



PI Integrator for Esri® ArcGIS® 1.0 Beta 3

User Guide

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PI Integrator for Esri® ArcGIS® 1.0 User Guide Beta 3

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Welcome



PI Integrator for Esri® ArcGIS® is a versatile platform that enables real-time geographic data visualization by connecting your PI System with the Esri ArcGIS Platform. PI Integrator for Esri ArcGIS combines the "time" aspect of the PI System with the "space" aspect of the Esri ArcGIS platform to enhance insight over infrastructure processes and increase operational awareness. PI Integrator for Esri ArcGIS works in conjunction with both Esri ArcGIS server and Esri ArcGIS Online.

A long-time leader in geographic information systems, Esri powers the creation of data-intense maps and location-based analytics. Esri's ArcGIS suite of products includes client software for most common desktop and mobile devices.

OSIsoft is the maker of the PI System, the industry standard for real-time data collection and time-based analytics. PI supplies data from control systems to operators who monitor the current status of their assets, and reference a rich, dense history and analytics to explore and improve their operations.

PI Integrator for Esri ArcGIS is the bridge between the vast raw data and asset information of the PI System and Esri's powerful mapping capabilities. PI Integrator for Esri ArcGIS functions as a data provider to the Esri ArcGIS platform, where you can add dynamic features to functional and geographic maps, and continuously update these features as states, values, and locations change.

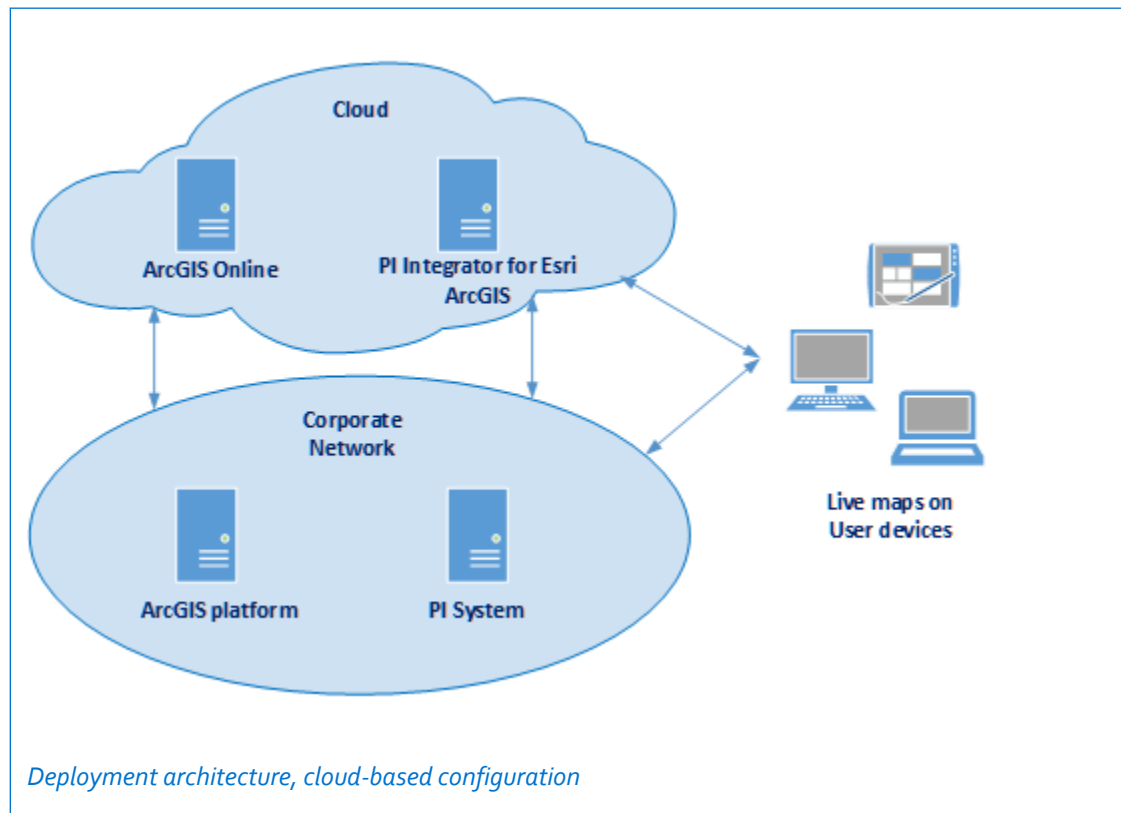
PI Integrator for Esri ArcGIS exposes the full power of the PI System in serving assets for mapping as features, along with related raw data, aggregates, statistics, and analytics. Related PI client products allow users to dig deeper into historical data from a map feature to examine trends leading to an asset's current status.

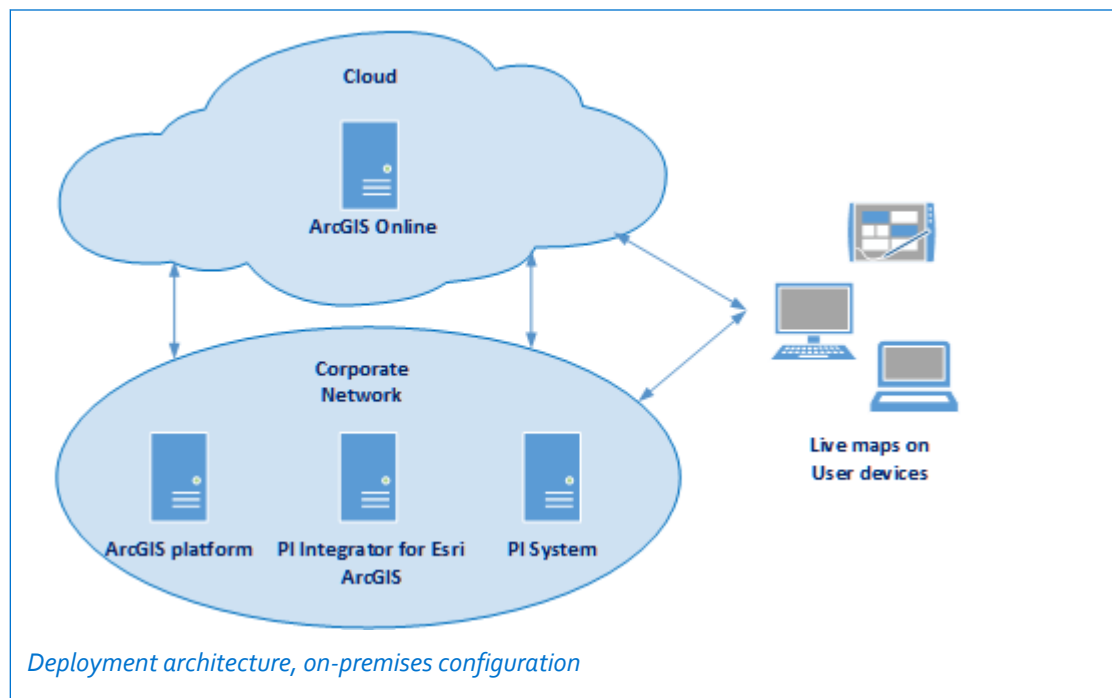
Esri's ArcGIS GeoEvent Extension for Server (called GeoEvent Processor in this document) adds additional spatial aggregation and mapping capabilities that allow users to monitor assets individually or grouped geographically. Together, Esri and OSIsoft's integrated services provide new ways to monitor assets including heat maps, or alerts and events triggered by movement.

Architecture

PI Integrator for Esri ArcGIS supplies real-time PI System data together with geo-spatial context information to the ArcGIS platform. ArcGIS Online and ArcGIS Server enable you to overlay many different kinds of information on a map.

GeoEvent Processor is an add-on to the ArcGIS server, and enables real-time geospatial analysis. PI Integrator for Esri ArcGIS serves real-time data streams to GeoEvent processor.





Glossary

- **PI Integrator for Esri ArcGIS**

A new OS/ISO product suite to integrate with Esri's ArcGIS platform, and consisting of multiple applications to support the integration, including different UI components or client applications.

- **Feature**

An item (with a geometry) that represents an asset, a measurement or a series of measurements. A feature can have attributes that represent values or measurements associated with the feature.

- **Geometry**

A geographical location and shape. The simplest geometry would be a point on a map (x,y). Geometries can be a point, multipoint, polyline polygon, or an extent -- for example, a well, a series of measurements, or a road.

- **Feature Service**

Esri technology. A REST (REpresentational State Transfer) service that exposes information that can be projected onto a map according to Esri specifications. Typically this information consists of (physical) assets or measurements that contain location information.

- **Streaming Service**

Esri technology. A web socket based service that can push data updates to a consumer. For instance a web page that can receive value updates for a specific Feature, without having to periodically poll the Feature Service for updates.

- **Geographical Coordinate Systems (GCS)**

Geographical Coordinate Systems enable every location on the Earth to be specified by a set of numbers or letters.

[About geographic coordinate systems \(http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=About_geographic_coordinate_systems\)](http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=About_geographic_coordinate_systems)

- **Projected Coordinate System (PCS)**

A projected coordinate system is always based on a sphere or spheroid geographic coordinate system, but defined on a flat, two-dimensional surface. Unlike a geographic coordinate system, a projected coordinate system has constant lengths, angles, and areas across the two dimensions.

[About projected coordinate systems \(http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=About_projected_coordinate_systems\)](http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=About_projected_coordinate_systems)

Product prerequisites

PI Integrator for Esri ArcGIS requires specific versions of some product components and supporting software.

PI System components

Certain capabilities of PI Integrator for Esri ArcGIS rely on the latest versions of several OS/soft modules. While not necessarily required, it is strongly recommended that customers be on the following production releases:

- PI Server 2012
 - PI Data Archive version 3.4.390 or later
 - PI AF Server version 2.5 or later (v 2.6 recommended)
- PI Coresight 2013
- PI Integrator for Esri ArcGIS - Portal (on-premises only)
 - Microsoft Windows Server 2012®
 - Internet Information Services (IIS)® 8.0
 - Access to a local or remote Microsoft SQL Server 2008 R2® or later
- PI Integrator for Esri ArcGIS - Data Relay service (included in the Data Relay setup kit are Microsoft .Net Framework 4.5.1 and PI AF SDK version 2.6.1)
 - Microsoft Windows Server 2008® R2

Esri ArcGIS Platform components

All Esri components must be version 10.2.1 or later:

- ArcGIS Server
- ArcGIS Desktop
- Esri ArcGIS GeoEvent Extension for Server (called GeoEvent Processor in this document)
- Portal for ArcGIS Server *or* ArcGIS Online Subscription

- Operations Dashboard for ArcGIS
- Must have administrator credentials for ArcGIS GeoEvent Processor
- ArcGIS accounts used to create Data Stores in the GeoEvent Processor Manager must be sufficiently privileged to create a hosted Feature Service

Other

For a browser, use Internet Explorer version 11 or later, or the latest version of Firefox or Chrome.

Features and capabilities

Esri's ArcGIS suite helps you to visualize the data that underpins your PI assets. ArcGIS displays this information many different ways, such as colored features on the map, event records created as a Geo Fence is violated, and even hyperlinks into the PI Coresight application for further historical analysis.

Features include:

- **Uniform asset-based operation**

PI Integrator for Esri ArcGIS is a ready-to-consume framework. During installation, your administrator configures the PI System and ArcGIS to use corresponding PI assets as rich features, as they are known in ArcGIS. These assets may correspond to physical assets you want to place on a map (electrical meters, vehicles, slurry ponds) or may be functional in nature (aggregates of physical assets, by area, connectivity, or type).

The data available to you is gathered and arranged for intuitive use. Similar assets are easy to compare - for example, the efficiency of every electric pump, or the load-factor of every power consumer. What appears in one system is ready for further analysis in the other.

As business needs evolve, you and your colleagues might participate in enriching the current assets (to contain more information) or in bringing additional assets online (more assets to power your maps).

- **Real-time data**

ArcGIS map symbols can update dynamically - through color, shape or size - to reflect real-time status or data values. For example, an operator may ask: show me each power transformer's core temperature, by colored quartile, or size them by time since their last maintenance.

- **Historical data**

Click a map feature to expose a pop-up window containing details of operation and historical trends of asset values. A hyperlink takes you directly to a detail view in PI Coresight with rich visualization features and hands-on, interactive analysis.

- **Time-based analytics**

Time-based statistics are readily available for you to see as details or to show directly on the map. With its support of time, PI Data Archive provides ready-to-use statistics such as average, standard deviation, and maximum or minimum event frame.

- **Geographical analysis**

Esri GeoEvent Processor can continuously analyze the location of moving assets and determine if they have violated a virtual border. You can add such borders, or Geo Fences, to a map region in order to monitor activity.

- **Layering and zooming**

Configure map views and the visibility of corresponding feature layers to see the level of aggregation desired. Typically, granular feature-level data is shown.

- **Advanced cartography**

PI Integrator for Esri ArcGIS can provide data to Esri GeoEvent Processor in native formats, allowing features such as visual heat maps based on magnitudes of values and geographical proximities. These advanced cartography applications allow you to pose and answer more complex geographic questions visually:

- Where do my wind turbines underperform in the early morning hours?
- What terrain patterns seem to correlate with this?

Installation and configuration roadmap

Two versions of PI Integrator for Esri ArcGIS are available:

- A cloud-based version, in which PI Integrator for Esri ArcGIS portal is accessed securely from the internet.
- An on-premises version, in which PI Integrator for Esri ArcGIS portal is run on a local computer within your organization.

See [Architecture](#) for information about how the cloud-based and on-premises versions of PI Integrator for Esri ArcGIS are configured.

Roadmap:

1. Ensure you have met the prerequisites for running PI Integrator for Esri ArcGIS. See [Product prerequisites](#).
2. Determine which license was purchased for your organization: cloud-based or on-premises:
 - For on-premises PI Integrator for Esri ArcGIS follow the software installation steps here: [Install the portal software](#). Like all OSIsoft products, you can download the software from <https://techsupport.osisoft.com> (<https://techsupport.osisoft.com>) or from vCampus.
 - For cloud-based PI Integrator for Esri ArcGIS, obtain the link and necessary credentials from your OSIsoft representative.
3. Follow the Administrator configuration steps: [Administrator configuration](#).
4. Follow the User configuration steps: [User configuration](#).
5. If necessary, perform any additional configuration tasks: [Additional configuration tasks](#).
6. Create your map and configure it with your PI data: [Map and layer configuration](#).

For help adding Esri assets to your PI system, see: [Utilities](#).

For help with diagnosing technical issues, see: [Troubleshooting](#)

For additional help that is beyond the scope of this user manual, see: [Technical support and other resources](#).

Prepare to install the portal software (on-premises version only)

When installing the on-premises Configuration Portal software, proper configuration of IIS and SQL Server is required.

The following software must be installed before installing the PI Integrator for Esri ArcGIS portal software:

- Microsoft Windows Server 2012
- Microsoft .Net Framework 3.5 and .Net Framework 4.5.1. (Microsoft .Net Framework is available for download from Microsoft.)
- Internet Information Services (IIS) 8.0

The following Server Roles and Role Services are prerequisites:

- Server Roles
 - Application Server
 - Web Server (IIS)
- Application Server Role Services
 - .NET Framework 4.5
 - Web Server (IIS Support)
- Web Server Role Services
 - Security
 - Basic Authentication
 - Windows Authentication
 - Application Development
 - .NET Extensibility 4.5
 - Application Initialization
 - ASP.NET 4.5
 - WebSocket Protocol
- Management Tools
 - IIS Management Console

After IIS is installed with all of the necessary Role Services, the following configurations are required within the Web site where the Configuration Portal will be installed. A Web application (within the chosen Web Site) and a dedicated Application Pool will be created automatically during installation. As long as configuration prerequisites are satisfied, it is permissible to share the Web Site with other Web Applications. Use of the "Default Web Site" is acceptable. See [Configure IIS](#) for more information.

Web Site configuration

- Site bindings (may use non-default ports if necessary)
 - HTTP
 - HTTPS (with trusted certificate) See [Configure SSL](#) for SSL configuration steps.
- Authentication
 - Anonymous Authentication: Enabled
 - Windows Authentication: Enabled
 - All other authentication methods: Disabled
- Microsoft SQL Server (Installed locally or on the network.)

If you intend to use Windows Authentication for the Configuration Portal's connection:

- The Windows user account that will be used to install the Configuration Portal must be added as an SQL Server Login, and mapped to the following Server roles:
 - dbcreator
 - securityadmin
- This Login mapping is only required during installation. After installation, the installing user's SQL login may be removed or de-mapped as desired.
- During installation, the installer creates a login for the Configuration Portal to use, with permissions confined to the Configuration Portal's own database. This login must remain for the Configuration Portal to function properly.

If you will use legacy SQL Server Authentication for the Configuration Portal's connection:

- The same SQL Login designated for use by the Configuration Portal will also be used during installation.
- During installation, this SQL Login must be mapped to the following Server Role:
 - dbcreator
- This Login mapping is only required during installation. After installation, the server-level **dbcreator** mapping can be removed.
- This Login will become the owner of the Configuration Portal's newly-created database, and the Configuration Portal will use this SQL Login to access its database.

Install the portal software

You can install the portal software using either Windows Integrated Authentication or SQL Server authentication. Using Windows authentication, the application uses the Windows user ID and password that were used when you logged into your computer. Using SQL Server authentication, you must enter the SQL Server user ID and password that were created when SQL Server was installed.

You must install the Configuration Portal on a dedicated web server that has access to a Microsoft SQL Server. The Configuration Portal may authenticate with the SQL Server either via Windows Authentication or legacy SQL Authentication. During installation, you will have the opportunity to validate the connection and authentication.

Before you start

- Ensure that you have met all of the prerequisites listed in: [Prepare to install the portal software \(on-premises version only\)](#)
- To install the portal software, you must have administrator rights on that computer.

Procedure

1. Download the latest version of configuration portal for PI Integrator for Esri ArcGIS from either Vcampus or from [Tech support \(https://techsupport.osisoft.com\)](https://techsupport.osisoft.com).

2. Run the downloaded file.

The file is a self-extracting archive that contains the installation program and support files.

3. In the destination folder field, enter the path for the installation files or accept the default location and then click **OK**.

The installation program starts automatically after the files are extracted. You can also click **Change** to modify the installation path.

4. Click **Ok**. The Configuration Portal Setup screen displays.

5. In the destination folder field, enter the path for the installation files or accept the default location and then click **OK**.

You can also click **Change** to modify the installation path.

6. Click **Next**.

7. Select the IIS Web site into which the Web application will be installed.

The Web application must be installed in Microsoft Internet Information Services (IIS).

8. Click **Next**.

9. Enter the name of the SQL Server on which PI Integrator for Esri ArcGIS Portal will store application data.

In the **Server Instance** field, enter the name and location of the SQL Server. Use "." to indicate localhost. For example, if your SQL Server is named SQLExpress and is located on the same computer you are running the installation on, you can specify: .\SQLExpress.

The **Database Name** field indicates the name of the database on the SQL Server. You do not need to specify anything in this field if this is the first time the installation program is run. If you are reinstalling, enter the name of the database you intend to use.

10. Choose either **Windows Integrated Authentication** or **SQL Server Authentication**.

- a. For **Windows Integrated Authentication** no additional information is needed.

- b. For **SQL Server Authentication**, enter the user ID and password that were used to create the SQL Server instance. Note that these credentials will be stored in clear text in the web application's configuration.



Note:

The use of **SQL Server Authentication** is not recommended. If SQL Server Authentication is desired, you should first create a dedicated SQL login with minimum server privileges as detailed in the prerequisites above. The login should be created specifically for use by PI Geo administrator. The login should be defined with dbcreator and securityadmin roles, which may be removed after installation.

11. Click **Validate** to verify that the user ID and password are valid.

12. Click **Next**.

You are now ready to begin the software installation.

13. Click **Install**.

You can click **Back** if you want to modify any of the settings that were entered previously.

After completing the installation, you can confirm that the installation was successful by navigating to:

`https://<machine-name>/pigeoportal`

After you finish

When the Configuration Portal software is upgraded, the upgrade is detected by all supported web browsers and the latest version of the Configuration Portal website is reloaded automatically. No other actions are required of users.



Note:

When logging in to your portal server after the installation is complete, you might encounter a warning that your machine certificate is not trusted. A known issue with Mozilla Firefox might prevent you from attempting to trust a machine certificate. See [Mozilla bug \(https://bugzilla.mozilla.org/show_bug.cgi?id=659736\)](https://bugzilla.mozilla.org/show_bug.cgi?id=659736) for more information.

Configure IIS

Installing IIS does not install the WebSocket Protocol by default. Rather, it must be manually configured for Portal installations.

Procedure

1. From the Control Panel, select Programs and Features, then start the Server Manager utility

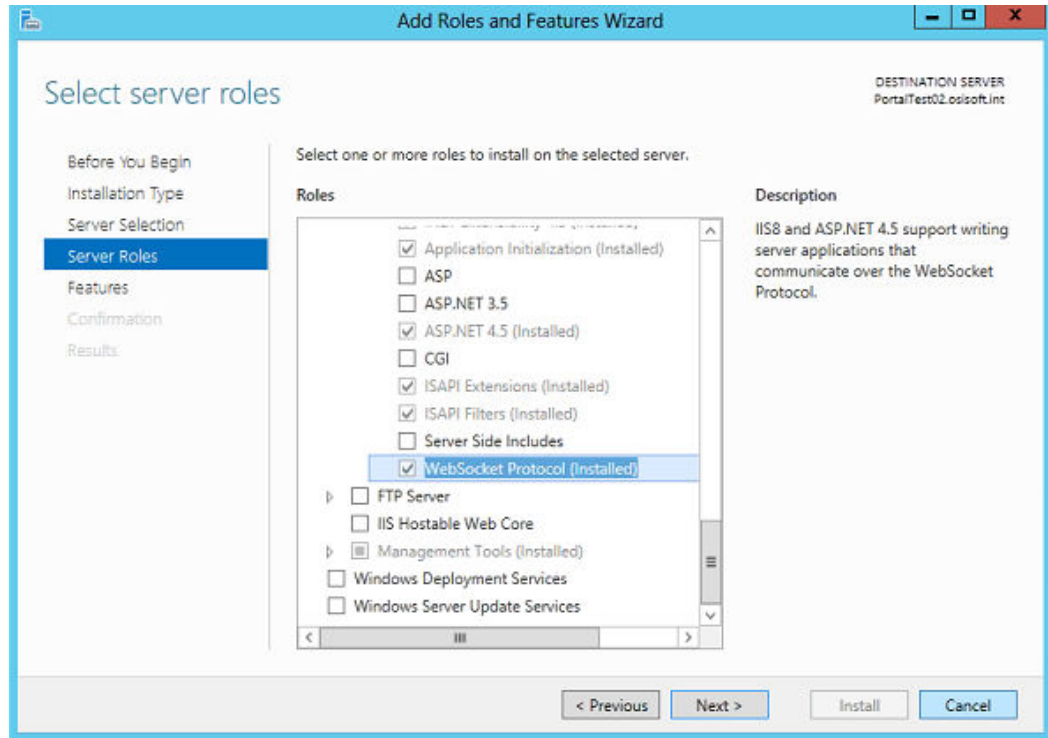
2. Select **Manage > Add Roles and Features**.

The Add Roles and Features Wizard starts.

3. Select **Server Roles**, scroll through the list of features and select **WebSocket Protocol**

You can find WebSocked Protocol in the hierarchy as shown here: **Web Server (IIS) > Web Server > Application Development > WebSocket Protocol**.

4. Check the box to enable the WebSocket Protocol and click **OK**.



Configure SSL

You must configure an SSL binding to allow web access to your portal. By default, sites of type HTTP are bound to TCP/IP port 80. Follow the steps in this topic to enable secure HTTPS access to your portal.

If you are not familiar with configuring SSL web sites in IIS, refer to Microsoft documentation or contact your local IT administrator.

Procedure

1. Start the Internet Information Server (IIS) Manager application.
2. Click **portal site name** > **Sites** > **Default Web Site**
3. From the **Actions** menu, in the **Edit Site** sub-menu, select **Bindings**.

The Site Bindings screen displays.

4. On the Site Bindings screen, click **Add**.

The Add Site Binding screen displays.

5. In the **Type** list, select **https**.

The **IP address** default setting of "All Unassigned" is filled in automatically, which means that any IP address that accesses the site will be allowed to communicate with it. The **Port** field is filled in automatically with 443. These settings are probably correct for most installations.

6. In the **SSL certificate** field, select a certificate from the list.

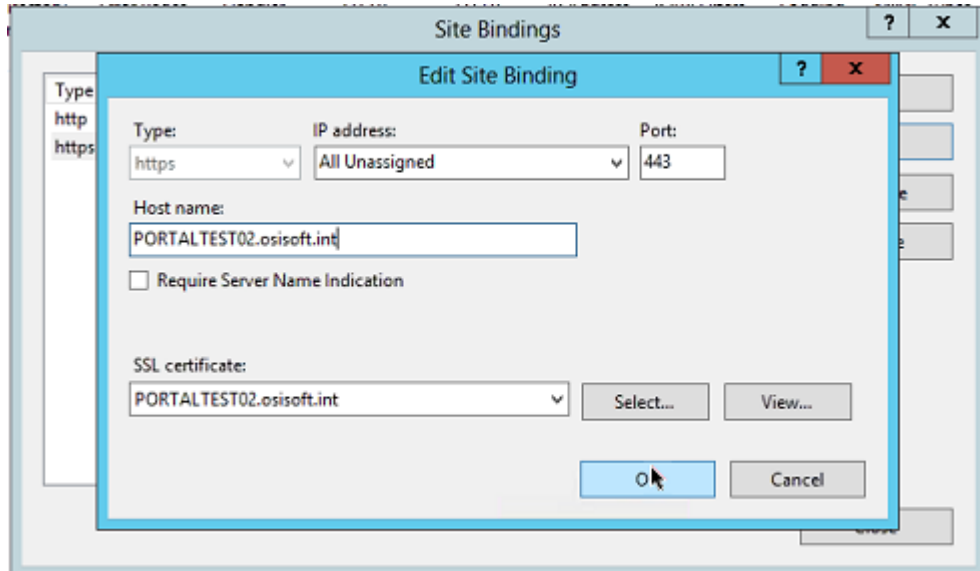
SSL validates web sites using certificates. When Windows is installed, a machine certificate is created automatically. Depending on the particular IT policies at your location, you can

Prepare to install the portal software (on-premises version only)

specify either the existing machine certificate, or your IT group might issue a certificate specifically for your internal portal website. If your organization has a custom certificate, click the **Select** button and select it from the list. You must specify a certificate to proceed.

7. In the **Host name** field, specify the complete portal host name.

You can verify the host name by specifying the SSL certificate and clicking **View**. On the Certificate screen, the complete name is shown after the "Issued to" field. The certificate name is not case sensitive.



8. When finished, click **OK**.

Administrator configuration

While logged on as a PI Integrator for Esri ArcGIS system administrator, you must perform a few configuration tasks before users can access PI Integrator for Esri ArcGIS. Perform the setup steps in each of the topics that follow.

Topics in this section

- [PI Integrator for Esri ArcGIS Data Relay](#)
- [Configure ArcGIS GeoEvent Processor endpoint](#)
The ArcGIS GeoEvent Processor endpoint is a URL that identifies the location of ArcGIS GeoEvent Processor Manager, which permits remote configuration of ArcGIS GeoEvent Processor.
- [Configure PI Coresight server endpoint](#)
The PI Coresight server endpoint is a URL that identifies the location of your PI Coresight server.
- [Additional configuration tasks](#)
Depending on your particular system requirements, you might need to perform these additional configuration steps.

PI Integrator for Esri ArcGIS Data Relay

The PI Integrator for Esri ArcGIS Data Relay is a data client that runs on a computer located within your corporate network. It provides data to the PI Integrator for Esri ArcGIS Portal. When the Portal is hosted in the cloud, the Data Relay sends your PI data securely across a service bus to the Portal. When the portal is hosted on-premises, the Data Relay sends data across your local network to the Portal. Due to the nature of PI data retrieval, the Data Relay might incur significant computational and memory overhead. The Data Relay should be installed on a dedicated server whenever possible.



Caution:

Do not install more than one Data Relay instance. Before installing a Data Relay, you should check whether a Data Relay is already installed by clicking **Administration > Data Relay**. The following message is displayed if a Data Relay is already installed:

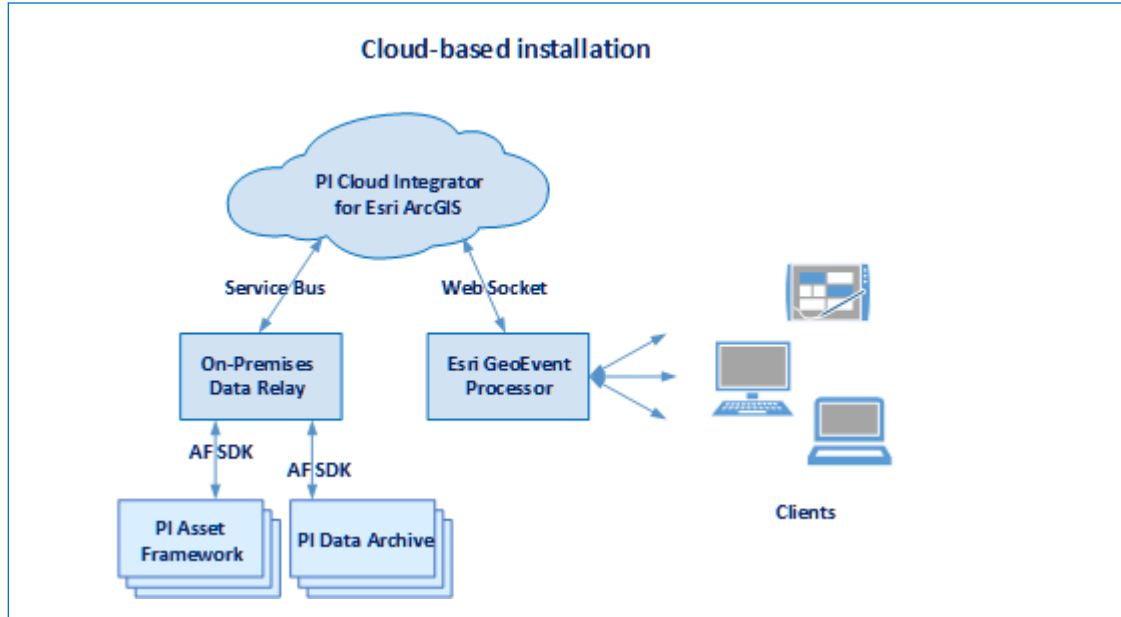
```
Your Data Relay is running on node 'node_name'
```



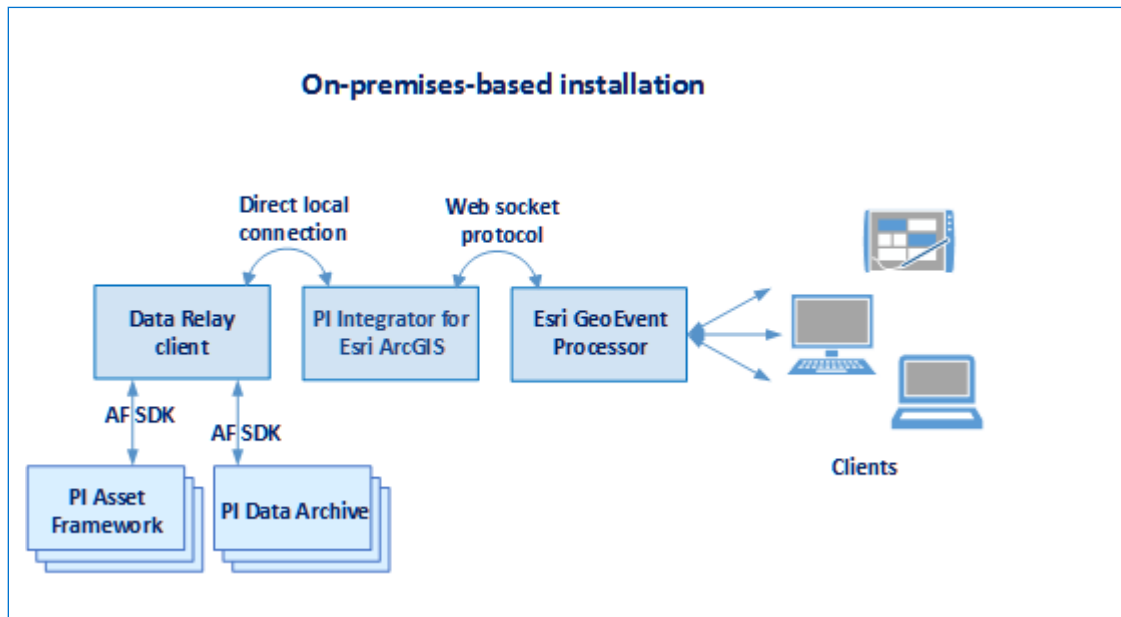
Tip:

Do not install the Data Relay that you intend to use for your production environment on a shared server of any kind; rather, you should install the Data Relay on a dedicated server (in a manner similar to how PI Coresight is installed). The Data Relay is where AF Data references are executed and the load on the computer will be significant when accessing a mature AF database. While it is technically possible to run several OS/soft processes on a single computer, a production environment should use a separate computer for the Data Relay.

Data Relay architecture



Note: Data is not stored in the cloud. Your Azure Service Bus is private and is not shared with any other tenant.



Note: The on-premises Data Relay monitors connections from the on-premises Portal on port 5464. This port must be open on the Data Relay machine.

The recovery behavior of the Data Relay service is set to restart the service if a failure occurs. While it is possible to modify the behavior of the service by using the Windows service configuration, it is recommended that the service remains set to **Restart the service**. If the service fails and is not set to automatically restart, it will become unavailable until it is

manually restarted. PI Integrator for Esri ArcGIS cannot function properly without a working Data Relay.

Install and configure the cloud Data Relay



Note:

The steps in this topic are mandatory if you are using the cloud version of PI Integrator for Esri ArcGIS. If you are using the on-premises version, see [Install and configure the on-premises Data Relay](#) instead.

Before you start

- The client node you intend to use for the Data Relay must have Microsoft .Net Framework 4.5.1 installed.
- You should exit any open Windows programs before running the Data Relay Setup Wizard.

See [PI Integrator for Esri ArcGIS Data Relay](#) for more information.

Procedure

1. Log in as Administrator on the computer on which the Data Relay is to be installed.
You must be an administrator on the Data Relay node when running the installer.
2. Using a browser, access the link to the PI Integrator for Esri ArcGIS configuration portal and log in as Administrator.
3. Navigate in the Portal to the **Administration > Data Relay** page and consult the **Configuration settings** section.
Make a note of or copy the values provided for Issuer Name, Namespace, and Shared Key; you will need these values in a later step.
4. Start the PI Integrator for Esri ArcGIS Data Relay Wizard by selecting **Administration > Data Relay**.
The PI Integrator for Esri ArcGIS Data Relay Setup window opens.
5. On the Welcome screen, click **Next**.
6. Enter the folder in which to download and install the Data Relay.
You can modify the path by clicking the **Change** button.
7. Click **Next**.
8. Select either **The default service account for this service** or **A custom account**.

While not recommended, you can select the **default account** when you want the Data Relay to run under a local service account created specifically for the Data Relay. This local account might not work optimally with PI System security. You should instead create a dedicated service account on your domain, and use the **custom account** option to run the Data Relay under this dedicated user account. Regardless of which option you choose, the service account must have read permissions to all PI Data Archive and Asset Framework servers that you want to access. This access may be granted using either a legacy PI Trust or by using Windows Integrated Security. If prompted, provide the custom service name and password, and click **Next**.

9. Enter the values for **Issuer Name**, **Namespace**, and **Shared Key** that you obtained from step 3.
10. Click **Next**.
11. Click **Install**.

A message is displayed if the service was successfully started:

Successfully completed the PI Integrator for Esri ArcGIS Data Relay Setup Wizard

12. Click **Finish**.

To uninstall or modify PI Integrator for Esri ArcGIS Data Relay service, start Microsoft Control Panel, then select **Programs and Features**. Find and select PI Integrator for Esri ArcGIS **Data Relay** and then select either **Uninstall** or **Change**.

Install and configure the on-premises Data Relay



Note:

The steps in this topic are mandatory if you are using the on-premises version of PI Integrator for Esri ArcGIS. If you are using the cloud version, see [Install and configure the cloud Data Relay](#) instead.

Before you start

- The client node you intend to use for the Data Relay must have both Microsoft .Net Framework 3.5 and Microsoft .NET Framework 4.5.1 installed.
- You should exit any open Windows programs before running the Data Relay Setup Wizard.

See [PI Integrator for Esri ArcGIS Data Relay](#) for more information.

Procedure

1. Log in as Administrator on the computer on which the Data Relay is to be installed.
You must be an administrator on the Data Relay node when running the installer. You can view users with administrator privileges by selecting the **PI Geo Admins** local group on the PI Integrator for Esri ArcGIS Portal server.
2. Log in to PI Integrator for Esri ArcGIS portal by navigating to: `https://machine name/pigeoportal` or to: `FQDN/pigeoportal`, where *FQDN* is the *Fully Qualified Domain Name*.
3. Navigate in the Portal to the **Administration > Data Relay** page and consult the **Configuration settings** section. Make a note of or copy the value of *ApplicationPoolID*; you will need this value in a later step.

For new installations, if a data relay has not been configured previously, the following message displays:

You do not have a PI Integrator for Esri ArcGIS Data Relay installed, properly configured or running. PI integrator for Esri ArcGIS cannot properly operate without the Data Relay. See help for more information.

4. Click **Download latest** to download the installation kit for the Data Relay.
5. Depending on the browser you are using, follow the steps necessary to download and start the Data Relay installation program.

The PI Integrator for Esri ArcGIS Data Relay Welcome window opens.

If prompted, install PI-SDK and AF Client.

6. On the Welcome screen, click **Next**.
7. Enter the folder in which to download and install the Data Relay.
You can modify the path by clicking the **Change** button.
8. Click **Next**.
9. Select either **The default service account for this service** or **A custom account**.

While not recommended, you can select the **default account** when you want the Data Relay to run under a local service account created specifically for the Data Relay. This local account might not work optimally with PI System security. You should instead create a dedicated service account on your domain, and use the **custom account** option to run the Data Relay under this dedicated user account. Regardless of which option you choose, the service account must have read permissions to all PI Data Archive and Asset Framework servers that you want to access. This access may be granted using either a legacy PI Trust or by using Windows Integrated Security. If prompted, provide the custom service name and password.

10. Click **Validate** to verify that the credentials are valid, and then click **Next**.
11. Fill in the **Portal Identity** using the value you obtained in Step 3.
12. Click **Next**.
13. Click **Install**.

A message is displayed if the service was successfully started:

```
Successfully completed the PI Integrator for Esri ArcGIS Data Relay
Setup Wizard
```

14. Click **Finish**.

To verify that the Data is installed and running, log in to the portal as administrator, then navigate to **Administrator > Data Relay** and verify that the following message displays:

```
Your Data Relay is running on node 'node_name'
```

To uninstall or modify PI Integrator for Esri ArcGIS Data Relay service, start Microsoft Control Panel, then select **Programs and Features**. Find and select PI Integrator for Esri ArcGIS **Data Relay** and then select either **Uninstall** or **Change**.

Configure ArcGIS GeoEvent Processor endpoint

Before you start

Ensure that you have access to a working ArcGIS GeoEvent Processor and that you know the URL of the ArcGIS GeoEvent Processor Manager.



Note:

This document uses the term ArcGIS GeoEvent Processor to refer to the Esri ArcGIS GeoEvent Extension for Server.

Procedure

1. Using a browser, access the link to the PI Integrator for Esri ArcGIS configuration portal and log in.
2. Select **Administration > Systems**. If no ArcGIS GeoEvent Processor servers were defined previously, the following message displays:

You don't have any GeoEvent Processor servers registered. Click here to add one.

If one or more ArcGIS GeoEvent Processor servers have been defined, they are listed alphabetically on the page.
3. Click the **Add GeoEvent Processor** button. The Add known PI ArcGIS GeoEvent Processor endpoint window opens.
4. Enter a name for the ArcGIS GeoEvent Processor server in the **Name** field.

You can use any name; however, you should select a name that is easy to remember.
5. Enter a description for the ArcGIS GeoEvent Processor server in the **Description** field.
6. Enter the endpoint or URL of the ArcGIS GeoEvent Processor server in the **Endpoint** field.

The URL should have the following format:

```
https://server:port
```

For example:

```
https://my.geoeventserver.int:6143
```

It is not necessary to specify the full path to GeoEvent Processor Manager.
7. Click **Add**.

Configure PI Coresight server endpoint

Procedure

1. If necessary, access the link to PI Integrator for Esri ArcGIS configuration portal and log in.
2. Select **Administration > Systems**.

If no PI Coresight servers were defined previously, the following message displays:

You don't have any PI Coresight servers registered. Click here to add one.

If one or more PI Coresight servers have been defined, they are listed alphabetically on the page.
3. Click **Add PI Coresight server**.

The Add known PI Coresight service window opens.
4. Enter a name for the Coresight server in the **Name** field.

You can use any name; however, you should select a name that is easy to remember.
5. Enter a description for the Coresight server in the Description field.
6. Enter the Endpoint or URL of the Coresight server in the Endpoint field.

The URL should have the following format:

```
https://server:port/folder
```

For example:

```
https://my.computer.int:80/coresight
```

7. Click **Add**.

Additional configuration tasks

Your ArcGIS Online account is registered as a Data Store in ArcGIS GeoEvent Processor. The same credentials for that Data Store are used when creating a Feature Service through the configuration portal. In addition, the ArcGIS Online user must be an administrator in ArcGIS Online. For more information about configuring Data Stores in GeoEvent Processor, see [Managing data stores \(http://pro.arcgis.com/en/share/geoevent-processor/administer/managing-data-stores.htm\)](http://pro.arcgis.com/en/share/geoevent-processor/administer/managing-data-stores.htm).

If applicable for your site, follow the steps in the remaining topics in this section.

Configure a proxy server (for cloud installations)

If you are running the cloud version of PI Integrator for Esri ArcGIS and your organization routes network traffic through a proxy server, you should follow the steps in this section to configure the Data Relay.

The Data Relay opens a bidirectional communication channel over the internet, which might require a proxy at some sites. The data relay uses standard HTTPS ports (443) to communicate, which might require routing through a web proxy depending on your organization's IT policy.

The on-premises version of PI Integrator for Esri ArcGIS Data Relay acts as a local server that accepts requests from the Configuration Portal and does not usually require communication through a proxy server.

Normally, the cloud version of the Data Relay communicates with the Azure Service Bus using port 443, which is the standard port for HTTPS (Web) traffic. If your organization routes HTTP(S) traffic through a proxy, you must edit the Data Relay configuration file to make the Data Relay aware of the proxy. After following the steps below, all network traffic going to and from the Azure Service Bus is routed through the specified proxy server.

Procedure

1. Navigate to the directory that contains the Data Relay program files, then open the file: `OSIsoft.DataRelay.Connector.exe.config`. Normally the location is:

```
%ProgramFiles%\OSIsoft\Integrators\Esri ArcGIS Data Relay\
OSIsoft.DataRelay.Connector.exe.config
```

2. Edit the file and add the following lines:

```
<system.net>
  <defaultProxy enabled="true" useDefaultCredentials="true" />
</system.net>
```

3. Stop and restart the Data Relay service.

If successful, the following message is displayed:

```
Your Data Relay is running (on node 'node_name')
```

Configure a proxy server (for on-premises installations)

If you are running the on-premises version of PI Integrator for Esri ArcGIS and your organization routes network traffic through a proxy server, you should follow the steps in this section to allow network access between the on-premises PI Integrator for Esri ArcGIS and Windows Azure. You must follow these steps to obtain access to PI Integrator for Esri ArcGIS Data Relay and to download the latest version. These steps also enable the ability to send usage information to OSISoft (if you have previously agreed to sending usage information).

Procedure

1. Navigate to the directory that contains the file: `web.config`. Normally the location of the file is:

```
%ProgramFiles%\OSISoft\Integrators\PI Integrator for Esri ArcGIS\
```

2. Edit the file and add the following lines:

```
<system.net>  
  <defaultProxy enabled="true" useDefaultCredentials="true" />  
</system.net>
```

3. Stop and restart the Data Relay service.

If successful, the following message is displayed:

Your Data Relay is running (on node '*node_name*')

Results

You can find more information about the *defaultProxy* Element network setting at Microsoft's Developer Network here: [Proxy settings \(http://msdn.microsoft.com/en-us/library/kd3cf2ex\(v=vs.110\).aspx\)](http://msdn.microsoft.com/en-us/library/kd3cf2ex(v=vs.110).aspx)

Configure a secure WebSocket

GeoEvent Processor versions earlier than 10.3 do not support a secure WebSocket. Secure WebSockets are to WebSockets what https is to http. A secure WebSocket permits users to create an encrypted connection that prevents data from being intercepted or interpreted. Configuring secure WebSockets ensures that the data you send back and forth to the cloud is encrypted and secure.

While logged in as GeoEvent Processor administrator, you must install the secure WebSocket transport into GeoEvent Processor. You do this by editing the Java runtime environment properties file, then adding the WebSocket transport.

Use the information in the sections that follow to install a WebSocket adaptor for GeoEvent processor.

Installing the secure WebSocket is a temporary workaround. A later version of GeoEvent Processor will support secure WebSocket input.

Modify the JRE properties file

The Java Runtime Environment (JRE) properties file is the configuration file for the Java Runtime Engine. The file is read when the application starts and pre-loads any external

libraries or Java Framework libraries that the Geo Event Processor requires to run. Two libraries are missing from the properties file and must be added. The files are framework libraries.

Procedure

1. On the GeoEvent Processor server, open the `jre.properties` file as administrator.

The `jre.properties` file is normally located in the following directory:

```
c:\Program Files\ArcGIS\Server\GeoEventProcessor\etc
```

The file contains a list of the Java runtime libraries that GeoEvent Processor loads when it is run.

2. Scroll to the JRE-1.7 section of the file.

The file should resemble the following:

```
# Standard package set. Note that:
# - javax.transaction* is exported with a mandatory attribute
jre-1.7= \
javax.accessibility, \
# javax.activation, \
javax.activity, \
# javax.annotation;version="1.1", \
javax.annotation.processing;version="1.1", \
```

3. Add `sun.misc` and `sun.reflect` as shown in the following example.

```
# Standard package set. Note that:
# - javax.transaction* is exported with a mandatory attribute
jre-1.7= \
sun.misc, \
sun.reflect, \
javax.accessibility, \
# javax.activation, \
javax.activity, \
# javax.annotation;version="1.1", \
javax.annotation.processing;version="1.1", \
```

4. Use the Services applet in Control Panel to stop and then restart the GeoEvent Processor service.

Install the secure WebSocket transport

Before you start

Ensure that you have downloaded the file: `Secure WebSocket Transport for GeoEvent Processor.zip`. The compressed file contains the two jar files:

```
wss-transport-10.2.jar
```

```
feature-json-adapter-10.2.1.jar
```

The file is available from the OSIsoft Tech Support site: [Tech Support \(https://techsupport.osisoft.com/\)](https://techsupport.osisoft.com/).

Procedure

1. Extract the two files that are contained in `Secure WebSocket Transport for GeoEvent Processor.zip` to a known location.
2. Log in to ArcGIS GeoEvent Processor Manager.

3. Navigate to the following site:

`https://your_server_name:6143/geoevent/manager/components.html`

4. Click the **Site** button, then select **Components**.

A list of transports to GeoEvent Processor is displayed. Normally, the WebSocket Inbound layer is used for unsecured transport. You will add an additional layer that will support secure WebSockets (WSS).

5. Click the **Add Local Transport** button.

The **Add Local Transport** window opens.

6. In the **Add Local Transport** window, click **Choose File**, then browse to the `wss-transport-10.2.jar` file.

7. Click **Add**.

You might have to refresh your browser to see the WSS inbound transport:

```
WssInboundTransport inbound 10.2.1 This is a Secure WebSocket Inbound transport
```

8. On the menu, click **Adapters**.

9. Click **Add Local Adapter**.

The **Add Local Adaptor** window opens.

10. In the **Add Local Adaptor** window, click **Choose File**, then browse to the `feature-json-adapter-10.2.1.jar` file.

11. Click **Add**.

You might have to refresh your browser.

The GeoEvent Processor is now capable of communicating through a secure WebSocket.

User configuration

After the administrator has configured your system, you perform the steps in the following sections to configure PI Integrator for Esri ArcGIS for your specific requirements.

In the sections that follow, you will create and configure services and layers. A layer defines a set of search parameters that are used to select elements in the AF database. These AF elements will be represented as map features. A service can contain one or more layers. A service is a logical grouping of Layers. Layers represent REST service endpoints.

Topics in this section

- [Configure certificates](#)
Follow the steps in this section to first export certificates from PI Integrator for Esri ArcGIS Configuration Portal and Esri GeoEvent Processor, and then import the certificates to your local computer.
- [Create a service](#)
You create a service to expose information that can be projected onto a map according to Esri specifications.
- [Create a layer](#)
A layer defines a set of search parameters that are used to select elements in the AF database. These AF elements will be represented as map features. A service can contain one or more layers.
- [Run the ArcGIS Platform Wizard](#)
You run the ArcGIS Platform Wizard to connect the layer to the ArcGIS platform.

Configure certificates

To avoid security problems with your browser, you must convert and import a security certificate into the GeoEvent Processor's keystore file.

Follow the steps in this section to first export certificates from PI Integrator for Esri ArcGIS Configuration Portal and Esri GeoEvent Processor, and then import the certificates to your local computer.

Import certificates

You use the Microsoft Management Console (MMC) to first export one certificate from PI Integrator for Esri ArcGIS Configuration Portal computer and one from GeoEvent Processor computer. You then import the certificates to your local computer. The steps below describe how to import the certificates and save them to files.

Before you start

You must be an administrator on the local computer and on the target computer.

In addition to your local computer, you must have access to the following:

- The computer that is running PI Integrator for Esri ArcGIS Configuration Portal.
- The computer that is running GeoEvent Processor.

Procedure

1. On your Windows desktop, select **Start > Run**, then enter **mmc.exe**.
An empty MMC screen opens.
2. Select **File > Add/Remove snapin**. The **Add or Remove Snap-ins** screen displays.
3. Find and double-click the **Certificates** snap-in.
The **Certificates snap-in** screen displays.
4. Select the **Computer account** radio button then click **Next**.
The **Select Computer** screen displays.
5. Select the **Another computer** radio button.
6. If you know the name of the Configuration Portal then enter its name in the text box; otherwise, click **Browse** and locate and select the Configuration Portal computer. If this is your second time through these steps, specify the GeoEvent Processor computer.
7. Click **Finish** then click **OK**. A certificates tree is compiled within MMC for the computer you are using.
8. Expand the certificates tree to the level of **Remote Desktop**; generally a single entry will be shown for the intended target computer.
9. Right click on **Remote Desktop** then select **All tasks > Export**.
The **Certificate Export Wizard** displays.
10. Click **Next, Next, Next** to reach the fourth panel, leaving the settings in the first three panels with default settings. On the fourth panel enter a filename that you will remember when it comes time to import the file, then click **OK**.
11. Repeat steps 1 - 10 for the GeoEvent Processor computer.

Export certificates

You use the Microsoft Management Console (MMC) to first export one certificate from PI Integrator for Esri ArcGIS Configuration Portal computer and one from GeoEvent Processor computer. You then import the certificates to your local computer. The steps below describe how to import the certificates to your local computer.

Before you start

You must be an administrator on the local computer and on the target computer.

Procedure

1. On your Windows desktop, select **Start > Run**, then enter **mmc.exe**.
An empty MMC screen opens.
2. Select **File > Add/Remove snap-in**. The **Add or Remove Snap-ins** screen displays.
3. Find and double-click the **Certificates** snap-in.

The **Certificates snap-in** screen displays.

4. If necessary, select the **Local computer** radio button then click **Finish** then click **OK**.

A Certificates tree is compiled into MMC for importing to the Local Computer.

5. Expand the certificates tree to the level of **Trusted Root Certificate Authorities**.
6. Right click on **Trusted Root Certificate Authorities** then select **All tasks > Import**.

The **Certificate Import Wizard** displays.

7. Browse to or enter the filename you used during the export steps, select the file, then click **Next**.
8. Ensure that the radio button next to **Trusted Root Certificate Authorities** is selected and click **Next**.
9. Click **Finish** then click **OK**.

Verify that your new certificate is present in the list. Repeat from step 1 for each of the previously imported certificates.

Close the MMC utility when finished.

Create a service

You create a service to expose information that can be projected onto a map according to Esri specifications. Typically this information consists of feature (asset) attributes or measurements that have location information.

When configuring a service, you can select whether the service supports a StreamServer and a DisplayServer. The StreamServer allows you to stream data from your PI System to the ArcGIS platform. The DisplayServer provides Processbook and Coresight display capabilities for map features.

Procedure

1. If necessary, access the link to the PI Integrator for Esri ArcGIS home screen and log in.

If this is the first time you have started PI Integrator for Esri ArcGIS, the following message displays:

You don't have any Services defined. Click here to add one.

If you have logged in and created services previously, a list of services is displayed. You can change how the list of services is displayed by clicking either **Table view** or **Tile view**. **Tile view** displays services in a series of boxes or "tiles," while **Table view** shows the services in a table. See [The Services Table view](#) for more information.

2. Click the **Create service** button to add a new service.

The Create new Geo Service page opens.

3. In the **Name** field, enter a name for the new service.

Fields with an asterisk next to them are mandatory. Specify a name that contains a minimum of five lowercase or uppercase alphanumeric characters, hyphens, or underscores. You should choose a name that is easy to remember. The name is required and must be unique. Do not use spaces or special characters in the name.

4. In the **Description** field, enter a description for the service.

5. Check the **StreamServer** check box, the **DisplayServer** check box, or both, then click **Create**.

The service is now created, and the details page of the service you just created are displayed. If desired, you can create additional services, or configure the service by adding layers, which is described in the following topics.

6. Click the **Create** button.

The service is created and ready for configuration.

Results

The detail page for the newly created service opens. From this page you can create one or more layers, and you can configure the StreamServer and the DisplayServer, which are covered in the topics that follow.

The Services Table view

The **Table view** of the **Services** screen allows you to customize the display and configure options. You can:


- Sort the list by Name alphabetically by clicking the **Name** heading.





Note:

For any of the columns that can be sorted, clicking the heading a second time reverses the sort order. The sort order is indicated by an arrow; ascending sort is shown as:



, while descending is: . The presence of the arrow indicates the sorted column.

- Sort the list by Description alphabetically by clicking the **Description** heading.
- Sort the list by the date the service was created or modified.
- Sort the list numerically by the number of layers in each service by clicking the **Layers** heading.
- Edit a **Service name**, **Description**, or **StreamServer** or **DisplayServer** properties by clicking the pencil icon: .
- Delete a service by clicking the Delete icon: .

You can also create a new service by clicking the **Create Service** button.



Note:

You must first remove any layers defined within a service before the service can be deleted.

View a summary of service connections

You can view a list of services that have had recent StreamServer connection activity.

Procedure

1. From any PI Integrator for Esri ArcGIS page, select **Administration > Stream connections**.

A list of services that have recent StreamServer activity is shown. Each service can be expanded or collapsed by clicking on the service name, or all of the services can be

expanded by clicking **Expand all**. Expanding a service displays the layers defined for the service, in addition to the following fields:

- **Open connections**
Connections that are active and currently streaming data.
- **Closed connections**
Connections that were closed gracefully by the client.
- **Faulted connections**
Connections that closed unexpectedly due to an error on the client, server, or the network connection between the two.
- **Total connections**
A summary of all connection activity.
- **Updates**
The number of feature updates that were sent.
- **Data**
The total number of data bytes sent.

The display is refreshed automatically every ten seconds while the page is open; however, you can manually refresh the page by clicking **Refresh**.

You can click on a layer name to link to its Layer Details page, where the individual StreamServer connections are shown in detail.

Create a layer

PI Integrator for Esri ArcGIS provides a feature layer service that can expose an AF model's elements and attributes as features enhanced with data fields. If PI assets are tagged with geographical markers, these are exposed in the feature layer so that position points can be rendered on the feature layer, or vector shapes defining regions can be drawn.

A layer defines a set of search parameters that are used to select elements in the AF database. These AF elements will be represented as map features. A service can contain one or more layers.

Procedure

1. Open one of the previously defined services by clicking on it in the PI Integrator for Esri ArcGIS home screen.

If you have not previously defined a layer, the following message displays:

You don't have any layers defined for this service. Click here to start adding layers.

If you have previously defined one or more layers they are listed alphabetically on the screen. See [The Layers Table view](#) for more information.

2. Click either the **here** link or the **Create Layer** button.

The layer is created and ready for configuration.

3. In the **Name** field, enter a name for the new layer.

You can specify any name. You should select a name that is easy to remember. The name is required and must be unique. In addition, the name must contain a minimum of five characters. The **Name** field may contain only lowercase and uppercase alphanumeric characters, hyphens, and underscores. Do not use spaces or special characters in the name.

4. Enter a description for the layer in the **Description** field.
5. Click the **Continue** button.

Results

Continue to the next topic to configure the layer with server, database, and element definitions.

Configure the layer

Before you start

Ensure that you are familiar with the name of the AF database you will use. Use PI System Explorer to find AF servers, databases, and templates.

Procedure

1. In the AF Server drop-down list, select the AF server that you wish to use.

The drop-down displays all of the AF Servers that are known to the PI Integrator for Esri ArcGIS Data Relay. When you select an AF server, all of the databases defined on that server are shown in the AF Database drop-down list. The servers must be defined in the servers list in PI System Explorer.

2. In the AF Database drop-down list, select the AF database that you wish to use.

When you select an AF database, all of the templates defined in that database are shown in the Template drop-down list.

3. In the Template drop-down list, select the template you wish to use.

4. Optionally, specify information in the following fields:

- a. In the Category drop-down list, select the AF element category that you wish to use.

You use a category to classify AF elements in the layer. Refer to AF user manual for information about creating PI AF categories. See *Introduction to PI Asset Framework* for information about PI AF categories.

- b. In the Max Count field, specify the maximum number of objects returned from a search. Because some searches might return thousands or even tens of thousands of results, the max count prevents bogging down the system by preventing large numbers of AF elements being returned when performing a search. The number of search results is limited to the number specified in the Max Count field.

- c. In the **Search root** field, specify the starting node from which to search.

The **Search root** field specifies where in the path the search should start. You can drill down as far as you wish into the search path. A node is an element in a hierarchy in an AF database which forms the root of a search. All elements below this node which are derived from the selected template will be found.

You can specify the search root node by clicking the **Select** button located next to the **Search root** field. You can traverse the database tree to locate and specify the starting node from which to search.

5. Click the **Continue** button.

Results

After specifying the layer data you want to use, you can preview the data you have specified by clicking the **Preview** button.

Continue to the next topic to configure the fields in the layer.

Configure the fields

You configure fields to determine which attributes to use. The Template attribute fields section of the layer definition screen shows all of the attributes found using the AF template. See [Field configuration](#) for more information about fields.

By default, the attributes are listed by attribute category. Uncheck the Show categories check box to list elements alphabetically.

You must specify one of the fields as a key field. The key is a unique identifier field for a map feature. Use the following steps to configure the fields in the layer definition.

Procedure

1. Specify whether the attribute is included, the attribute name, and the function for each of the listed attributes.



Caution:

OBJECTID is a reserved system name which cannot be used. The system might ask you to rename any attributes that have reserved names. If so, you can make a simple modification to the name such as adding a space (OBJECT ID) or adding a name (Esri OBJECTID).

2. Press Continue when finished.

A message is displayed if an error is found with the configuration. Fix the error and try creating the layer again.

Results

After the layer is created, the details page of the layer is displayed. Continue to the next task to run the ArcGIS Platform Wizard.

Specify element fields

An element contains more information than just attributes. You can select element fields such as the following:

- **Element name**

The name of the element

- **Element path**
The full path to the element
- **GUID**
A unique identifier for the element (usually used internally but may be exposed)
- **Description**
The element description
- **Retrieval time**
The timestamp at which the data was retrieved
- **Template name**
The template name

Procedure

1. Modify the attributes in the element fields section of the layer definition as desired.

Preview the layer data

After selecting the desired layer attributes, you can preview the data you have selected by clicking the **Preview** button. The elements are displayed as an alphabetic list. You can sort the list in reverse alphabetic order and you can perform a search within the data.

Procedure

1. Click the **Preview** button.
You can sort the list by clicking either **A - Z** or **Z - A**. You can also search the element list by entering a term in the **Search** box.
2. Close the preview screen to return to your layer.

Field configuration

The Field configuration shows the following fields:

- **Included**
All fields are included by default; however, you can improve performance by deselecting unwanted fields or fields that will not be used. Transferring field data that is not used can slow system performance. In addition, having fewer fields might make the list easier to understand.
You can select the individual fields you want exposed in the Template attribute fields section. Fields with a checkmark are used in the layer while those without a checkmark are not. Remove the checkmark to remove the attribute from the layer.
- **Name**
The name field shows the name that will be used in the ArcGIS platform. The name can be different from the attribute name specified in PI AF, if necessary, to make it easier for users to understand.

Attribute names must be composed from simple alphanumeric characters: A-Z, a-z, and 0-9 and underscore (_). When the New Layer page opens, the AF attribute names are converted automatically to simple alphanumeric characters. For example, characters with diacritical marks are converted into the closest corresponding simple characters.

But they may then be edited further as desired. Validation cues will appear if the user modifies an attribute name to contain invalid characters.

- **Attribute Name**

The name of the attribute as it appears in PI AF. The attribute name cannot be changed in this screen.

- **Type**

The data type of the attribute.

- **Source**

The name of the AF data reference or static. The attribute source can be PI point, calculation, or static.

- **Units**

The default measurement unit for the attribute.

- **Function**

The X and Y functions are pre-selected if the tool finds any attribute name that contains the words *longitude* or *latitude*, or *X* or *Y* and assigns them to the x and y function. If desired, you can select a different function (select **None**, **X**, **Y**, **Key** or **Geometry**). You specify X and Y functions for attributes that indicate geographic positions, including positions that move over time. Only one X and Y pair can be specified.

A field function defines a special function for the field value, which allows you to specify those fields that make up the geometry (or location) of a map feature. You can select either an X or a Y function, or select a geometry function.

- **Specifying X and Y**

By specifying the X and Y functions, you determine which values make up the location of the map feature. For example, when you have longitude and latitude values defined in your AF template, you can select the X function for longitude and Y for latitude. X and Y must be defined in pairs; you cannot have an X value without a Y value and you cannot have a Y value without an X value. X and Y function fields must be numeric.

- **Specifying a geometry**

Another geometry option is to specify the geometry or location on a map feature by defining it in Esri Feature Geometry Json. See [Esri geometry information \(http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=The_geometry_object\)](http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=The_geometry_object) for more information. Specifying a geometry allows for much more complex areas to be defined, such as (poly)lines or polygons. Geometry function fields must be of type string.

- **Specifying a key function**

A key function specifies a unique identifier for a particular map feature. Use care to ensure that the key function is unique for your configured search parameters when you select a field. The key function is used when updating map features in a Feature Service, and also to identify PI Coresight displays.

Specify layer geometry

If your layer uses complex geometry (that is, if your geometry is defined by text that contains Esri Feature Geometry Json instead of X and Y coordinates), you must specify the kind of geometry that the layer displays. It is important that this field be specified correctly; if the wrong geometry type is specified, your layer will appear incorrectly on maps.

Procedure

1. In the **Geometry** field, select the appropriate geometry from the drop-down list.
2. In the **Spatial reference** field, select the most appropriate coordinate system for the data you intend to display.

You can choose from among more than 5,000 coordinate systems. To make finding a specific coordinate system easier, you can enter part of the name in the search box, which limits the displayed coordinate systems to those that contain the search words. The number in parentheses shown after the coordinate name is an ID assigned by Esri, called the **well-known** ID. If you are familiar with coordinate systems you can simply enter the well-known ID number.

The most widely used coordinate system is World Geodetic System 84, or WGS_1984, which is the coordinate system used by most GPS receivers. WGS_1984 is the default coordinate system when you create a layer with geometry. You should check with your GIS expert about coordinate system to use.

To find out more about coordinate systems, see these Esri sites: [Geographic coordinate systems \(http://resources.arcgis.com/en/help/main/10.1/index.html#//003r00000006000000\)](http://resources.arcgis.com/en/help/main/10.1/index.html#//003r00000006000000) and [Projected coordinate systems \(http://resources.arcgis.com/en/help/main/10.1/index.html#/What_are_projected_coordinate_systems/003r0000000p000000/\)](http://resources.arcgis.com/en/help/main/10.1/index.html#/What_are_projected_coordinate_systems/003r0000000p000000/).

3. Click the **Create Layer** button.

The layer is created.

The Layers Table view

The **Table view** of the **Layers** screen allows you to customize the display and configure options. You can:


- Sort the list by Name alphabetically by clicking the **Name** heading.





Note:

For any of the columns that can be sorted, clicking the heading a second time reverses the sort order. The sort order is indicated by an arrow; ascending sort is shown as:



, while descending is: . The presence of the arrow indicates the sorted column.

- Sort the list by Description alphabetically by clicking the **Description** heading.
- Sort the list by the date the layer was created or modified.
- Sort the list numerically by the number of active connections by clicking the **Active connections** heading.

- Edit a **Layer name** or **Description** by clicking the pencil icon: .
- Delete a layer by clicking the Delete icon: .

You can also create a new layer by clicking the **Create Layer** button.

Run the ArcGIS Platform Wizard

When you finish defining the layer and click **Connect**, the layer is created and a window opens asking whether to connect the layer to the ArcGIS platform. The ArcGIS Wizard makes it easy to connect the newly created layer to the ArcGIS platform.

ArcGIS Platform Wizard prerequisites

Before starting the wizard, make sure you have the following:

- You must have an ArcGIS Online account or an ArcGIS Portal account that has privileges to publish a hosted Feature Service.
- Your ArcGIS GeoEvent Processor is running and is configured as a known ArcGIS GeoEvent Processor in PI Geo Services.
- You have administrator credentials for your ArcGIS GeoEvent Processor.
- Your ArcGIS Online account is registered as a Data Store in ArcGIS GeoEvent Processor.
- The GeoEvent Processor Manager certificate must be a trusted and valid certificate. You can check whether the certificate is trusted by browsing to your GeoEvent Processor Manager. Depending on your browser, a red lock icon with a warning message is displayed when the certificate is not trusted.

You can either choose to trust the certificate in your browser or obtain and install a valid certificate signed by a Certification Authority to be used with GeoEvent Processor.

To trust the certificate in Internet Explorer, see: [ArcGIS GeoEvent Processor for Server Install Guide for Windows \(http://resources.arcgis.com/en/help/install-guides/arcgis-geoevent-processor-windows/10.2/index.html#/02wn00000005000000\)](http://resources.arcgis.com/en/help/install-guides/arcgis-geoevent-processor-windows/10.2/index.html#/02wn00000005000000).

For Google Chrome and Mozilla Firefox, follow similar product-specific steps to install a valid certificate.

To install a certificate signed by a Certification Authority in GeoEvent Processor, see: [Optional: Replacing ArcGIS GeoEvent Processor for Server's self-signed certificate \(http://resources.arcgis.com/en/help/install-guides/arcgis-geoevent-processor-windows/10.2/index.html#/Optional_Replacing_ArcGIS_GeoEvent_Processor_for_Server_s_self_signed_certificate/02wn00000004000000/\)](http://resources.arcgis.com/en/help/install-guides/arcgis-geoevent-processor-windows/10.2/index.html#/Optional_Replacing_ArcGIS_GeoEvent_Processor_for_Server_s_self_signed_certificate/02wn00000004000000/).

ArcGIS Platform Wizard Feature Service Environment

GeoEvent Processor retrieves data from PI Integrator for Esri ArcGIS and outputs the data to a Feature Service. You use the Feature Service to create a layer on a map. The Feature Service can be hosted either in ArcGIS Online or on an ArcGIS Portal.

Procedure

1. Select one of the following:
 - **ArcGIS Online** to select the ArcGIS online server.
 - **ArcGIS Portal** to select a local ArcGIS server.



Note:

If you select **ArcGIS Online**, you must have previously configured a Data Store that points to ArcGIS online. If you click **ArcGIS Portal**, you must have previously configured a server Data Store that points to your on-premise ArcGIS Portal server. Feature Services that are stored in ArcGIS Online are not visible to ArcGIS Portal, and Feature Services that are stored in ArcGIS Portal are not visible to ArcGIS Online. See Esri documentation for more information about configuring Data Stores.

ArcGIS Online option

You use the ArcGIS online option to automatically create an ArcGIS Feature Service with the appropriate schema. Follow the steps below to create the Feature Service.

Procedure

1. On the **Publish an ArcGIS Online Feature Service** screen, enter your User name and password.

The account credentials you use must have administrator privileges within the specified organization.



Note:

You can use ArcGIS online to view and set the required permissions for each user. If necessary, start ArcGIS Online and select the **My Organization** tab and modify individual users as required.

2. Click **Verify credentials**.

If the credentials are valid successful, the wizard shows a suggested Service and Layer name with descriptions.

3. Enter a new Service name and Description or leave the default name and description.

The layers defined for PI Integrator for Esri ArcGIS are similar to layers for ArcGIS.

4. Enter a new layer name and description or leave the default values.

5. Click **Create Feature Service**.

When you select **Create Feature Service**, the service and layer are created in ArcGIS online. If successful, the following message is displayed:

Feature Service created

You can log in to ArcGIS Online to view and change permissions on your new Feature Service.

**Note:**

Remember to set permissions accordingly to prevent the ArcGIS Online global community from subscribing to your Feature Service.

6. Click **Next** to display the Configure GeoEvent Processor screen. Proceed to [Share the Feature Service publically](#) for the next step.

ArcGIS Portal option

You use the ArcGIS Portal option to automatically create an ArcGIS Feature Service with the appropriate schema. Follow the steps below to create the Feature Service.

Procedure

1. On the **Create Feature Service** screen, enter the URL of your local ArcGIS portal, your user name, and password.

The user name and password are for your local ArcGIS portal. The account credentials you use must have administrator privileges.

2. Click the **Verify credentials** button.

If the login credentials are correct, the wizard shows a suggested Service and Layer name with descriptions. The Geometry Type and Spatial Reference coordinate system that you selected previously are also displayed.

3. Enter a new Service name and Description, a new Layer Name and Description, or leave the default names and descriptions as-is.

4. Click the **Create** button.

When you select **Create**, the service and layer is created in ArcGIS online. If successful, the following message is displayed:

Feature Service created

5. Click **Next**. The Configure GeoEvent Processor screen displays. Proceed to [Share the Feature Service publically](#) for the next step.

Manually create a Feature Service

You can manually create an ArcGIS Feature Service. In the steps that follow, you download a CSV (Comma-Separated Value) file and use it to publish the data to your ArcGIS server portal to create a hosted Feature Service.

Procedure

1. Click **I want to manually create a Feature Service** link.

A Download button displays.

2. Click the **Download** button to save the file.

3. After downloading the file click **Next**.

Before you can continue with the wizard, the CSV file must be uploaded manually to the ArcGIS portal.

4. Start your ArcGIS portal and click the **My Content** tab, then click **Add Item**.

The Add Item screen displays.

5. Click **Browse**, then select the CSV file that was downloaded previously and click **Open**.
6. In the **Add Item** screen, specify a tag in the **Tag** field. In the **Location Fields** column, ensure that you have Latitude and Longitude fields specified in your data.
7. Click **Add Item**. If prompted, provide your login credentials to ArcGIS server. The data items that were added to the ArcGIS portal are updated on the ArcGIS Server. ArcGIS Server uses the information from the CSV file to create a Feature Service that you can use.

Allowing access to the Feature Service

After the Feature Service is created, you must select who should have access to it. Sharing the Feature Service makes it visible to GeoEvent Processor. To make a Feature Service available publicly, follow the steps in [Share the Feature Service publicly](#).

If you have created a GeoEvent Processor Data Store by specifying the on-premises server (portal) option and a token is not specified, then the ArcGIS Platform Wizard will not show unpublished and unshared feature services that are hosted on your ArcGIS portal server. To create a Feature Service and associate it with a specific account, follow the steps in [Share the Feature Service with a specific account](#).

Share the Feature Service publicly

Follow the steps in this section to enable the Feature Service to be shared by everyone.

Procedure

1. Log in to either ArcGIS Portal or ArcGIS Online, depending on which service you are using.
2. If necessary, select **My Content**.
The My Content screen displays
3. Find and click the Feature Service you just created.
4. When the Feature Service is displayed, click **Share**.
The Share window displays.
5. In the Share window, check the boxes as appropriate to make the Feature Service available to the audience that should have access to the Feature Service.
6. Click **Ok**.

Proceed to [ArcGIS Platform Wizard Configure GeoEvent Processor](#) to continue.

Share the Feature Service with a specific account

Follow the steps in this section to share a Feature Service with a specific account. Sharing a Feature Service with a specific account allows the Feature Service to be visible only to a specific user and not visible to the public. You can always share the Feature Service with a wider audience later.

Procedure

1. Log into ArcGIS GeoEvent Processor Manager.
2. Click the **Site** button.

3. Click the **Data Stores** menu item.

The Data Stores screen displays. The Registered ArcGIS Server section displays all registered ArcGIS servers.

4. Click **Register ArcGIS Server**. The **Register ArcGIS Server** screen displays.
5. In the **Name** field, specify a hostname to register with GeoEvent Processor.
6. In the **URL** field, specify the URL of your ArcGIS server.

Specify the same URL you use to log in to ArcGIS. After entering the URL, a set of instructions displays that explain how to obtain a token.

Register ArcGIS Server

SERVER PORTAL AGOL

ArcGIS Server Connection

Do you wish to use token? Yes No

Name:

URL:
Example: http://<hostname>:<port>/arcgis/

Update Interval: Minutes

Token:

To acquire token, go to
<https://phl-arcgis.osisoft.int/arcgis/sharing/generateToken>
 and enter the below Uri in the 'HTTP referer' parameter :
<https://PHL-ARCGIS:6143/geoevent/admin/datastores/agsconnection/AdminAccountPORTAL>

7. Highlight and copy the HTTP referer parameter in the instructions.
8. Click the link after: **To acquire a token, go to:**
A new tab opens in your browser named **Generate Token**.

The screenshot shows the 'Generate Token' form in the ArcGIS Portal Directory. The form is titled 'Generate Token' and has a 'Home' link. Below the title is an 'API Reference' link. The form contains the following fields and options:

- Username:** A text input field containing 'admin'.
- Password:** A password input field with masked characters (dots).
- Client:** Three radio button options: 'IP Address', 'Webapp URL' (which is selected), and 'IP Address of this request's origin'. Each option has an associated text input field.
- Expiration:** A dropdown menu set to '1 hour'.
- Format:** A dropdown menu set to 'HTML'.
- Generate Token:** A button at the bottom of the form.

9. Enter your ArcGIS portal user ID and password.
10. Click the **Webapp URL** radio button then click **Generate Token**.
The generated token screen displays.
11. Highlight and copy the entire token to your clipboard.
12. Return to the ArcGIS GeoEvent Processor Manager tab in your browser and paste the token into the **Token** field.
13. Click **Register**.
The server now appears in the list of registered ArcGIS servers.
14. In your browser, return to the ArcGIS Platform Wizard tab and click **Refresh** in the Data Store section.
The Data Store is displayed in the data store list. You might need to click the **Refresh** button.
15. Select the newly created Data Store and continue running the ArcGIS Platform Wizard.

ArcGIS Platform Wizard Configure GeoEvent Processor

After creating the Feature Service, you can connect the service to the GeoEvent Processor. The Feature Service that was created previously is selected automatically if it is defined in the selected Data Store.

Procedure

1. In the **GeoEvent Processor** field, select the appropriate GeoEvent Processor from the list.
You can click the **Manager** button to open a new browser tab containing the ArcGIS GeoEvent Processor Manager.
2. Enter your User ID and password for the GeoEvent Processor and click **Validate credentials**.

After you credentials are verified, the wizard connects to the GeoEvent Processor and retrieves information about all ArcGIS servers that are configured. The GeoEvent Processor that was selected is displayed. You can change to a different GeoEvent Processor by clicking: [Click here to change your connection](#).

3. In the **Data Store** field, select the Data Store that is configured in your GeoEvent Processor.

4. In the **Folder** field, select folder where your Feature Service is stored. The folder is normally the root directory, specified by entering "/".
5. In the **Service** field, select the Feature Service that contains the layer you want to update with data.

The name of the Feature Service should correspond with the Feature Service that was created in previous steps.



Note:

The screen is refreshed automatically until the Feature Service that you created earlier is selected. Click the **Refresh** button manually if the Feature Service is not selected automatically. A spinning loader icon displays when a refresh is in progress. An **ok** icon displays when the Feature Service and layer are selected.

You must select the correct Data Store for the screen to refresh automatically. Use the Data Store that corresponds with the credentials that were entered earlier when the Feature Service was created.

6. In the **Service Layer** field, select the layer that you want updated with data. The name should correspond to the Feature layer that was created earlier.
7. Check the **Use Secure Websockets** check box . See [Configure a secure WebSocket](#) for more information.
8. Click **Next**.

ArcGIS Platform Wizard Advanced Settings

You can modify several settings on the Advanced Settings screen. Default values for each of the fields are provided.

GeoEvent Processor works by taking an input from PI Integrator for Esri ArcGIS, and connecting it with a Feature Service output. How the input and output are related is determined by the Service. At the simplest level, a service simply connects an input to an output.

Procedure

1. In the **Input**, **Output**, and **Service** fields, verify that the appropriate input, output, and service values are displayed. If not, change as appropriate.



Note:

Default names are provided for the input, output, and service name fields. You can change the names as desired; however, the names should contain only letters, numbers, hyphens and underscores. Avoid using spaces and special characters such as &, ^, or %.

The minimum length for each field is five characters, and the maximum length is 200 characters. All three fields are required to have valid names before continuing. A message is displayed when an input is incorrect.



Caution:

The wizard uses the names in the Input, Output, and Service fields to store information. If any of those names already exist, they will be overwritten by the wizard when you click the **Create Service** button.

2. In the **Identity (key) Field**, verify that the default data is appropriate. If not, change it as appropriate.

By default, the element that was selected as the key is entered into the **Identity (key) Field**. You have the option of using a different field if desired.

3. In the **Refresh Interval** field, specify (in seconds) how often the GeoEvent Processor polls the configuration portal for new data. The default refresh interval is 5 seconds.
4. In the **Session Inactivity Timeout** box, specify the amount of time that must elapse before the connection between the GeoEvent Processor and the Configuration Portal is considered closed. The activity timeout helps manage resources on the Data Relay. When the GeoEvent Processor begins polling again, data flow resumes seamlessly. The inactivity timeout should generally be several times greater than the poll interval.

The default session inactivity timeout period is 300 seconds (5 minutes).

5. Check **Send latest values only** to specify the nature of the data updates that are returned when the GeoEvent Processor polls for data. When enabled, only the latest value of each updated Feature (Asset) is returned, which greatly reduces the load on all systems involved. When disabled, all intermediate values are also returned, which is desirable if performing analytics in the GEP and intermediate values are necessary.

Send latest values only is selected by default.

6. Check **Use HTTPS (secure)** to specify whether all data is transmitted securely. Using HTTPS requires performing a one-time security configuration on the GeoEvent Processor before data can flow back and forth.

7. Click **Create Service**.

If the service was created without errors, the following message is displayed:

```
Service created
```

8. Click **Next**. The following message is displayed:

```
You can always repeat this process to create additional feeds.
```

9. Click **Finish**. After clicking the **Finish** button, the service is created within GeoEvent Processor and then a Summary screen is displayed.

Results

The Summary screen shows a summary of what was done in the previous steps. You should ensure the following:

- A connection from your ArcGIS GeoEvent Processor is made to this Stream Server endpoint, which is displayed when the wizard is closed.
- Your ArcGIS GeoEvent Processor is receiving events from PI Integrator for Esri ArcGIS. Use the ArcGIS GeoEvent Manager to check whether events are received.

Map and layer configuration

The following topics show how to create and configure maps so that geographic information about your PI assets is displayed. You can customize the map and the way in which information is shown on the map

Create a map

You create a map to display the geographic positions of your PI assets.

Procedure

1. Log in to ArcGIS online and click the Map menu item.

A base map is displayed. You can select all or part of the map you want to use, and decide what should be shown on the map. Create a map using the following four steps:

- **Step 1: Choose an area.**

You can pan and zoom the map to display a specific area or you can search for a name or address.

- **Step 2: Decide what to show.**

Click the **Basemap** menu item then select one of the base maps to use. Add layers to the map by clicking the **Add** menu item and selecting one or more layers. You can select pre-defined Esri map layers, add a layer from the **Web** or a file, or add map notes. If you have already defined one or more Feature Service layers, you can add them here.

- **Step 3: Add more to your map.**

Click the **Add** menu item and select map notes to add static map features such as private buildings or roads.

- **Step 4: Save and share your map.**

Save your map by clicking the disk icon and choosing **Save as** and provide a map title, tags, a summary of what the map contains, and the location in which to save the map. Next, click the **Share** menu item and choose who can view the map.

Note the link URL you can use to display the map on the Web.

2. Add one or more of the layers you created previously by clicking the **Add** menu item and selecting **Search for layers**.

A list of layers that you created is displayed.

3. Enter a search term, find your map, and click **Add**.

Don't forget to save your map and to update the sharing information.

Create a pop-up

Each symbol on your map represents a physical object. When you click a symbol on a map, a pop-up is displayed. You can edit the pop-up to include a link to your PI Coresight server, allowing you to monitor real-time information about that asset. The specific information shown depends on the fields selected when the layer was created. You can link a symbol to a PI Coresight server, then the pop-up will contain a link to a PI Coresight display.

Before you start

Ensure that you have configured a PI Coresight endpoint (see [Configure PI Coresight server endpoint](#) for more information).

Procedure

1. Open your map in ArcGIS.
2. Select one of the layers by clicking it.
A drop-down list appears next to the selected layer.
3. Select **Configure Pop-up** from the drop-down list.
A list of pop-up properties is displayed.
4. Select **Image** from the **ADD** drop-down list in the **Pop-up Media** section.
5. In the **Configure Image** window, enter a Title, Caption, and URL to use for the pop-up image.

The URL should point to an image. The image will appear in the pop-up and will act as a link to your PI Coresight server. You should use the same link that was configured when you set up PI Coresight (see [Configure PI Coresight](#)).

6. In the Link field, enter the link to the Coresight server using the same URL as was entered in the Ad hoc display field (see [Configure PI Coresight](#)).

Now, when the pop-up is clicked, it will contain the image that was configured in step 5. Clicking the image in the pop-up will link to your PI Coresight server display.

Create and customize symbols

By default, the symbols or map features on your map display as red dots. You can modify the symbols to make them more visually accurate or appealing.

Procedure

1. Open your map in ArcGIS.
2. Select one of the layers by clicking it.
A drop-down list appears next to the selected layer.
3. Select **Change Symbols** from the drop-down list.
The Change Symbols menu is displayed.
4. Select **Change Symbols** from the **Options** drop-down list.
The Change Symbols window opens.

5. Choose a symbol category from the drop-down list.
The Basic category is displayed by default. Several categories are available to choose from, including Business, General infrastructure, and Travel.
6. Adjust the size of the symbol as necessary **Symbol size** using the slider, or by entering the pixel size in the **px** box.
7. Click the **Apply** button to preview the symbol, then click the **Done** button when finished.
Click the **Cancel** button if you want to ignore your changes.
You can also select one of the attributes in the map and assign a range of colors to it. The symbol will change color based on the value of the attribute obtained from the PI Data Archive.

Configure PI Coresight

Before you start

Ensure that the PI Coresight server endpoint has been configured. See [Configure PI Coresight server endpoint](#).

Procedure

1. In PI Integrator for Esri ArcGIS, select the Layer for which you want to display PI Coresight data, then click the **DisplayServer** button at the bottom of the screen.
The **Configure Display Server** screen is displayed. All of the fields contain default values.
2. In the Display server configuration section, verify or change the default value in the **PI Coresight Server** drop-down list.
If you have multiple PI Coresight servers configured you can select the one you want to use.
3. In the Sharing section, enter the URLs of images to display in the **Ad hoc display**, the **AFdButton Image** field, the **OSIsoft Button Image** field, and the **Coresight Button Image** field.

Utilities

Asset Extractor

The Asset Extractor is a tool you can use to read assets within a feature layer and insert those assets into your PI System.

Two versions of the Asset Extractor are available: an online version and a downloadable version. The desktop version can extract features from map layers hosted on secure map services (HTTPS) and unsecured map services (HTTP), and can handle larger amounts of data. The online version is accessed directly from the PI Integrator for Esri ArcGIS Portal, and is often the easiest version to use. However, the online version does not support the extraction of data from map layers that are hosted on unsecured map services; only secure map services are supported. In addition, the online version is unable to extract features from very large map layers. If you attempt to extract large amounts of data or to extract data from a non-secure map service, you will be prompted to download and use the desktop version. The desktop version is available for Windows Vista and later versions and does not require installation.

If you are an Esri ArcGIS user and you are just getting started with the PI System, you probably have assets that are defined in ArcGIS but not in the PI System. While ArcGIS assets consist mostly of metadata such as location information, PI System assets might include data and analytics from the PI System in addition to metadata. You use PI Integrator for Esri ArcGIS to augment and enrich PI assets. To use PI Integrator for Esri ArcGIS effectively, you must have rich PI Assets which expose PI System data. You use the Asset Extractor as the first step towards converting your existing Esri ArcGIS asset metadata and getting started building rich assets in the PI System.

The Asset Extractor will read and include any geometry information that is included with the target Map Layer. This includes the feature shape, the feature shape type (Point, Polygon, and so on), and coordinate systems. These fields are placed in an AF category called *Geometry*. For geometries of type Point, values for Latitude and Longitude are included. Note that in some cases, the Attribute names of **Latitude** and **Longitude** and the default unit of measure of degrees might not apply. You must modify these fields manually in PI Asset Framework as necessary. Any existing fields (that is, if your map layer already has a field called **Latitude**) are not overwritten; the Extractor-generated fields are given a unique name such as **Latitude1**. You should choose which fields to keep and use; you can also rename fields as appropriate.

Run the Asset Extractor

You use Asset Extractor to read assets automatically from a feature layer endpoint (URL) so they can be added to your PI System. The endpoint must be the address of an Esri ArcGIS Feature Layer that has been exposed using MapServer or FeatureServer. If desired, you can include an Esri-designed query into the endpoint to limit the elements that are selected. For example, you could select all of the elements within a certain city, state, or region rather than all of the elements that exist within a country.

Procedure

1. If necessary, start PI Integrator for Esri ArcGIS and select **Asset Extractor** from the **Tools** menu.
2. In the **Address** field, enter a MapServer or FeatureServer address (endpoint).
The endpoint must point to one specific map layer. A valid endpoint URL must point to a MapServer or FeatureServer, and can optionally contain an embedded Esri query.
If desired, you can enter advanced mode by clicking the link: **Or, manually provide feature JSON (advanced)**. In advanced mode, you can paste the Esri layer definition and feature definition JSON.
3. Click **Apply**.
The features are loaded into pages, and the status of the extract is displayed. Be aware that large layers might take a long time to load and can heavily tax the web browser.
4. Click **Next**.
The AF output preferences page is displayed.
5. In the listbox, select the feature attribute that should be used as the Asset Framework (AF) Element name.
The name must be a unique field, and it should be a descriptive field; that is, something which is not overly cryptic, if possible. Note that you can always rename fields later using PI Builder for Excel. Remember that the element names must be unique.
6. Click **Next**.
The Download AF Elements screen is displayed.
7. Click **Download**.
The download file contains XML and is named *{name} database.xml*.

Results

The downloaded file is ready for import into PI Asset Framework.

Use PI System Explorer to import the file into a new Asset Framework database. In PI AF, select **File > Import from File**.

You can then enrich the assets by adding data, analytics, and other metadata. If any attribute created by the Asset Extractor maps to real-time data, you should (as administrator) edit the Attribute to use the PI Point Data Reference to point to a PI tag.

For more information, see the Asset Framework instructional materials and courses.

Desktop version of Asset Extractor

You use the desktop version of PI Asset Extractor when the layer you want to extract contains thousands of features, or if your map server is situated at an unsecured site. Sites that start with `https` are secure while those that start with `http` are not secure.

The desktop version of the Asset Extractor is compatible with Windows Vista and later versions. To use it, you download the zip file and extract it to a convenient location.

Download and extract the program

The downloadable package is a .ZIP archive that contains the Asset Extractor application. To access the application, you must first download it from the PI Integrator for Esri ArcGIS Portal, and then extract its files.

Procedure

1. From the PI Integrator for Esri ArcGIS home screen, select the **Tools** menu item.
The Tools screen is displayed.
2. Click the **Asset Extractor** tile.
The extractor page is displayed.
3. Click the text: **Desktop edition also available for download**.
The section expands to display the **Download desktop edition** button.
4. Click the **Download desktop edition** button.
Follow your browser's instructions for downloading the file.
5. Using Windows Explorer, navigate to the directory in which the file was downloaded. If desired, you can extract the file contents from the download directory, or copy the .ZIP file to another directory.
6. Right-click the .ZIP file and select **Extract all**.
Note the location of the extracted files before proceeding to the next section.

Run the desktop Asset Extractor

After the application is downloaded and extracted, it is ready to be run. No installation is required other than extracting the executable program from the .ZIP archive. Although it is possible to retain the files for future use, it is recommended that you download the latest version from the Portal each time you use the Asset Extractor.

Procedure

1. Navigate to the directory in which the Asset Extractor files were extracted from the .ZIP file.
2. Double click the executable file: **PI Asset Extractor for Esri ArcGIS.exe**.
The PI Asset Extractor for Esri ArcGIS window opens.
You might receive an application run security warning when opening the extractor. Click **Run**.
3. In the PI Integrator for Esri ArcGIS window, enter the address of the layer that you want to extract.
You should enter the address of an ArcGIS Feature Layer. The feature layer should be exposed using the MapServer or FeatureServer. You can include an Esri-specific query to restrict elements to a specified element subset. For example, if you are extracting oil well data, you might want to restrict the query to show only wells that are located in a particular state.
4. Click **Load features**.

If successful, the following message is displayed:

Features loaded! Choose the desired Asset Name and you're ready to generate the XML export.

5. From the drop-down list of asset names, select the asset name to use to generate the XML. When finished, click **Save as XML**.

The Save As window opens.

6. Specify a file name in which to save the XML data.

The data is now ready for use. You can exit from the application by clicking the close icon.

Administrator roles and definitions

Throughout the steps in this document for configuring PI Integrator for Esri ArcGIS, you might be required to have one or more administrator accounts. This section describes each administrator role, what you need it for, and how to obtain administrator access.

- **ArcGIS administrator**

The ArcGIS administrator is responsible for performing necessary ArcGIS setup tasks, and for ensuring proper permissions to publish content to the Esri GeoEvent Processor.

You need ArcGIS administrator privileges in order to configure ArcGIS.

You can obtain ArcGIS administrator privileges from an existing ArcGIS administrator within your organization.

- **PI Integrator for Esri ArcGIS administrator**

The PI Integrator for Esri ArcGIS administrator is responsible for user account management and Data Relay configuration.

You need PI Integrator for Esri ArcGIS administrator privileges in order to view administrative pages such as account management and Data Relay configuration.

You can obtain PI Integrator for Esri ArcGIS administrator privileges from an existing administrator. In the Cloud version of the software, the first user to sign up for PI Integrator for Esri ArcGIS is made an administrator automatically. In the on-premises version of the software, the user who installs the Portal is made an administrator automatically.

- **local system administrator**

The local system administrator is responsible for installing necessary software pieces, such as the Data Relay.

You need local system administrator privileges in order to install software.

You can obtain local system administrator privileges, or identify someone who has them, by working with your IT department.

Security and system administration

You use PI Cloud security administration tools to maintain user and user account information. Refer to the PI Cloud Security manual for additional information.

You can perform limited account administration using PI Integrator for Esri ArcGIS.

1. If necessary, start PI Integrator for Esri ArcGIS and select **Account** from the **Administration** menu.

The Account option is visible only if you are an account administrator. The Service Bus information is configured per account.

The first person within an organization to log in is designated as the PI Integrator for Esri ArcGIS administrator. The administrator can designate additional administrators from the screen in this step.

2. Click the **Manage Users** button to grant or revoke administrator privileges to individual users.

Configure a user for on-premises version

The on-premises application is identical to Azure cloud environment except for how user access rights are managed. On-premises security is based on Windows authentication and user management is performed within Windows.

The installation program creates two local security groups, named **PI Geo Admins** and **PI Geo Users**. To use the on-premises version of PI Integrator for Esri ArcGIS, users must be a member of either of the security groups. The first user to install the Portal at your site is placed in the **PI Geo Admins** group automatically.

Your administrator can add users individually or can add subgroups of users that share access rights.

To access the Portal of the on-premises version, each user's Windows account must be placed in the **PI Geo Users** and/or **PI Geo Admins** group, or must belong to an Active Directory group which in turn has PI Geo permissions. Users and administrators have the same permissions, except that administrators are permitted to open the Data Relay page.

Administrators of PI Integrator for Esri ArcGIS can add users and groups from Active Directory into the authorized lists for Users and Administrators. It is recommended that you use existing Active Directory groups wherever possible, rather than managing users individually.

Procedure

1. As a Windows administrator, start the **Local Users and Groups** management console (**lusrmgr**).
2. Navigate to the **Groups** collection, and open the **PI Geo Users** or **PI Geo Admins** group.
3. Use the standard Windows account search and selection controls to add users or groups.

Troubleshooting

Use the topics that follow to troubleshoot problems that you encounter while using PI Integrator for Esri ArcGIS.

Problems configuring the Data Relay service

- **The Data Relay service is installed and running, but the Portal says it is not running.**

The Data Relay creates log files in %ProgramData%\OSIsoft\Integrators\Esri\Logs that you can use to aid in troubleshooting. A new log file is created daily when the service is running. Locate the current log file and refer to the following sections.

- Mode of operation

When the Data Relay service is initialized, a line is written in the log file that says: `Initializing service for {local or cloud} operation`. If the Configuration Portal is hosted in the cloud, ensure that the Data Relay service is installed in cloud mode. If the Configuration Portal is installed locally, ensure that the Data Relay service is installed in on-premises mode. Reinstall the Data Relay if it is installed incorrectly.

- Network and security

Follow the version-specific instructions as shown below:

- On-premises version

When running in on-premises mode, Data Relay logs all connections made from the Portal, and should identify them as either successful or unsuccessful. If no connection attempts appear, it is likely that problems with the network are terminating the connection attempt before it reaches the Data Relay service. If connection attempts appear but are unsuccessful, you must check the security configuration as outlined below.

- Network

If the Data Relay log indicates that there are no connection attempts, ensure that Port 5464 is unblocked on the Data Relay node. If you encounter problems with the port and you want the Data Relay node to use a custom port, then contact OSIsoft Technical Support.

- Security

If the Data Relay log indicates that connections are rejected, verify that the Data Relay node and the Configuration Portal are installed on the same Windows Domain, or on Domains that trust each other. Ensuring the domains trust each other is a necessity, because Windows security is the only security mechanism offered.

When you install the Data Relay node, you are asked to supply the Portal identity, or the Windows account under which the Portal is running. This Windows account must match exactly with what the Portal lists on the

Configuration Settings page under **Administration > Data Relay**. The setting is stored in the Data Relay's `app.config` file, which is located in the directory where the application was installed. To change the setting, you may either reinstall the Data Relay (recommended) or manually edit the `app.config` file (advanced).

- **Cloud version**

When initializing in Cloud mode, the Data Relay service logs connection attempts to the Microsoft Azure Service Bus. If the connection is unsuccessful, messages similar to the following are logged:

```
Failed to open server: Unable to reach  
mycompany.servicebus.windows.net
```

If the log contains messages similar to the above, you should verify the following:

- That outbound traffic is allowed as required by the Data Relay, or that, if necessary, the service has been configured to use your organization's proxy server.
- That the Data Relay node is using the correct configuration values. The values are written to the log when the service starts. Confirm that the values match exactly the configuration values given on the **Administration > Data Relay** page of the Configuration Portal. If they do not match exactly, you can either reinstall the Data Relay service (recommended) or manually edit the `app.config` file (advanced).

Problems when installing the Configuration Portal

- **Navigating to the Configuration Portal site gives an "SSL error" page**

Add an HTTPS binding to the IIS Website that is hosting the Configuration Portal, as detailed in the prerequisites of the Portal Installation section of this manual.

- **Navigating to the Configuration Portal site gives a server error page**

Ensure that all IIS Role Services are installed properly as detailed in the prerequisites of the Configuration Portal Installation section of this manual.

Ensure that your SQL Server is still online, and still accessible from the machine that is hosting the Configuration Portal site.

Problems when creating a layer

- **The Data Source section doesn't contain any AF Servers**

Check that there is a banner near the top of the page that says:

Your Data Relay node is running.

If the above message is missing, or if the following message is displayed, then you must resolve this issue before proceeding to create a map layer:

You do not have a PI Integrator for Esri ArcGIS Data Relay installed, properly configured or running

The machine running the Data Relay node maintains a list of known PI AF servers. Ensure that all desired PI AF servers have been added to the known servers list.

- **The Data Source section does not update or refresh if I choose certain AF Servers**

Check your PI AF security. The Data Relay service runs as a Windows service account, which is the account used when connecting to PI. The account must have read privileges to the PI AF Servers and to the PI Data Archive Servers you intend to use within map layers.

When attempting to connect to AF, problems with security are not shown to users but they are logged by the Data Relay service. The Data Relay creates log files that can help in troubleshooting security problems. Log files are stored in the following location:

`%ProgramData%\OSIsoft\Integrators\Escri\Log`

Problems publishing to ArcGIS

Often, failures encountered while running the Configuration Wizard are caused by failing to ensure that all of the prerequisites are followed when the Configuration Wizard opens. Please ensure that you have checked each of the prerequisite steps; failing to verify even a single prerequisite can prevent the Configuration Wizard from succeeding.

Certain more specific failure reasons or unexpected behaviors are detailed below.

- **Wizard, Step 2: I cannot connect to my on-premises ArcGIS Portal**

Attempt to navigate to your ArcGIS Portal administration site using your web browser. If the portal address does not begin with `https://`, try navigating to the same site using the `https://` prefix. You must be able to access the Configuration Wizard using `https://` prefix to successfully communicate with the ArcGIS Portal. If you cannot navigate to the portal, you must configure your ArcGIS Portal to be available using HTTPS.

- **Wizard, Step 3: I cannot connect to the GeoEvent Processor**

Attempt to navigate to the GeoEvent Processor administration page using your web browser. If the address cannot be resolved, then you must troubleshoot GeoEvent Processor availability. If the address can be resolved, but your web browser warns you about its security certificate, the Configuration Wizard will be unable to connect to the GeoEvent Processor. Follow one of these steps.

- Instruct your computer to trust the certificate being used by the GeoEvent Processor. See [Esri ArcGIS help \(http://resources.arcgis.com/en/help/install-guides/arcgis-geoevent-processor-windows/10.2/index.html#/Optional_Marking_the_self_signed_ArcGIS_GeoEvent_Processor_for_Server_certificate_as_trusted_by_Internet_Explorer/02wn000000500000/\)](http://resources.arcgis.com/en/help/install-guides/arcgis-geoevent-processor-windows/10.2/index.html#/Optional_Marking_the_self_signed_ArcGIS_GeoEvent_Processor_for_Server_certificate_as_trusted_by_Internet_Explorer/02wn000000500000/).
- Configure the GeoEvent Processor to use an already-trusted certificate, such as one generated by your Windows domain. See [Esri ArcGIS help \(http://resources.arcgis.com/en/help/install-guides/arcgis-geoevent-processor-windows/10.2/index.html#/Optional_Replacing_the_ArcGIS_GeoEvent_Processor_for_Server_self_signed_certificate/02wn000000400000/\)](http://resources.arcgis.com/en/help/install-guides/arcgis-geoevent-processor-windows/10.2/index.html#/Optional_Replacing_the_ArcGIS_GeoEvent_Processor_for_Server_self_signed_certificate/02wn000000400000/).

- **Wizard, Step 3: The Feature Service I created in the previous step isn't available to be selected**

Ensure that a Data Store has been configured in the GeoEvent Processor, and that this Data Store corresponds to the proper ArcGIS Online account, or ArcGIS Portal server.

If you are using ArcGIS Online, ensure that your account has Administrator privileges within your organization.

After new Feature Services are added, the GeoEvent Processor service sometimes requires restarting to properly read from the Data Store. On the machine hosting the GeoEvent Processor, restart the GeoEvent Processor system service. Then, from step 3 in the Wizard, click **Refresh** next to the **Data Store** field. The list should now refresh properly, and should contain your newly created target Feature Service.

Problems validating a connection to Esri ArcGIS

- **How do I test my map layer to see what data will stream?**

In the Configuration Portal of PI Integrator for Esri ArcGIS, navigate to your map layer and follow the link: [View in services directory: StreamServer](#). The resulting page allows you to stream updates from the map layer. The initial state of the StreamServer is displayed when the connection is opened. After opening the connection, you should see all of the current features and associated values

Descriptions of fields in the StreamServer screen:

- **Updates**

The number of feature updates that were transmitted. An update is defined as one payload of values.

- **Total data**

The total file size of these feature updates.

- **Host**

The IP address of the Portal server.

- **Address**

The IP of the recipient (typically, the GeoEvent Processor).

- **Secure**

Shows whether using WSS or not.

- **Created**

The amount of time that has passed since the connection was opened.

- **Updated**

The amount of time that has passed since the last feature update was transmitted.

- **Total time**

The difference between the time of the last update and the time of creation.

- **Time since last**
For open connections, the difference between the current time and the time of the last update.
- **Average update rate**
The update count divided by the total time.
- **Average update data rate**
The total data divided by the total time.
- **My map layer won't stream anything in test; the connection simply closes**
 - On-premises
Confirm that the web server that is hosting the Configuration Portal has the **WebSocket Protocol Role Service** installed in IIS. The server cannot stream data without the service.

Also, confirm that the **pigeoportal** IIS Web Application has both **Anonymous Authentication** and **Windows Authentication** set to "Enabled" on the web server that is hosting the Configuration Portal. Both authentication settings are required. All other forms of authentication should be set to "Disabled." You use the IIS Manager console to modify these IIS settings.
 - Cloud and on-premises Data Relay
Navigate to **Administration > Data Relay**, or, if you are not an administrator, the page for creating a new layer will show the same information. A banner shows status information for the Data Relay service. If the Data Relay service is not connected, refer to that section of this troubleshooting guide.

If the Data Relay is connected, examine the Data Relay logs for any sign of failures to connect to PI Asset Framework and load elements and data.
- **How do I know if the GeoEvent Processor is connected to my map layer?**
In the Configuration Portal of PI Integrator for Esri ArcGIS, navigate to your map layer and choose the **StreamServer** tab. Here, you can see all recent connections to the map layer.
- **In the Esri ArcGIS GeoEvent Processor Manager, my newly created input status is set to UNAVAILABLE**
Navigate to the **Inputs** section of the Esri ArcGIS GeoEvent Processor and check whether the following message displays:

UNAVAILABLE - No transport available matching this name/version:
`com.esri.gep.transport.inbound/WssInboundTransport/10.2.1`
This error message means that you have not properly installed the custom wss transport for ArcGIS GeoEvent Processor. See [Configure a secure WebSocket](#) for information about how to install the custom WebSocket transport.
- **How do I see high-level statistics about connections to my map layers?**
In the Configuration Portal of PI Integrator for Esri ArcGIS, navigate in the main toolbar to **Administration > Connections**. Layers with recent connections are shown.

- **On the map, some of my assets/features are missing**

If this is a layer with thousands of assets or features, you might be encountering the feature count limit which is, by default, set very low during layer creation.

By default, when you create a map layer, the maximum count of map features is limited to 1000. If you wish to see more than 1000 map features in your layer, this limit must be set to a suitably high number such as 1,000,000. Currently, the only way to change this value is to recreate the map layer.

- **On the map, certain data fields never update with valid values**

All data fields correspond to element attributes in PI AF. For the asset in question, find its corresponding PI AF element, and locate the element attribute(s) that are not updating properly. Look at the configuration for the Element Attribute to see which Data Reference is selected and refer to the following:

- **PI Point**

If PI Point data is not updating, it is usually due to problems with security or server registration.

Determine which PI Data Archive server contains the PI Point in question, and ensure that the PI Data Archive server is added to the Data Relay machine's **PI Known Servers Table**. Otherwise, the server will be inaccessible by the Data Relay.

Ensure that the service account used by the Data Relay service has security permissions on the PI Data Archive server for all desired PI Points. Security configuration in the PI Data Archive is selectable on a per-point basis; however, read-only security identity is available which will suffice if more granular security is not warranted. In this simple case, it is sufficient to create a mapping for the Data Relay service account to the PI World identity using PI System Management Tools.

- **Anything other than PI Point**

If the attribute references PI Point data in any way (for example: if it is a formula that uses PI Point data as an input, or a formula that depends on another formula that does use PI Point data as an input), then the follow the steps about security in the previous bullet.

If the attribute does not reference PI Point data in any way, then it is likely that the attribute will not be able to trigger data updates to Esri ArcGIS. Data updates to Esri ArcGIS are triggered individually for each PI AF Element when any of its trigger-capable attributes receives new data. This usually means that Data updates to Esri ArcGIS are triggered when any of its attributes reference a PI Point, and that PI Point has new data events. However, when data updates are triggered, then all requested attribute values are included in the update, even if they did not play a part in triggering the update.

Monitor data flow into the GeoEvent Processor

Use the steps in this topic to monitor the flow of data from your Feature Service to GeoEvent Processor.

Procedure

1. Open Esri ArcGIS GeoEvent Processor Manager and, if necessary, click the **Services** button in the top menu and then click the **Monitor** button.
2. Find your service in the **GeoEvent Services** section of the page. The status of the GeoEvent Service should be **Started**. The event flow rates on the **In** and **Out** lines should be the same.
3. Open the PI Integrator for Esri ArcGIS Portal in a different browser window and perform the following steps:
 - a. Click your Feature Service, then select a layer within the Feature Service and click the **All** tab.
 - b. Scroll to the **Layer connections** section of the page and verify that the Average data rate (shown as **Avg data rate**) matches the rate shown in the Input section of the Monitor page in GeoEvent Processor Manager.

Data Relay message log

The Data Relay service writes errors, status, and certain summary information to text logs on the machine where it is installed. This information is helpful during troubleshooting and when working with OSISoft Technical Support.

The log files are located in:

```
%ProgramData%\OSISoft\Integrators\Esri\Logs
```

Log files are never deleted automatically. You can delete old log files manually to save space; however, it is recommended that you retain as many logs as possible should the need for troubleshooting arise.

Log files are created as necessary whenever the Data Relay is running. The naming convention for log files is:

```
YYYY-MM-DD .log
```



Note:

Uninstalling the Data Relay does not delete the log folder or its contents. You can remove the folder manually after uninstalling the Data Relay.

Portal event log

The PI Integrator for Esri ArcGIS portal records certain events to an event log which you can use to troubleshoot the software.

The Portal software might display a warning ribbon to alert you to check the event log. The warning ribbon displays when any error with severity of **Warning** or higher has occurred within the past 24 hours. You can prevent certain of the warnings from displaying by acknowledging the error from within the event log. Other errors are closed automatically as soon as the error condition is resolved. For example, if no Data Relay is active, a message is logged with a status of Ongoing. The message status is set to Closed after a Data Relay becomes active. The warning ribbon is displayed as long as there are active or unacknowledged errors that have occurred within the past day.

On the log viewer page, several filter fields are populated with default values. You might want to change these values:

- **Log level**

Use Log level to filter events that are as severe or more severe than the chosen level. This can eliminate "noise" from the log message if you want to view only events of a certain importance. In order of descending importance, the levels are: *Fatal Error*, *Error*, *Warning*, *Information*, and *Debug*.

- **Start time and End time**

Start time and End time are specified in any valid PI Time syntax, and control the bounds of the log messages returned during search.

- **Filter**

Filter allows you to return only log messages which include certain key word(s) in their content.

- **Service and Layer**

The search may also be confined to messages that are tied to a specific Service or Layer.

The log entries found by the search also include a **Status** column. For error conditions that are active-until-closed (such as errors that occur when there is no active Data Relay node), the **Status** column identifies whether the error is Ongoing or Closed. For error conditions that do not signal an ongoing condition (such as a security error encountered by a user), the **Status** column allows recent messages to be acknowledged by Configuration Portal administrators. The sole effect and purpose of acknowledgement is to suppress the message from triggering an alert banner after administrators become aware of the error. Messages older than one day do not trigger an alert banner and do not require or permit acknowledgement.

View the Portal event log

You can search for errors reported by examining the event log. The event log is accessible from the PI Integrator for Esri ArcGIS menu.

Procedure

1. From the PI Integrator for Esri ArcGIS menu, select **Administration > Event log**

The Search events screen displays.

2. In each of the input fields, specify your search parameters then click **Search**.

In the **Start** and **End** fields, clicking the asterisk (*) displays a calendar with the current date and time selected. To choose a date and time other than the default, select the desired date and time on the calendar.

To search for errors that were generated by a particular service, select the appropriate service in the **Service** list. After selecting a service, the layers defined within that service are displayed in the **Layer** list.

The results of the search are displayed on the page. If the search results in no events found, the following message displays:

No search results

If you do not see messages as expected, you should verify that you are not over-restricting the Log Level (severity) or the time boundaries.

After you finish

In the event that no data is flowing to the PI Integrator for Esri ArcGIS portal, see [Data Relay message log](#) for additional troubleshooting information.

You can export search results to a CSV (comma-separated values) file. For example, you might want to export a list of events to send to OSIsoft Technical Support if you encounter technical problems. Click **Download** after specifying valid search criteria to save the search results to a file.

Technical support and other resources

For technical assistance, contact OSISOFT Technical Support at +1 510-297-5828 or through the [OSISOFT Tech Support Contact Us page \(https://techsupport.osisoft.com/Contact-Us/\)](https://techsupport.osisoft.com/Contact-Us/). The website offers additional contact options for customers outside of the United States.

When you contact OSISOFT Technical Support, be prepared to provide this information:

- Product name, version, and build numbers
- Details about your computer platform (CPU type, operating system, and version number)
- Time that the difficulty started
- Log files at that time
- Details of any environment changes prior to the start of the issue
- Summary of the issue, including any relevant log files during the time the issue occurred

The [OSISOFT Virtual Campus \(vCampus\) website \(https://vcampus.osisoft.com\)](https://vcampus.osisoft.com) has subscription-based resources to help you with the programming and integration of OSISOFT products.

