that both portgroups on those hosts have the same name.

Is it possible to let ExtremeConnect create portgroups automatically, but to let the VM administrator handle VLAN configurations?

Yes, the configuration offers an option to turn off VLAN creation/updates.

What happens if VLAN updates are enabled and a VM administrator changes the settings of a portgroup?

Extreme Connect will update the settings using the local configuration data. It will not delete and recreate the portgroup, but simply update the existing configuration.

What happens if an end-system group is deleted and the portgroup deletion option is enabled?

Extreme Connect will move all VMs attached to that portgroup/network to the “VM Disconnected Systems” group and then delete the original portgroup/network.

If a portgroup has been deleted by ExtremeConnect, can another portgroup with the same name be created manually within vSphere afterwards?

Using its local data store, ExtremeConnect will put the name of the end-system group onto a special “deletion” stack. During each run cycle, every module will check the stack and remove all portgroups that use the same name until the deletion interval timer runs out. This value is set to 2 minutes per default. After those 2 minutes have passed, a VM administrator can safely create a portgroup of the same name without risking it being deleted.

Although portgroup deletion is enabled, groups are not getting deleted by ExtremeConnect. What is the reason for that?

ExtremeConnect will delete all groups as long as the group is on the deletion stack and the entry has not timed out. If too much time is required for each run through, try increasing the deletion interval timer so that the module has a better chance of performing the operation.

Troubleshooting Citrix XenServer Configuration with ExtremeConnect

Do I have to create a dedicated user for ExtremeConnect to access the XEN Server webservice?

No, you can use the root account on the XEN Server.

What are the least permission requirements for the webservice user?

The account should have at least all necessary permissions to:

- write data to VM description fields
- read data from VM configurations (MAC, Network)

How often will ExtremeConnect update the information within XenCenter (descriptions, networks...etc.)?

ExtremeConnect will check if the current remote data differs from its local. If so, it will update all data that is different on the remote service. This is especially true for the description field and it is generally recommended not to use variables like LastSeenTime in the annotation text, which will change very frequently and have a lot of updates as a result.

How does Extreme Connect determine the name of the end-system group that a VM MAC address should be added to?

ExtremeConnect creates XEN networks with the exact same name as the corresponding ExtremeCloud IQ Site Engine end-system group. ExtremeConnect then checks all XEN networks it manages and the VMs which are assigned to them. The MAC's of these VMs will then be added to the corresponding end-system group in ExtremeCloud IQ Site Engine.

Is it possible to let ExtremeConnect create networks automatically, but to let the VM administrator handle VLAN configurations?

No, this feature is currently only supported for VMware, not for XEN.

What happens if a XEN administrator changes the settings of a network (VLAN ID, NIC)?

ExtremeConnect will update the settings using the local configuration data. For this to take place, all VMs connected to the network will temporarily be disconnected from this network. Then the network will be reconfigured and finally all VMs priory connected to this network will be reconnected.

What happens if an end-system group is deleted and the network deletion option is enabled?

ExtremeConnect will move all VMs attached to that network to the "VM Disconnected Systems" network and then delete the original network.

If a network has been deleted by ExtremeConnect, can another network with the same name be created manually within XenCenter afterwards?

Using its local data store, ExtremeConnect will put the name of the end-system group onto a special "deletion" stack. During each run cycle, every module will check the stack and remove all networks that use the same name until the deletion interval timer runs out. This value is set to 2

minutes per default. After those 2 minutes have passed, a XEN administrator can safely create a network of the same name without risking it being deleted.

I've set an end-system group's description to "sync=true vlan=100" but in XEN only an internal network is being created – not an external one with the corresponding VLAN ID - why?

In order for ExtremeConnect to create an external network within XEN two settings are necessary: VLAN ID and physical NIC to connect the external network to.

I've set an end-system group's description to "sync=true nic=eth1" but in XEN only an internal network is being created – not an external one attached to nic eth1 without a VLAN ID - why?

In order for ExtremeConnect to create an external network within XEN two settings are necessary: VLAN ID and physical NIC to connect the external network to. It is not possible to create an external XEN network without assigning a VLAN ID (all external XEN networks are tagged).

Troubleshooting Adapters for XenDesktop, Hyper-V, SCVMM and SCCM Configuration with ExtremeConnect

What is the adapter doing and how?

The adapter is creating a Web Service bound to the IP and port that configure within the configuration file. ExtremeConnect is then making web service calls to this adapter to retrieve data on managed end-systems (VMs, Windows devices, etc.) and (depending on which integration is used) also update data on the remote server (for example: update description fields for VMs).

What ports are needed to communicate between the ExtremeConnect and the adapter?

Only one port is required and this is the one configured on the adapter side within its configuration file.

Is the communication secure?

All data sent and retrieved from/to the adapter is encrypted using the pre-shared key which the admin defines when setting up the adapter and installing ExtremeConnect. The key itself is then automatically encrypted.

No information is synchronized – what else can I check?

Check the adapter's logfile. It will show you when the adapter has been "called" by ExtremeConnect, what powershell commands it tries to execute and what the return values of these commands were. You need to set the log level to "DEBUG" and restart the adapter in order for this to print detailed logging information.

How can I check whether the adapter's web service is working and reachable?

Depending on whether your ExtremeCloud IQ Site Engine server is installed on a Windows server or on a Linux-based appliance you can use a standard browser or a Linux tool like wget to request one of the following web URLs (depending on the integration (adapter) you are trying to troubleshoot):

- XenDesktop: http://<IPofAdpater>:<PortOfAdapter>/DCM_XENDESKTOP_ADAPTER
- Hyper-V: http://<IPofAdpater>:<PortOfAdapter>/DCM_HYPERV_ADAPTER
- SCVMM: http://<IPofAdpater>:<PortOfAdapter>/DCM_SCVMM_ADAPTER
- SCCM: http://<IPofAdpater>:<PortOfAdapter>/FUSION_SCCM_ADAPTER

If you get a browser error that it cannot connect or the page is not existing you either have an issue with a firewall along the communication path or the adapter's web service did not start properly on the configured IP and port. Also make sure that the configured port for the adapter is not yet used by another service on your Microsoft server.

Troubleshooting Citrix XenDesktop Configuration with ExtremeConnect

Why do the usernames within ExtremeCloud IQ Site Engine NAC Manager appear as "Kerberos" usernames?

The XenDesktop adapter uses the same webservice call as the Kerberos snooping process. For the system's functionality this makes no difference: you can create user groups, rules and profiles based on these usernames.

After some time the usernames are deleted or disappear in NAC Manager - why?

1. The corresponding XenDesktop session has ended. In this case, the adapter resets the username on the corresponding end-system VM which will also trigger any existing rule / NAC profile changes.
2. The Kerberos aging timer was triggered. Within NAC Manager you can configure a period after which the Kerberos usernames will automatically age out. If you don't want this timer to interfere with the XenDesktop adapter functionality make sure to set a very high value or disable this feature.

Although some users have disconnected from their XenDesktop session the usernames are still active within NAC Manager - why?

XenDesktop distinguishes between a closed/non-existing session and a disconnected one. A session is first active, then disconnected and then deleted. As long as the session is in the disconnected state, the adapter still doesn't reset the username within ExtremeCloud IQ Site Engine. In case the user re-activates his/her session, there is no need for the adapter to set the username and the corresponding user-profile is already active within NAC.

Troubleshooting Microsoft Hyper-V and Virtual Machine Manager Configuration with ExtremeConnect

How often will ExtremeConnect update the information within the notes field?

ExtremeConnect will check if the current remote data differs from its local. If so, it will update all data that is different on the remote service. This is especially true for the notes field and it is generally recommended not to use variables like LastSeenTime in the notes text, which will change very frequently and have a lot of updates as a result.

How does ExtremeConnect determine the name of the end-system group that a VM MAC address should be added to?

ExtremeConnect reads the virtual networks (virtual switches) each VM belongs to and puts its MAC address into the corresponding end-system group in ExtremeCloud IQ Site Engine. For this feature to work, end-system groups with the exact same name as the virtual networks from Hyper-V must exist within ExtremeCloud IQ Site Engine and the description field must contain “sync=true”.

Connect Diagnostics

The **Diagnostics** tab provides information about the end-systems and end-system groups connecting to your network.

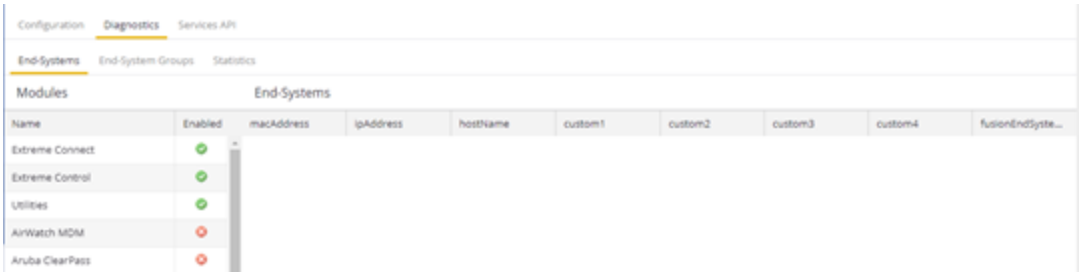
Using third-party software (known as modules) in conjunction with the network monitoring and access control functionality found in the ExtremeControl solution, the **Diagnostics** tab provides information available about end-systems and end-system groups in your network.

The **Diagnostics** tab contains the following sub-tabs, each providing information about end-systems:

- End-Systems — Displays the end-systems detected for each module.
- End-System Groups — Displays the end-system groups detected for each module.
- Statistics — Displays various statistics about the time end-systems spent performing certain operations on the network.

End-Systems

The **End-Systems** tab provides information about the end-systems connecting to your network.



Left Panel

The left panel of the tab shows all of the modules available in the **Connect** tab.

The **Enabled** column indicates whether the module is enabled:

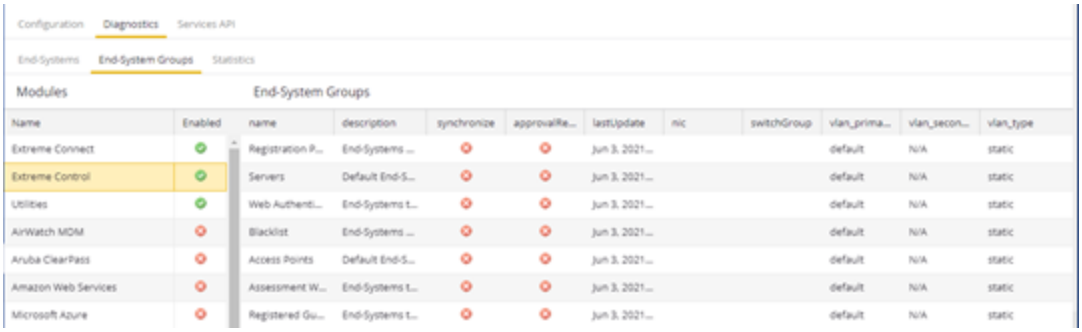
- Check icon (✓) — Module enabled on your network.
- X icon (✗) — Module not enabled on your network.

Right Panel

The right panel of the tab shows a table with information about the end-systems. Add or remove a column by selecting the down arrow at the right of a column header and selecting a checkbox associated with a column from the Columns menu.

End-System Groups

The **End-System Groups** tab provides information about the end-system groups connecting to your network.



Left Panel

The left panel of the tab shows all of the modules available in the **Connect** tab.

The **Enabled** column indicates whether the module is enabled:

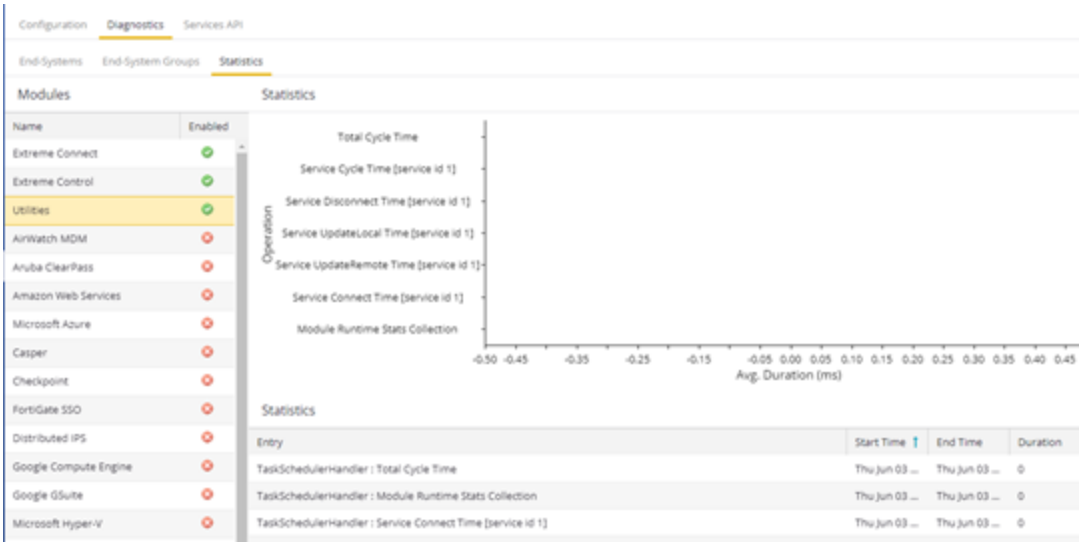
- Check icon ( ) — Module enabled on your network.
- X icon ( ) — Module not enabled on your network.

Right Panel

The right panel of the tab shows a table with information about the end-system groups. Add or remove a column by selecting the down arrow at the right of a column header and selecting a checkbox associated with a column from the Columns menu.

Statistics

Select the **Statistics** tab to view end-system statistics for each module.



Left Panel

The left panel of the tab shows all of the modules available in the **Connect** tab.

The **Enabled** column indicates whether the module is enabled:

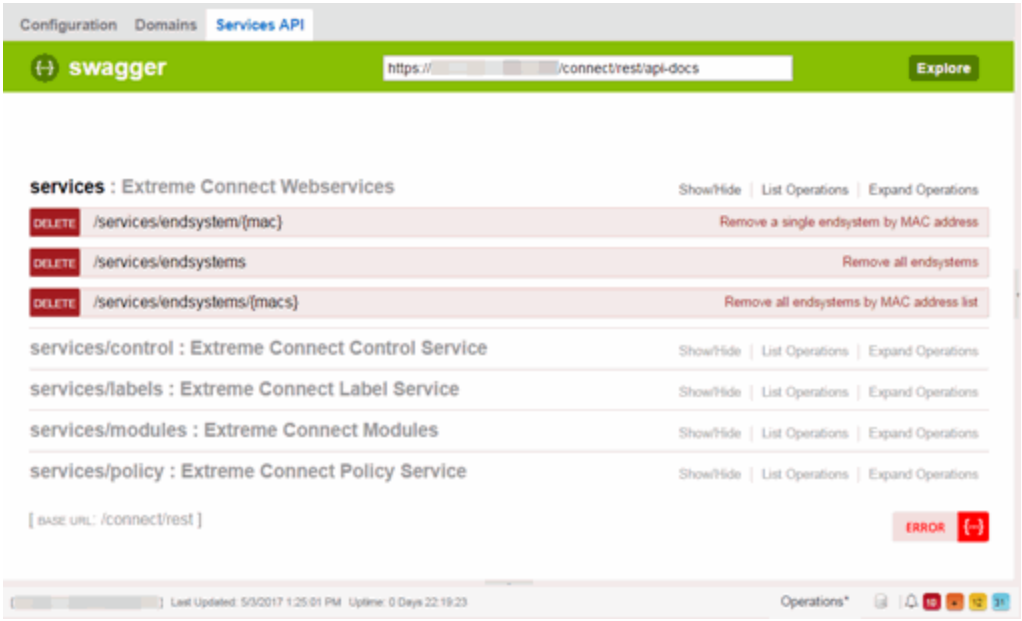
- Check icon ( ) — Module enabled on your network.
- X icon ( ) — Module not enabled on your network.

Right Panel

The right panel contains a table of the end-system statistics captured by the module and a bar graph displaying an average of the statistical entries contained in the table.

Connect Services API

The **Services API** tab allows you to execute a client/server application, known as a web service.



The available web services are organized based on the type of function they perform:

- Inventory Web Services — Perform Inventory Manager functions (e.g. backups or retrieving device properties).
- NAC Configuration Web Services — Perform ExtremeControl configuration functions.
- NAC End-System Web Services — Retrieve and modify ExtremeControl services, with a focus on accessing end-systems.
- NAC Web Services — Retrieve and modify general ExtremeControl services.
- ExtremeCloud IQ Site Engine Device Web Services — Retrieve and modify the devices in the ExtremeCloud IQ Site Engine database.
- Policy Web Services — Perform Policy Manager functions.
- Purview Web Services — Retrieve and modify ExtremeAnalytics data and configuration.
- Reporting Web Services — Retrieve and modify the ExtremeCloud IQ Site Engine reporting engine data configuration.

Web Service Error Codes

- Inventory Web Service
- NAC Configuration Web Service
- NAC End System Web Service
- NAC Web Service
- Netsight Device Web Service
- Policy Web Service

- Purview Web Service
- Reporting Web Service

Error Code	Description
0	Operation was successful
1	The requested object does not exist
2	Object already exists
3	Parameter value is incorrect
4	Error parsing an input
5	Result would be an Invalid configuration
6	Remote connection error
7	Unexpected error condition
8	End system group does not exist
9	CSV operation error

Returns

The operation returns an integer error code.

Example

Execute the following web service with a browser:

https://192.168.30.34:8443/axis/services/NACEndSystemWebService/addHostnameToEndSystemGroup?endSystemGroup=iPhone&hostname=jdoe-iPhone&description=Example-Web-Service&reauthorize=true&removeFromOtherGroups=true