ArcGIS® GeoEvent Processor for Server

Powered by ArcGIS

esri

NOTE: The ArcGIS GeoEvent Processor team updates the product tutorials frequently to reflect the latest version of the software. Depending on the product version you are using, there may be inconsistencies between your environment and illustrations or specific steps in the exercises. The concepts outlined in the exercises, however, should be applicable across product versions.

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Introduction

ArcGIS GeoEvent Processor for Server is an extension to ArcGIS for Server and can be used to incorporate real-time event data into the ArcGIS platform. Released as a new product with ArcGIS 10.2, GeoEvent Processor satisfies a growing demand across multiple industries to incorporate real-time streaming data into everyday GIS applications, workflows, and analyses.

The Remote Access Protocol (RAP), originally designed by Sierra Wireless for the AirLink Tracking System (ATS), is a proprietary binary message format.[1] The RAP specifications have been made available to developers who want to leverage the message format within their applications. Custom components, developed using the ArcGIS GeoEvent Processor SDK, enable RAP messages to be received as real-time event data. Exercises in this tutorial will illustrate how a typical Automatic Vehicle Location (AVL) device can be provisioned to broadcast messages in the RAP format and how GeoEvent Processor can be configured to receive, filter, and process these messages to feed the AVL system data into an enterprise GIS system.

In the use case being presented in this tutorial, GeoEvent Processor will receive RAP 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 is broadcast via a commercial cellular network such as AT&T or Verizon. While the RAP protocol supports two-way communication, GeoEvent Processor will only be receiving RAP messages as part of this tutorial.

Recent Updates

The Java Archive (JAR) file provided with this tutorial has been updated since its initial beta release. Changes include revisions to support RAP specification version 2.4.4 as well as changes to support phone number, local time, and month number offset.

Note: *If you have a previous version of the RAP Adapter in GeoEvent Processor, you will need to remove the old JAR file from GeoEvent Processor's …\deploy folder before deploying the updated JAR file. Once the old JAR file has been removed from GeoEvent Processor's …\deploy folder you can deploy the new JAR file. Existing Input Connectors which rely on the RAP Adapter will continue to work once you deploy the new JAR file.*

Note: *Uninstalling or upgrading to a new version of GeoEvent Processor will delete the product's …\deploy folder along with the other installation files. It is recommended you create a backup of any custom components you have deployed prior to uninstalling or upgrading GeoEvent Processor.*

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 Processor.*

[1] ALEOS User Guide (Rev 1.0E Nov.09). http://www.sierrawireless.com/support

Provisioning a Sierra Wireless device using ACE Manager

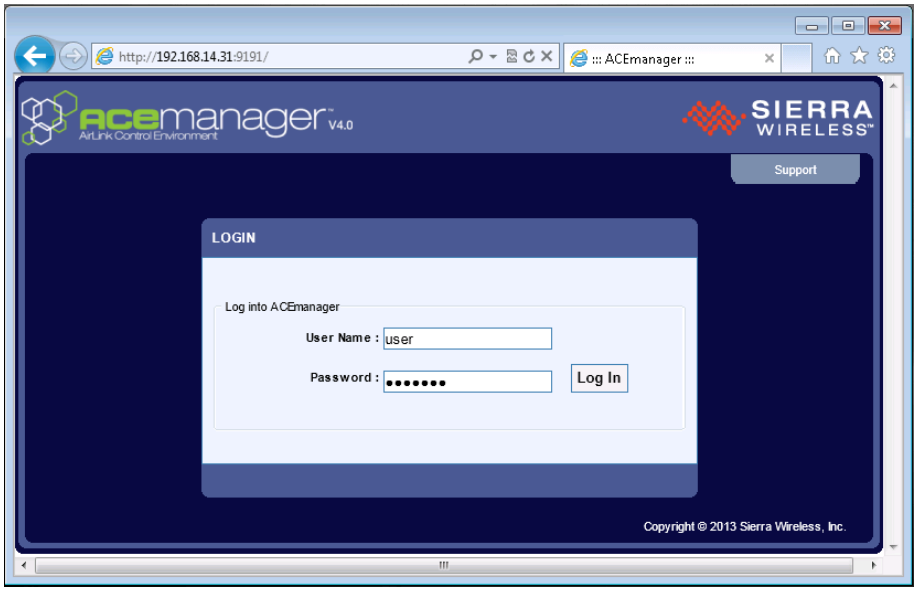
The exercise below was prepared using an AirLink GX440 mobile gateway – part of the Sierra Wireless product portfolio. Sierra Wireless devices which have the ACE Manager application installed as part of their firmware can be provisioned using a web browser (Internet Explorer, Chrome, Firefox, etc.)

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 GeoEvent Processor. The Sierra Wireless RAP Adapter, which will be introduced in the next exercise, is capable of interpreting any of the following RAP message formats:

- Standard GPS Report (e.g. Message format 0x11)
- GPS Report with UTC Date [v1.4] (e.g. Message format 0x12)
- GPS Report with UTC Data and RF Data [v.16] (e.g. Message format 0x13)
- GPS Report 0x13 plus Analog (EIO) Inputs (e.g. Message format 0x14)

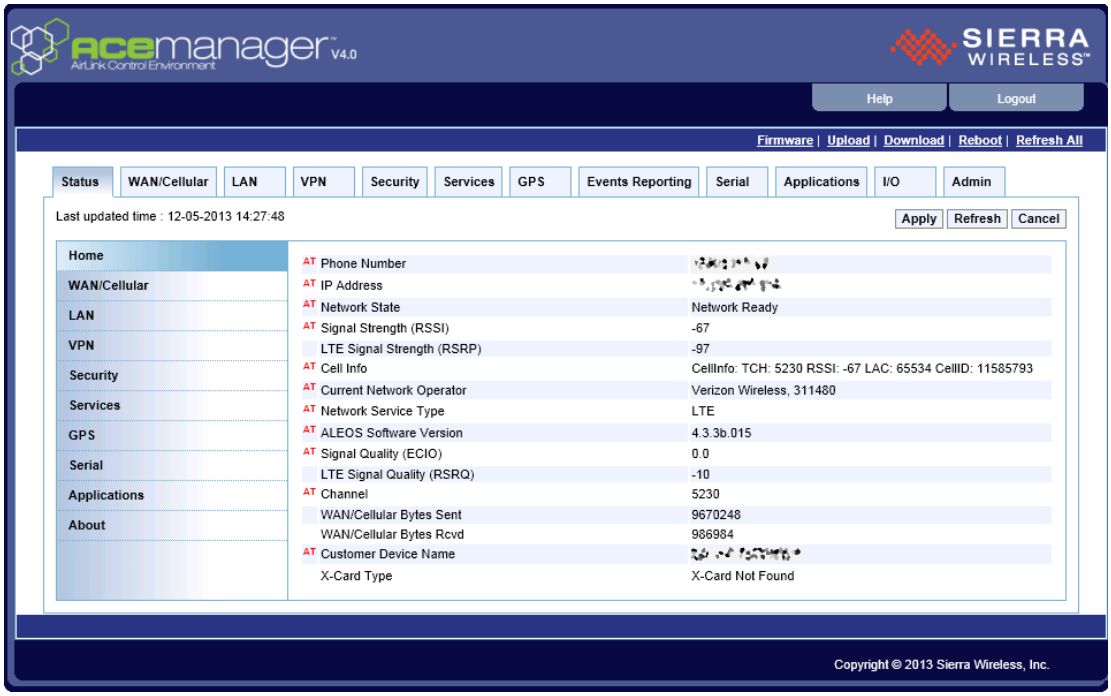
Follow the steps outlined below to provision an AirLink GX440 mobile gateway to broadcast RAP messages in the *GPS+Date+RF+EIO (0x14)* format supported by GeoEvent Processor.

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



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.*

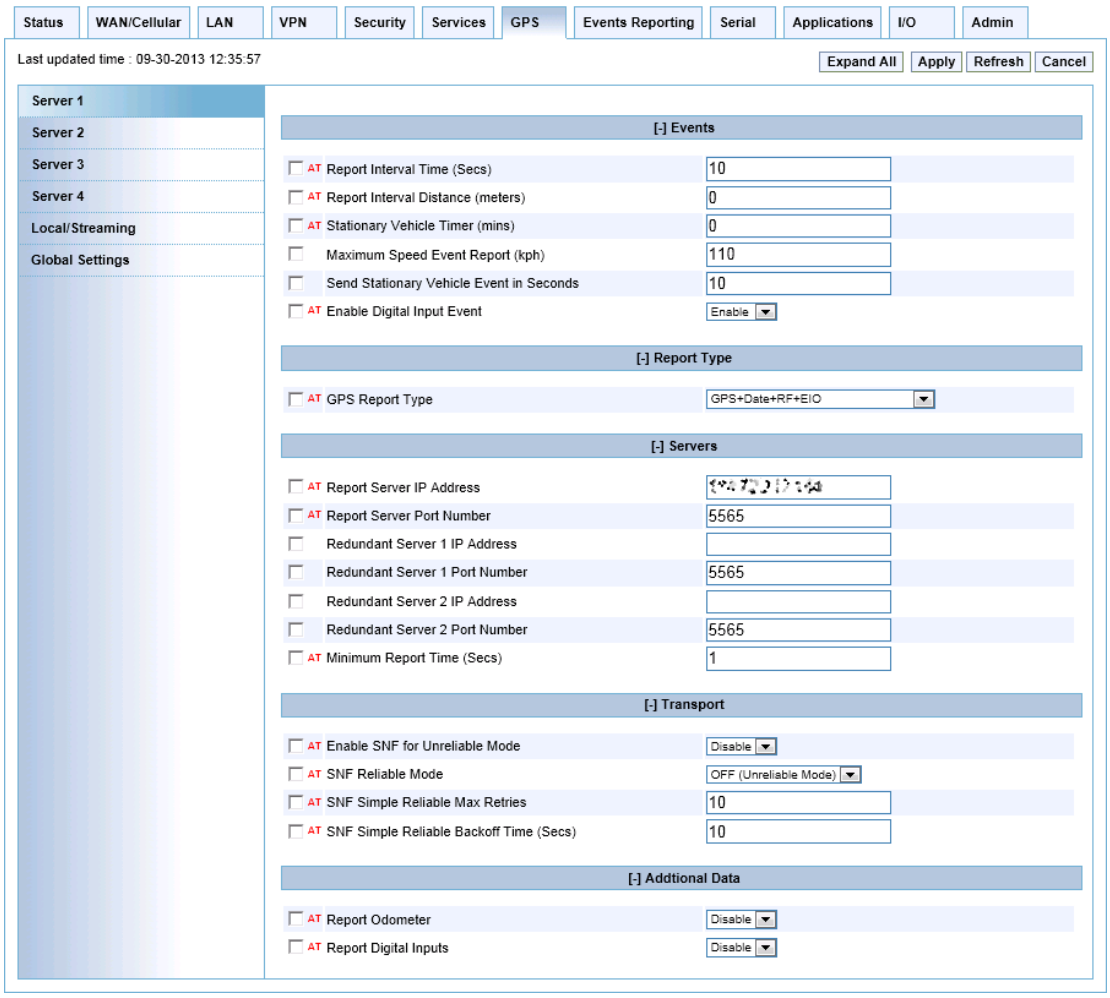
A status page should appear, indicating the device is functioning properly.



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

Note: *Several of the properties reflected in the illustration are critical. They specify the format of the RAP message, the server and port to which the RAP messages should be delivered, and content which must not be included in the RAP messages sent to GeoEvent Processor.*

- The ***GPS Report Type*** (beneath ***Report Type*** header) should be specified as **GPS+Data+RF+EIO**. This is the RAP 0x14 binary message format used in this tutorial.
- The ***Report Server IP Address*** and ***Report Server Port Number*** (beneath ***Servers*** header) should contain the IP of the server which is running your GeoEvent Processor and the UDP port on which messages should be received.
- The ***Enable SNF for Unreliable Mode*** and ***SNF Reliable Mode*** (beneath ***Transport*** header) should be disabled and set to **OFF** respectively. The adapter delivered with this tutorial does not support *Store and Forward* settings for RAP messages.
- The ***Report Odometer*** and ***Report Digital Inputs*** settings (beneath ***Additional Data*** header) should be disabled so optional/additional information is not included in the RAP messages sent to GeoEvent Processor.



Once you have completed your device's configuration and provisioning, apply your changes and close the ACE Manager. You may need to reboot your device in order for your changes to take effect; refer to your device's operations manual for additional 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 these exercises, the UDP Transport will be used to receive the RAP messages.*

Adding the Sierra Wireless RAP Adapter into GeoEvent Processor

Follow the steps outlined below to load the Sierra Wireless RAP Adapter into GeoEvent Processor. The adapter is the component which will interpret the binary messages received from the device you provisioned in the previous exercise.

Sierra Wireless RAP Adapter

1. In ***GeoEvent Processor Manager*,** navigate to **Site** > **Components** > **Adapters**.
2. Click **Add Local Adapter** and browse to select the **sierrawireless-rap-adapter-10.2.0.jar** file in the …*components* folder provided with this tutorial.

3. Select the file and click **Open**.
4. Click **Add** to add the selected file to GeoEvent Processor. A confirmation message will appear if the adapter was added successfully.

Note: *The Adapter page's item list will not update immediately. It takes a few moments for GeoEvent Processor to load the component. If you refresh the browser window, GeoEvent Processor Manager should list the added component, as illustrated below, once it has been loaded.*

RAP	inbound	10.2.0	This adapter is capable of receiving/parsing raw data in the RAP (Remote Access Protocol) format.

Note: *The Sierra Wireless RAP Adapter references version 10.2.0 – this is expected because the adapter supports all versions of ArcGIS 10.2.*

Sierra Wireless RAP GeoEvent Definitions

Four new GeoEvent Definitions, named *RAP0x11*, *RAP0x12*, *RAP0x13*, and *RAP0x14*, were created when the Sierra Wireless RAP Adapter was added to GeoEvent Processor.

1. Navigate to **Site** > **GeoEvent Processor** > **GeoEvent Definitions** and locate the new GeoEvent Definitions illustrated below:

RAP0x11	DeviceId, ReportType, ReportLen, Shape, Velocity, Direction, TimeS...	✎ ✕ ⧉
RAP0x12	DeviceId, ReportType, ReportLen, Shape, Velocity, Direction, TimeS...	✎ ✕ ⧉
RAP0x13	DeviceId, ReportType, ReportLen, Shape, Velocity, Direction, TimeS...	✎ ✕ ⧉
RAP0x14	DeviceId, ReportType, ReportLen, Shape, Velocity, Direction, TimeS...	✎ ✕ ⧉

Illustrated below you can see an example of the *RAP0x11* GeoEvent Definition. Notice the tags *TRACK_ID*, *GEOMETRY*, and *TIME_START* have been applied to appropriate fields within the GeoEvent Definition.

You can click ✎ to edit a GeoEvent Definition and further explore the schema 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.

GeoEvent Definition Name: * RAP0x11

Owner Name: com.esri.geoevent.adapter.inbound/RAP/10.2.0

Fields for RAP0x11

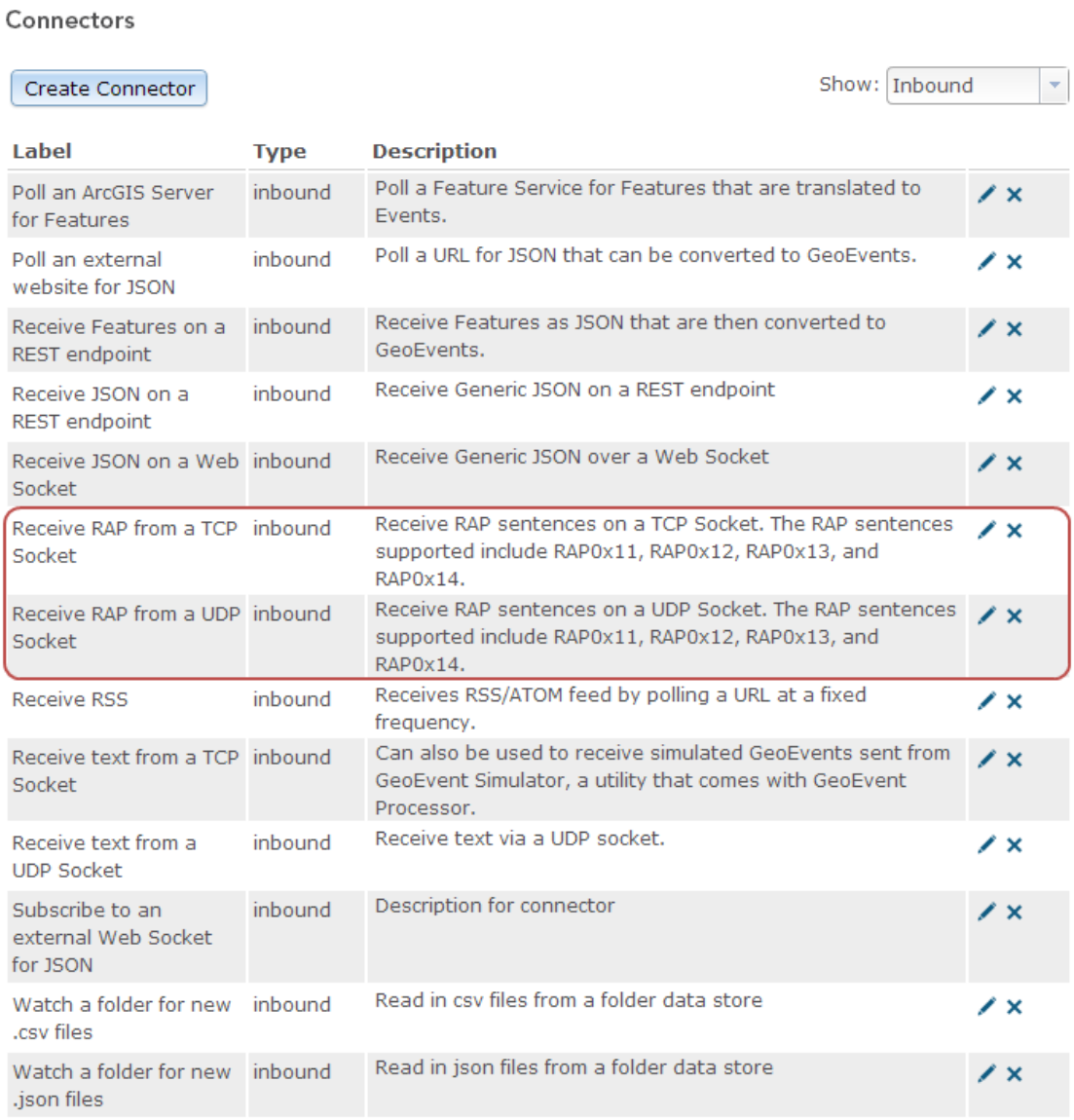
New Field | Reorder Fields

Name	Type	Cardinality	Tags
DeviceId	String	1	TRACK_ID
ReportType	Short	1	
ReportLen	Short	1	
Shape	Geometry	1	GEOMETRY
Velocity	Short	1	
Direction	Short	1	
TimeStamp	Date	1	TIME_START
MicState	Boolean	1	
RTS	Boolean	1	
DTR	Boolean	1	
GPSQI	Boolean	1	
GPSSatellites	Short	1	
Mic	Boolean	1	
Inputs	Boolean	1	
DTRI	Boolean	1	
RTSI	Boolean	1	
Odom	Boolean	1	
OdometerValue	Integer	1	
PinPointXInputs	Boolean	1	
Input1	Boolean	1	
Input2	Boolean	1	
Input3	Boolean	1	
Input4	Boolean	1	
Ignition	Boolean	1	

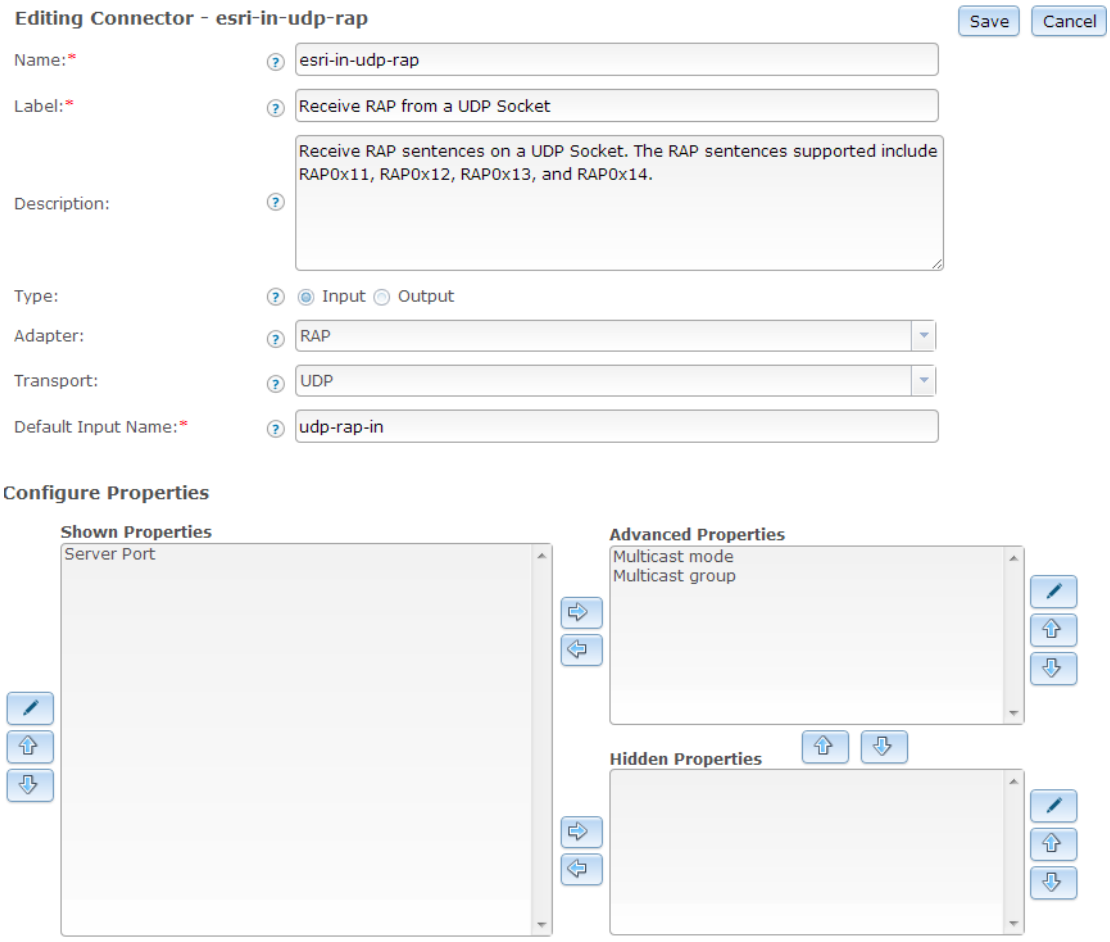
Sierra Wireless RAP Connector

Two new connectors were created when the Sierra Wireless RAP Adapter was added, one for receiving data over UDP and one for receiving data over TCP. Follow the steps below to explore the new connectors.

1. In ***GeoEvent Processor Manager***, navigate to **Site** > **GeoEvent Processor** > **Connectors**.
2. Use the drop-down in the upper right corner to show only **inbound** connectors.
3. The two new connectors are illustrated below.



4. Click ✎ to edit the **Receive RAP from a UDP Socket** and compare the properties with the illustration below.



The connector has been configured to use the Sierra Wireless RAP Adapter you added in a previous exercise. The connector's properties also specifies the transport to be used to receive the RAP messages, in this case it is the UDP Transport.

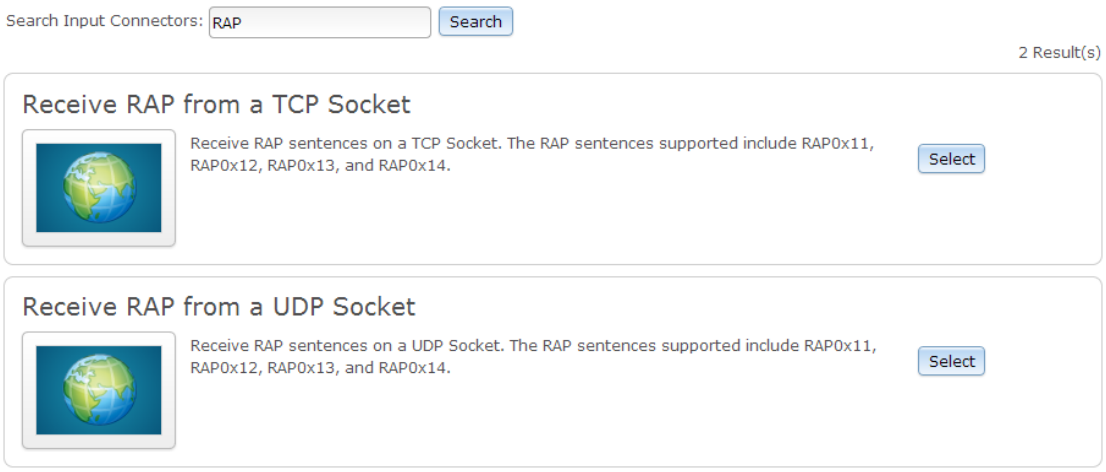
You can double-click any of the properties under *Configure Properties* to review their default settings. For instance, if you double-click *Server Port*, you will see the default port is set to *5565* which matches the value illustrated above in the *Provisioning a Sierra Wireless device using ACE Manager*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

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

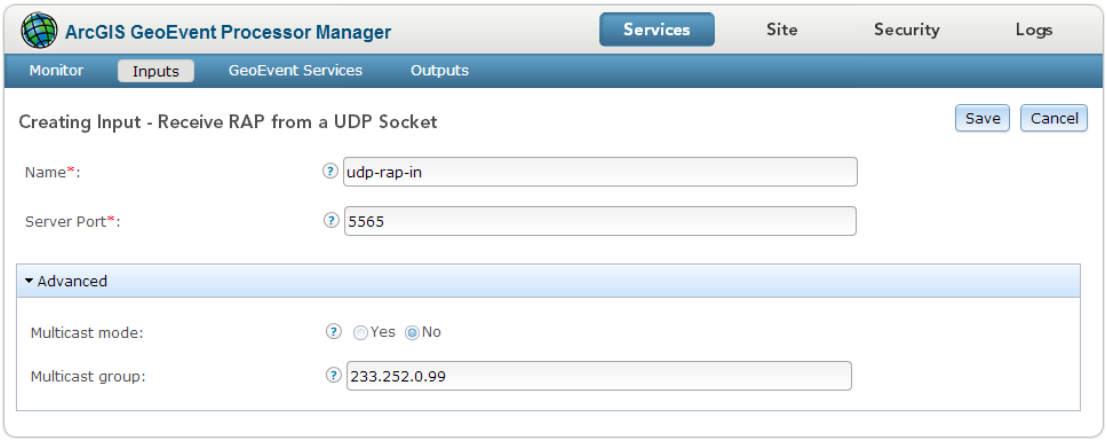
Create a new Input Connector

Once you have successfully integrated the Sierra Wireless RAP Adapter into GeoEvent Processor, you can now create a new Input Connector to receive RAP messages over the UDP protocol by following the steps below.

1. In ***GeoEvent Processor Manager***, navigate to **Services** > **Inputs**.
2. Click **Add Input** and search for the keyword **RAP**.

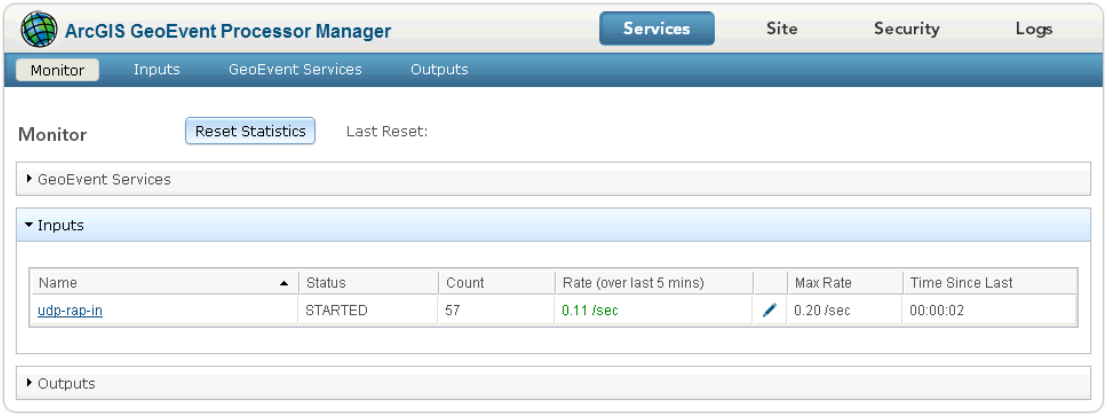


3. Click **Select** to choose the **Receive RAP from a UDP Socket** connector.
4. Update the ***Receive RAP from a UDP Socket*** properties as needed to reflect your AVL solution. You might choose to use a port other than your template's default, for example, or change the multicast group settings to reflect your system's configuration.



5. Click **Save** to create your new Input Connector.
6. In ***GeoEvent Processor Manager***, navigate to **Services** > **Monitor**.

If your AVL equipment is broadcasting, you should see messages being received by the new Input Connector. 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 RAP messages you have received.

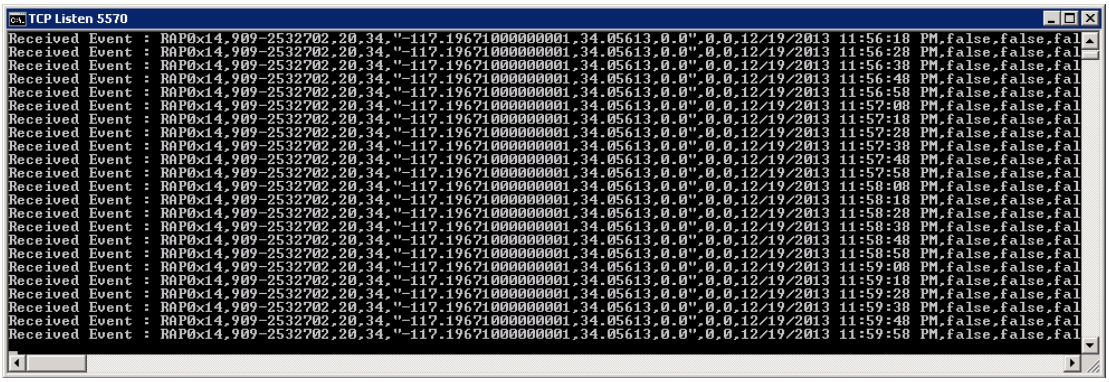


Design and publish a GeoEvent Service

Using the knowledge you gained from the *Introduction to GeoEvent Processor* tutorial, you should be able to quickly create a TCP/Text Output Connector, connect your RAP Input Connector to the TCP/Text Output Connector, and then publish a basic GeoEvent Service. You can then use the *TCP Console* application included with this tutorial to observe the RAP messages streaming through GeoEvent Processor.

1. In ***GeoEvent Processor Manager***, navigate to **Services** > **Outputs** and click **Add Output**.
2. Find **Publish text to a TCP Socket** in the list and click **Select**.
3. Click the **Advanced** drop-down, confirm the default ***Server Port*** is set to **5570**.
4. Click **Save** to create your new Output Connector.
5. Navigate to **Services** > **GeoEvent Services** and click **Add Service**.
6. Enter **RAP-Message-Handler** for the ***Service Name*** and click **Create**.
7. From ***Inputs***, drag and drop the **udp-rap-in** Input Connector and the **tcp-text-out** Output Connector onto the canvas.
8. Connect the **udp-rap-in** to the **tcp-text-out** and click **Publish** to publish your GeoEvent Service.

9. In the …*utilities**tcp-console-app* folder provided with this tutorial, launch the **TCP Console** application. Using this application you can observe the RAP messages as they are received in GeoEvent Processor from your AVL devices.


TCP Listen 5570
Received Event : RAP0x14,909-2532702,20,34,"-117.196710000000001,34.05613,0.0",0,0,12/19/2013 11:56:18 PM,false,false,fal
Received Event : RAP0x14,909-2532702,20,34,"-117.196710000000001,34.05613,0.0",0,0,12/19/2013 11:56:28 PM,false,false,fal
Received Event : RAP0x14,909-2532702,20,34,"-117.196710000000001,34.05613,0.0",0,0,12/19/2013 11:56:38 PM,false,false,fal
Received Event : RAP0x14,909-2532702,20,34,"-117.196710000000001,34.05613,0.0",0,0,12/19/2013 11:56:48 PM,false,false,fal
Received Event : RAP0x14,909-2532702,20,34,"-117.196710000000001,34.05613,0.0",0,0,12/19/2013 11:56:58 PM,false,false,fal
Received Event : RAP0x14,909-2532702,20,34,"-117.196710000000001,34.05613,0.0",0,0,12/19/2013 11:57:08 PM,false,false,fal
Received Event : RAP0x14,909-2532702,20,34,"-117.196710000000001,34.05613,0.0",0,0,12/19/2013 11:57:18 PM,false,false,fal
Received Event : RAP0x14,909-2532702,20,34,"-117.196710000000001,34.05613,0.0",0,0,12/19/2013 11:57:28 PM,false,false,fal
Received Event : RAP0x14,909-2532702,20,34,"-117.196710000000001,34.05613,0.0",0,0,12/19/2013 11:57:38 PM,false,false,fal
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Received Event : RAP0x14,909-2532702,20,34,"-117.196710000000001,34.05613,0.0",0,0,12/19/2013 11:57:58 PM,false,false,fal
Received Event : RAP0x14,909-2532702,20,34,"-117.196710000000001,34.05613,0.0",0,0,12/19/2013 11:58:08 PM,false,false,fal
Received Event : RAP0x14,909-2532702,20,34,"-117.196710000000001,34.05613,0.0",0,0,12/19/2013 11:58:18 PM,false,false,fal
Received Event : RAP0x14,909-2532702,20,34,"-117.196710000000001,34.05613,0.0",0,0,12/19/2013 11:58:28 PM,false,false,fal
Received Event : RAP0x14,909-2532702,20,34,"-117.196710000000001,34.05613,0.0",0,0,12/19/2013 11:58:38 PM,false,false,fal
Received Event : RAP0x14,909-2532702,20,34,"-117.196710000000001,34.05613,0.0",0,0,12/19/2013 11:58:48 PM,false,false,fal
Received Event : RAP0x14,909-2532702,20,34,"-117.196710000000001,34.05613,0.0",0,0,12/19/2013 11:58:58 PM,false,false,fal
Received Event : RAP0x14,909-2532702,20,34,"-117.196710000000001,34.05613,0.0",0,0,12/19/2013 11:59:08 PM,false,false,fal
Received Event : RAP0x14,909-2532702,20,34,"-117.196710000000001,34.05613,0.0",0,0,12/19/2013 11:59:18 PM,false,false,fal
Received Event : RAP0x14,909-2532702,20,34,"-117.196710000000001,34.05613,0.0",0,0,12/19/2013 11:59:28 PM,false,false,fal
Received Event : RAP0x14,909-2532702,20,34,"-117.196710000000001,34.05613,0.0",0,0,12/19/2013 11:59:38 PM,false,false,fal
Received Event : RAP0x14,909-2532702,20,34,"-117.196710000000001,34.05613,0.0",0,0,12/19/2013 11:59:48 PM,false,false,fal
Received Event : RAP0x14,909-2532702,20,34,"-117.196710000000001,34.05613,0.0",0,0,12/19/2013 11:59:58 PM,false,false,fal