

# ArcGIS® GeoEvent Server

## Trimble TAIP Connector



**NOTE:** The Real-Time GIS Team strives to update product tutorials to reflect the latest release. Depending on the version of GeoEvent Server you are using, there may be inconsistencies between your environment and the illustrations and/or specific steps in exercises or videos bundled with the tutorial. The concepts outlined, however, should be applicable across different versions of GeoEvent Server.

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## ArcGIS GeoEvent Server Overview

[ArcGIS GeoEvent Server](#) extends the capabilities of your enterprise GIS with support for Real-Time GIS. GeoEvent Server enables real-time data streaming and analytics in your everyday GIS applications, workflows, and analyses. Use GeoEvent Server to:

- Extend existing GIS data and IT infrastructure with support for real-time event processing.
- Incorporate data received from real-time events into your ArcGIS Enterprise workflows.
- Perform continuous processing and analysis on streaming data as it is received in real-time.
- Store large volumes of data from real-time observations in the spatiotemporal big data store.
- Visualize large volumes of real-time observations using dynamic on-the-fly data aggregations.
- Notify those who need to know about patterns of interest with updates and alerts in real-time.
- Produce new streams of data that can be leveraged throughout the ArcGIS platform.

Commercial organizations, transportation managers, defense and intelligence analysts – anyone with a need to leverage streaming data – can use GeoEvent Server to receive, analyze, and produce streaming data from a variety of sources including mobile devices, in-vehicle GPS devices, sensor networks, online social media, RFID tags, environmental monitors, and more.

## Trimble TAIP Overview

Trimble ASCII Interface Protocol (TAIP) is a Trimble-specified digital communication interface based on printable ASCII characters over a serial data link. TAIP was designed for vehicle tracking applications but has become common in other applications as well because of its ease of use. TAIP uses printable uppercase ASCII characters in 16 message types for easy integration with mobile data modems, terminals, and personal computers.<sup>1</sup>

In the use case being presented in this tutorial, GeoEvent Server will receive TAIP messages from an AirLink GX440 mobile gateway. The GX440 is part of a representative AVL solution which provides the location of a vehicle. The longitude, latitude, and vehicle information are broadcast via a commercial cellular network such as AT&T or Verizon Wireless.

**Note:** *The ACE Manager and the AirLink GX440 mobile gateway referred to in this tutorial are not Esri products. They are used to illustrate the sorts of steps you will need to perform on typical hardware and devices you have elected to incorporate into your solution. The contents of this tutorial are for demonstration purposes only and are intended to illustrate the capabilities of GeoEvent Server.*

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<sup>1</sup> Trimble SVEight product documentation.  
[ftp://ftp.trimble.com/pub/sct/timing/sveight/sv8\\_app\\_c.pdf](ftp://ftp.trimble.com/pub/sct/timing/sveight/sv8_app_c.pdf)  
[ftp://ftp.trimble.com/pub/sct/timing/sveight/sv8\\_glossary.pdf](ftp://ftp.trimble.com/pub/sct/timing/sveight/sv8_glossary.pdf)

## Recent updates

Refer to the **Release History.pdf** included with this deliverable for a complete list of updates to the Trimble TAIP Connector for GeoEvent Server and supporting documentation. For information on all the capabilities of GeoEvent Server, refer to the [Introduction to GeoEvent Server Tutorial](#) available on the [ArcGIS GeoEvent Server Gallery](#).

## Compatibility

This release of the Trimble TAIP Connector for GeoEvent Server is **compatible with ArcGIS GeoEvent Server versions 10.4 or later**. The version of the connector's components do not need to match the version of ArcGIS GeoEvent Server you are using.

**NOTE:** *The release strategy for ArcGIS GeoEvent Server connectors delivered on the ArcGIS GeoEvent Server Gallery has been updated. Going forward, a new release will only be created when a component has an issue, is being enhanced with new capabilities, or is not compatible with new versions of GeoEvent Server. This strategy makes upgrades of these custom components easier since you will not have to upgrade them for every release of ArcGIS GeoEvent Server unless a new version of that connector is released. The documentation for the latest release has been updated and includes instructions for updating your configuration to align with this strategy.*

## Provision a Trimble device using ACE Manager

The exercise below was prepared using an AirLink GX440 mobile gateway – part of the Sierra Wireless product portfolio. Sierra Wireless devices which have the ACE Manager application installed as part of their firmware can be provisioned using a web browser (Internet Explorer, Chrome, Firefox, etc.)

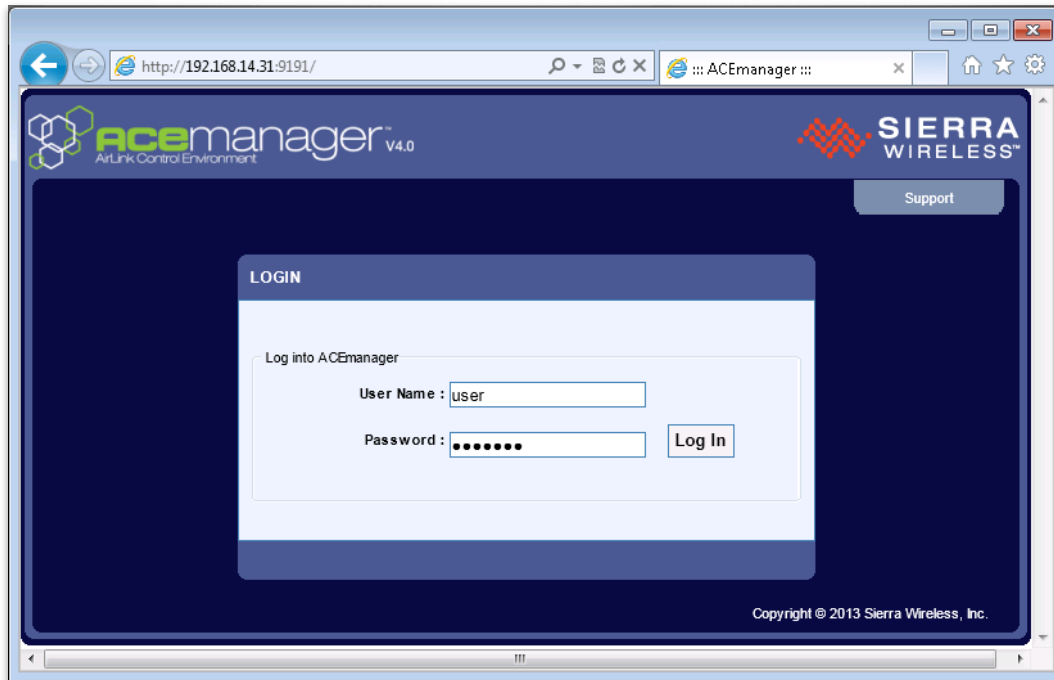
Regardless of the type of device you have integrated into your solution, you must be able to provision your equipment to broadcast messages in a format supported by ArcGIS GeoEvent Server. The Trimble TAIP Adapter, which will be introduced in the next section, is capable of interpreting any of the four following TAIP message formats:

- Position/Velocity Solution (RPV; also known as **TAIP0xF0**)
- Compact Position Solution (RCP; also known as **TAIP0xF1**)
- Long Navigation Message (RLN; also known as **TAIP0xF2**)
- Alarm (RAM; also known as **TAIPRAM**)

The Trimble TAIP Adapter does not currently support TAIP TM Time/Date report formatted messages.

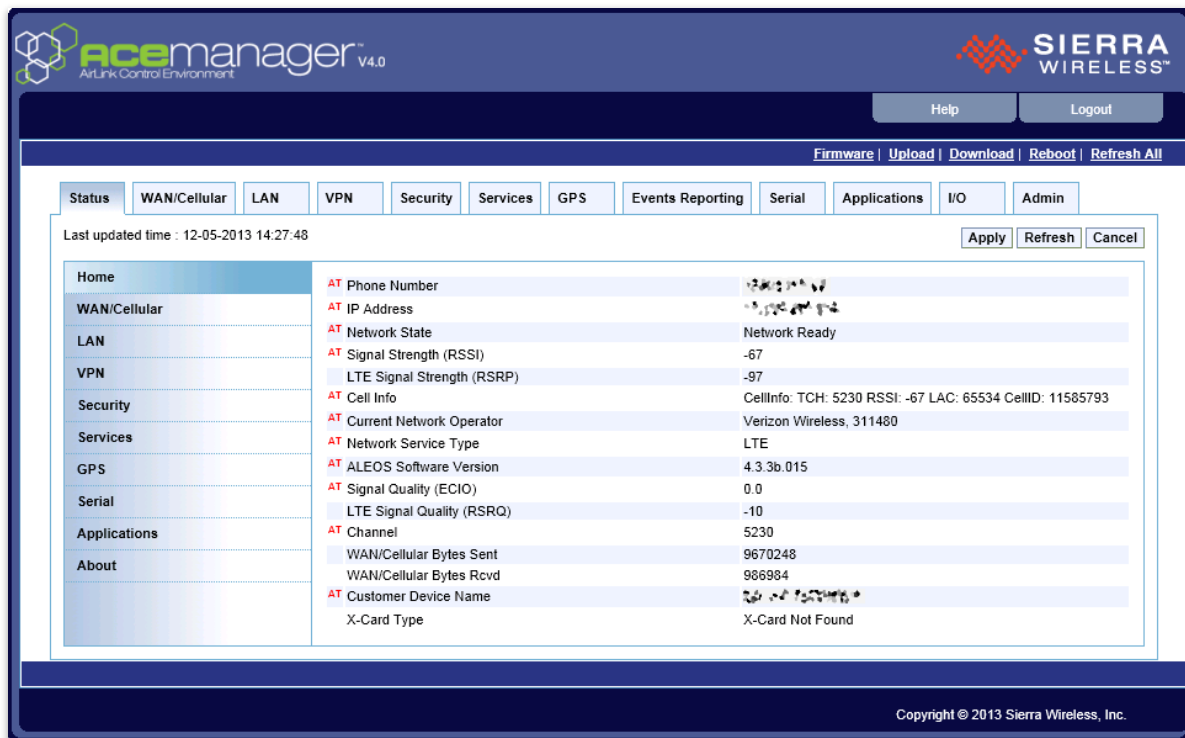
Follow the steps outlined below to provision an AirLink GX440 mobile gateway to broadcast messages in the first format identified above: RPV (TAIP data).

1. In a web browser, launch the **ACE Manager** and login using your credentials.



**NOTE:** The IP address and port in the illustration above identify a particular endpoint for a host machine on a private network. The device being provisioned has been connected to the host machine using a USB cable.

A status page should appear, indicating the device is functioning properly.



2. Click the **GPS** tab and configure the properties as illustrated below.

**NOTE:** *Several of the properties reflected below are important to configure as outlined below. They specify the format of the TAIP message, the server and port to which the TAIP messages should be delivered, and content which must not be included in the TAIP messages sent to GeoEvent Server.*

- The **GPS Report Type** (under the **Report Type** section) should be specified as **TAIP data**. This is the RPV or TAIP0xF0 message format used in this tutorial.
- The **Report Server IP Address** and **Report Server Port Number** (under the **Servers** section) should contain the IP of the server which is running GeoEvent Server and the UDP port on which messages should be received.
- The **Enable SNF for Unreliable Mode** and **SNF Reliable Mode** (under the **Transport** section) should be disabled and set to **OFF** respectively. The adapter used by GeoEvent Server does not support **Store and Forward** settings in TAIP messages.
- The **Report Odometer** and **Report Digital Inputs** settings (under the **Additional Data** section) should be disabled so optional/additional information is not included in the TAIP messages sent to GeoEvent Server.

Status

WAN/Cellular

LAN

VPN

Security

Services

GPS

Events Reporting

Serial

Applications

I/O

Admin

Last updated time : 09-30-2013 12:35:57

Expand All

Apply

Refresh

Cancel

Server 1

Server 2

Server 3

Server 4

Local/Streaming

Global Settings

[-] Events

AT

Report Interval Time (Secs)

10

AT

Report Interval Distance (meters)

0

AT

Stationary Vehicle Timer (mins)

0

Maximum Speed Event Report (kph)

110

Send Stationary Vehicle Event in Seconds

10

AT

Enable Digital Input Event

Enable

[-] Report Type

AT

GPS Report Type

TAIP data

[-] Servers

AT

Report Server IP Address

AT

Report Server Port Number

5565

Redundant Server 1 IP Address

Redundant Server 1 Port Number

5565

Redundant Server 2 IP Address

Redundant Server 2 Port Number

5565

AT

Minimum Report Time (Secs)

1

[-] Transport

AT

Enable SNF for Unreliable Mode

Disable

AT

SNF Reliable Mode

OFF (Unreliable Mode)

AT

SNF Simple Reliable Max Retries

10

AT

SNF Simple Reliable Backoff Time (Secs)

10

[-] Additional Data

AT

Report Odometer

Disable

AT

Report Digital Inputs

Disable

Once you have completed the device configuration and provisioning, apply your changes and close the configuration utility. A device reboot may be necessary for the changes to take effect; refer to the device's operations manual for information on whether a reboot is necessary.

**NOTE:** The AirLink GX440 device referenced in this tutorial broadcasts its messages over a UDP socket protocol. As you proceed through the exercises, look for the UDP Transport to be used to receive the TAIP messages.

## Upgrading from a Previous Version

If you are upgrading from a previous version of the Trimble TAIP Connector, you will need to do a few things before you upgrade.

**NOTE:** The upgrade processes documented below will generally be applicable to any custom components deployed to GeoEvent Server. However, specific instructions may differ between components, so consult the upgrade documentation for each custom component before upgrading.

## Determine your version of the Trimble TAIP Adapter

To determine which version of the Trimble TAIP Adapter you currently have deployed, follow the steps below.

1. In **GeoEvent Manager**, navigate to **Site > Components > Adapters** and search for **TAIP**.
2. If the **TAIP Inbound Adapter** does not appear in the list, you do not have the adapter deployed. Follow the instructions in the [Deploying the Trimble TAIP Connector](#) section below to deploy it.
3. If a **TAIP Inbound Adapter** is listed, the version will be indicated.
  - a. If this version matches the version on the new **trimble-taip-adapter-*<version>*.jar** file provided with this release, follow the steps in the [Replace the Trimble TAIP Adapter](#) section below.
  - b. If the version does not match, you are using a different version and must follow the steps in the [Upgrade the Trimble TAIP Adapter](#) section below.

## Replace the Trimble TAIP Adapter

If the version of the Trimble TAIP Adapter matches the version you have deployed, follow the steps below to replace the adapter with the latest release.

**NOTE:** The *<version>* in steps 2 and 3 below must be identical for each **.jar** file.

1. In **File Explorer**, navigate to the GeoEvent Server **deploy** folder:  

```
<arcgis_server_installation_directory>\GeoEvent\deploy
```
2. Delete the old **trimble-taip-adapter-*<version>*.jar** file from the **deploy** folder.
3. Copy the new **trimble-taip-adapter-*<version>*.jar** file provided with this deliverable to the **deploy** folder.

## Upgrade the Trimble TAIP Adapter

If the version of the adapter does not match the version you are upgrading to, follow the steps below.

1. In **GeoEvent Manager**, navigate to **Site > GeoEvent > Configuration Store** and click **Export Configuration** to export your current configuration of GeoEvent Server.
  - a. Name and save the exported configuration (.xml) file and store it, you will import this configuration in the next section.
2. Navigate to **Services > Inputs**. For each input you have configured that uses the Trimble TAIP Connector:
  - a. Document all the properties for the input (including the name). You will need the exact, case-sensitive, name of each input using the Trimble TAIP Connector(s).



- b. Delete any input(s) using the Trimble TAIP Connector(s).
3. In **File Explorer**, navigate to the GeoEvent Server **deploy** folder and delete the old **trimble-taip-adapter-<version>.jar** file from:  
  

```
<arcgis_server_installation_directory>\GeoEvent\deploy
```
4. In **GeoEvent Manager**, navigate to the **Site > Connectors** and delete the Trimble TAIP Connectors, specifically **Receive TAIP from a TCP Socket** and **Receive TAIP from a UDP Socket**.
5. **(OPTIONAL)** If you are upgrading ArcGIS GeoEvent Server to a new version, do so now following the steps outlined in [Upgrading GeoEvent Server](#).
6. See the instructions below in the [Deploying the Trimble TAIP Connector](#) section for information on deploying the new version of the connector.
7. See the instructions below in the [Create an input](#) section for recreating the Trimble TAIP inputs using the same properties you documented above in step 2 from your original inputs.

## Import the GeoEvent Server configuration

Using the GeoEvent Server configuration file (.xml) you exported above, follow these steps below to import it to GeoEvent Server.

1. If the Trimble TAIP Connector is not already deployed on your machine, deploy the connector using the steps in [Deploying the Trimble TAIP Connector](#) below.
2. In **GeoEvent Manager**, navigate to **Site > GeoEvent > Configuration Store** and click **Import Configuration** and import the configuration (.xml) you exported above.
3. Navigate to **Services > Inputs**, notice the imported Trimble TAIP inputs may display the error **Status: Error - Stopping Stream 'TAIP' because the Adapter is not available**. For each input that is displaying this error:
  - a. Document all the properties of the input (you may need to look in the exported configuration file for these properties).
4. Navigate to **Site > Connectors** and open the properties of the **Receive TAIP from a TCP Socket** and **Receive TAIP from a UDP Socket** connectors to verify the **Adapter** property is set to **TAIP**.
  - a. **IMPORTANT:** Click **Save** to save the connector, even if you did not make any changes.
5. Navigate to **Services > Inputs**, for each input displaying the **Status: Error - Stopping Stream 'TAIP' because the Adapter is not available** error:
  - a. Delete the input(s).

- b. Add a new input with the same properties. See the instructions below in the [Create an input](#) section for recreating the Trimble TAIP inputs.

## Deploying the Trimble TAIP Connector

Follow the steps below to add the Trimble TAIP Adapter to ArcGIS GeoEvent Server. The adapter is the component which will interpret the binary messages received from the device you provisioned above. When you load the adapter, it will create the Trimble TAIP Connectors for you, specifically the *Receive TAIP from a TCP Socket* and *Receive TAIP from a UDP Socket* connectors.

### Add the Trimble TAIP Adapter

Choose one of the two options below for deploying the Trimble TAIP Adapter.

#### Deploy via GeoEvent Manager (option 1)

**NOTE:** *There is a known issue deploying custom components via GeoEvent Manager in some browsers. If you receive an error while trying to deploy via GeoEvent Manager, refer to [Add to GeoEvent Server deploy folder \(option 2\)](#) section below.*

1. In **ArcGIS GeoEvent Manager**, navigate to **Site > Components > Adapters**.
2. Click **Add Local Adapter** and browse to select the **trimble-taip-adapter-<version>.jar** file from the **... \components** folder provided with this deliverable. Select the file and click **Open**.

**NOTE:** *The adapter provided with this release is compatible with ArcGIS GeoEvent Server version 10.4 or later. The version of the adapter does not need to match the version of ArcGIS GeoEvent Server.*

3. Click **Add** to add the adapter to GeoEvent Server. A confirmation message will appear if the adapter was added successfully.
4. Verify the **TAIP Inbound Adapter** appears in the list of available adapters.

**NOTE:** *The adapter list will not update immediately. It takes a few moments for GeoEvent Server to load the custom component. If you refresh the browser window, the new adapter should appear in the list.*

#### Add to GeoEvent Server deploy folder (option 2)

1. In **File Explorer**, navigate to the GeoEvent Server **deploy** folder at:  
`<arcgis_server_installation_directory>\GeoEvent\deploy`
2. Copy/paste the **trimble-taip-adapter-<version>.jar** file provided with this deliverable to the **deploy** folder.
3. Open **ArcGIS GeoEvent Manager** and navigate to **Site > Components > Adapters**.
4. Verify the **TAIP Inbound Adapter** appears in the list of available adapters.



## Explore the components

Next, you will explore the GeoEvent Definitions that were automatically created when you imported the adapter as well as the properties of the *Receive TAIP from a UDP Socket* connector.

## Review the GeoEvent Definitions

Four new GeoEvent Definitions (*TAIPOxF0*, *TAIPOxF1*, *TAIPOxF2*, and *TAIPRAM*) were created automatically when the Trimble TAIP Adapter was deployed to GeoEvent Server.

1. In **GeoEvent Manager**, navigate to **Site > GeoEvent > GeoEvent Definitions** and locate the GeoEvent Definitions illustrated below:

GeoEvent Definitions		
TAIP	Additional Filter Criteria: None	New Import Delete
Name	Fields	Action
TAIPOxF0	DeviceId, TimeStamp, Shape, Speed, Heading, So...	
TAIPOxF1	DeviceId, TimeStamp, Shape, Source, Age, Id	
TAIPOxF2	DeviceId, TimeStamp, Shape, Altitude, HorizSpeed...	
TAIPRAM	DeviceId, TimeStamp, Shape, Speed, Heading, Ala...	

Illustrated below you can see an example of the *TAIPOxF0* GeoEvent Definition. Notice the GeoEvent Server tags *TRACK\_ID*, *GEOMETRY*, and *TIME\_START* have been applied to appropriate fields in the GeoEvent Definition. You can click to edit a GeoEvent Definition and further explore the schemas and the data types expected by each event field. If you do edit one of the GeoEvent Definitions, click *Cancel* to exit without saving any changes you may have made.

Save Cancel

GeoEvent Definition Name: \*

Owner Name: com.esri.geoevent.adapter.inbound/TAIP/10.4.0

Fields for TAIP0xF0

New Field Reorder Fields

Name	Type	Cardinality	Tags	Action
DeviceId	String	1	TRACK_ID	<a href="#">/</a> <a href="#">x</a>
TimeStamp	Date	1	TIME_START	<a href="#">/</a> <a href="#">x</a>
Shape	Geometry	1	GEOMETRY	<a href="#">/</a> <a href="#">x</a>
Speed	Short	1		<a href="#">/</a> <a href="#">x</a>
Heading	Short	1		<a href="#">/</a> <a href="#">x</a>
Source	Short	1		<a href="#">/</a> <a href="#">x</a>
Age	Short	1		<a href="#">/</a> <a href="#">x</a>
Id	String	1		<a href="#">/</a> <a href="#">x</a>

## Review the connectors

Two new connectors were also created when the Trimble TAIP Adapter was deployed to GeoEvent Server, one for receiving data over a UDP socket and one for receiving data over a TCP socket. Follow the steps below to explore these two new connectors.

1. In **GeoEvent Manager**, navigate to **Site > GeoEvent > Connectors**.
2. Search for **TAIP**, notice the two new connectors, **Receive TAIP from a TCP Socket** and **Receive TAIP from a UDP Socket** are listed.

Services Site Logs

GeoEvent
Components
Settings

GeoEvent Definitions  
 Tags  
 GeoFences  
**Connectors**  
 Configuration Store  
 Data Stores  
 Spatiotemporal  
 Big Data Stores

**Connectors**

Search:  Show: All [Create Connector](#)

Label	Type	Description	Action
Receive TAIP from a TCP Socket	inbound	Receive TAIP sentences on a TCP Socket. The TAIP sentences supported include TAIP0xF0(RPV), TAIP0xF1(RCP), TAIP0xF2(RLN), and TAIPRAM(RAM).	<a href="#">/</a> <a href="#">x</a> <a href="#">i</a>
Receive TAIP from a UDP Socket	inbound	Receive TAIP sentences on a UDP Socket. The TAIP sentences supported include TAIP0xF0(RPV), TAIP0xF1(RCP), TAIP0xF2(RLN), and TAIPRAM(RAM).	<a href="#">/</a> <a href="#">x</a> <a href="#">i</a>

3. Click [/](#) to explore the properties of the **Receive TAIP from a UDP Socket** connector.

**Editing Connector - esri-receive-taip-udp**

Save Cancel

Name:\* esri-receive-taip-udp

Label:\* Receive TAIP from a UDP Socket

Description: Receive TAIP sentences on a UDP Socket. The TAIP sentences supported include TAIP0xF0(RPV), TAIP0xF1(RCP), TAIP0xF2(RLN), and TAIPRAM(RAM).

Type: ☒ Input ☐ Output

Adapter: TAIP

Transport: UDP

Default Input Name:\* udp-taip-in

**Configure Properties**

**Shown Properties**

Server Port

**Advanced Properties**

Multicast mode  
Multicast group  
Append Source IP to Message  
Source IP Prefix Character  
Characters to Append to Each Message  
Buffer Size (Bytes)

**Hidden Properties**

The connector has been configured by the Trimble TAIP Adapter you added in a previous section. The connector properties specify the transport to be used to receive the TAIP messages, in this case it is the UDP Transport. The other Trimble TAIP Connector uses the TCP Transport.

You can double-click any of the properties under *Configure Properties* to review the properties default settings. For instance, if you double-click *Server Port*, you will see the default port is set to 5565 which matches the value illustrated above in the [Provisioning a Trimble device using ACE Manager](#) section above. You may need to change this if you provisioned your device to broadcast its data to a different port.

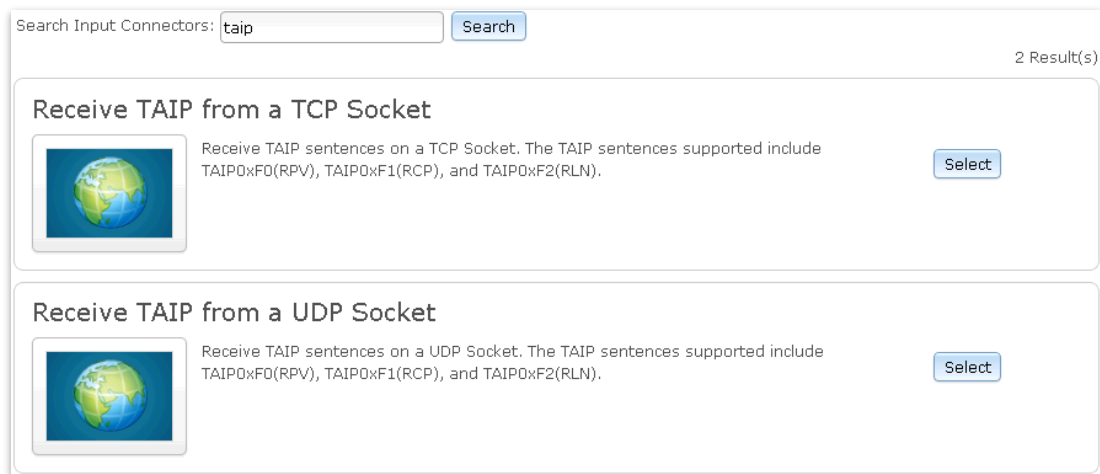
4. Make any necessary changes to the connector properties and click **Save** to save the connector.

## Working with the Trimble TAIP Connector

### Create an input

Now that you have successfully added the Trimble TAIP Adapter and explored the Trimble TAIP Connectors that were created, you will now use the *Receive TAIP from a UDP Socket* input to receive TAIP messages over the UDP socket.

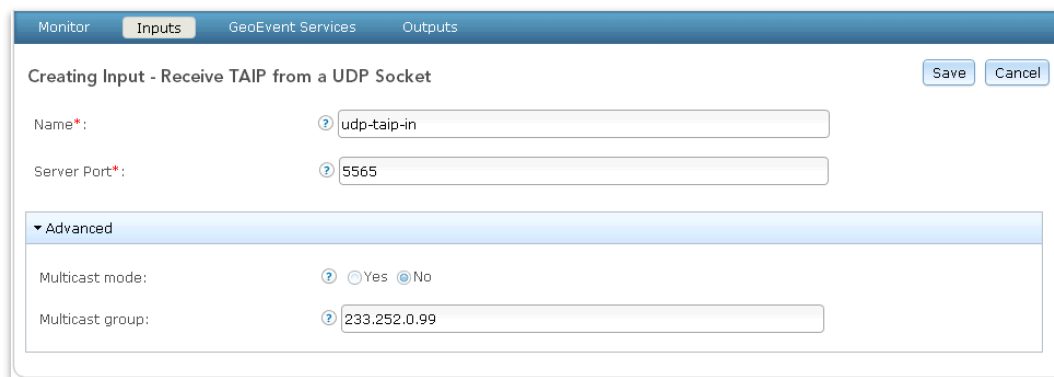
5. In **GeoEvent Manager**, navigate to **Services > Inputs** and click **Add Input**.
6. Search for **taip** and click **Select** to choose the **Receive TAIP from a UDP Socket** input.



The screenshot shows the 'Search Input Connectors' interface in GeoEvent Manager. A search bar contains the text 'taip' and a 'Search' button. The results show '2 Result(s)'. Two connectors are listed:

- Receive TAIP from a TCP Socket**: Includes a globe icon and a description: 'Receive TAIP sentences on a TCP Socket. The TAIP sentences supported include TAIP0xF0(RPV), TAIP0xF1(RCP), and TAIP0xF2(RLN)'. A 'Select' button is to the right.
- Receive TAIP from a UDP Socket**: Includes a globe icon and a description: 'Receive TAIP sentences on a UDP Socket. The TAIP sentences supported include TAIP0xF0(RPV), TAIP0xF1(RCP), and TAIP0xF2(RLN)'. A 'Select' button is to the right.

7. Update the **Receive TAIP from a UDP Socket** properties as appropriate to reflect your environment. You might choose to use a **Server Port** other than the default or change the **Multicast group** settings to reflect your system's configuration.



The screenshot shows the 'Creating Input - Receive TAIP from a UDP Socket' configuration window in GeoEvent Manager. The window has tabs for 'Monitor', 'Inputs', 'GeoEvent Services', and 'Outputs'. The 'Inputs' tab is active. The window contains the following fields:

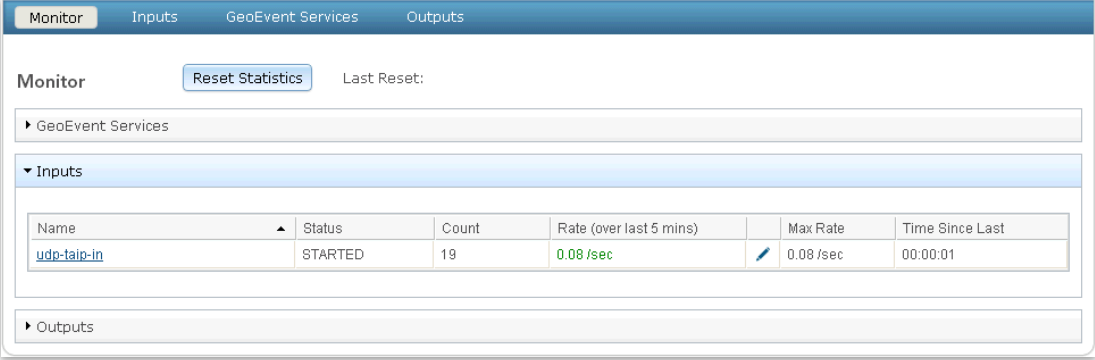
- Name\***: A text field containing 'udp-taip-in'.
- Server Port\***: A text field containing '5565'.
- Advanced** section (expanded):
  - Multicast mode**: Radio buttons for 'Yes' and 'No', with 'No' selected.
  - Multicast group**: A text field containing '233.252.0.99'.

'Save' and 'Cancel' buttons are in the top right corner.

8. Click **Save** to create the new **udp-taip-in** input.
9. In **GeoEvent Manager**, navigate to **Services > Monitor**.

If your Trimble device(s) are broadcasting, you should see messages being received by the new input. Remember, you do not need to incorporate an input into a GeoEvent Service for the input to

start receiving data. The count on the *Monitor* page will tell you how many TAIP messages you have received.



The screenshot shows the 'Monitor' tab in the GeoEvent Server interface. It features a 'Reset Statistics' button and a 'Last Reset:' label. Below this, there are expandable sections for 'GeoEvent Services', 'Inputs', and 'Outputs'. The 'Inputs' section is expanded, displaying a table with the following data:

Name	Status	Count	Rate (over last 5 mins)	Max Rate	Time Since Last
<a href="#">udp-taip-in</a>	STARTED	19	0.08 /sec	0.08 /sec	00:00:01

## Troubleshooting the Trimble TAIP Connector

### Logging Configuration

- Use `com.esri.geoevent.adapter.trimble.taip.TaipInboundAdapter` to see messages related to adapting TAIP messages into events.

### Congratulations!

By completing the exercises in this module, you learned how to deploy the Trimble TAIP Adapter to the GeoEvent Server, explored the supporting connectors, and configured an input to receive data from your Trimble devices.

For more information on working with GeoEvent Server, including creating outputs, and GeoEvent Services, refer to the [Introduction to GeoEvent Server tutorial](#) on the [ArcGIS GeoEvent Server Gallery](#).

If you have questions, comments, or feedback regarding this tutorial start a discussion on the [GeoEvent Server Forum](#) and tag your post with GEOEVENT TUTORIAL FEEDBACK.