



ESRI DEVELOPER SUMMIT

10-12 November | Berlin, Germany

ArcGIS GeoEvent Extension for Server: Building Real Time Web Applications

Jon Satchwell
Professional Services

Esri Switzerland

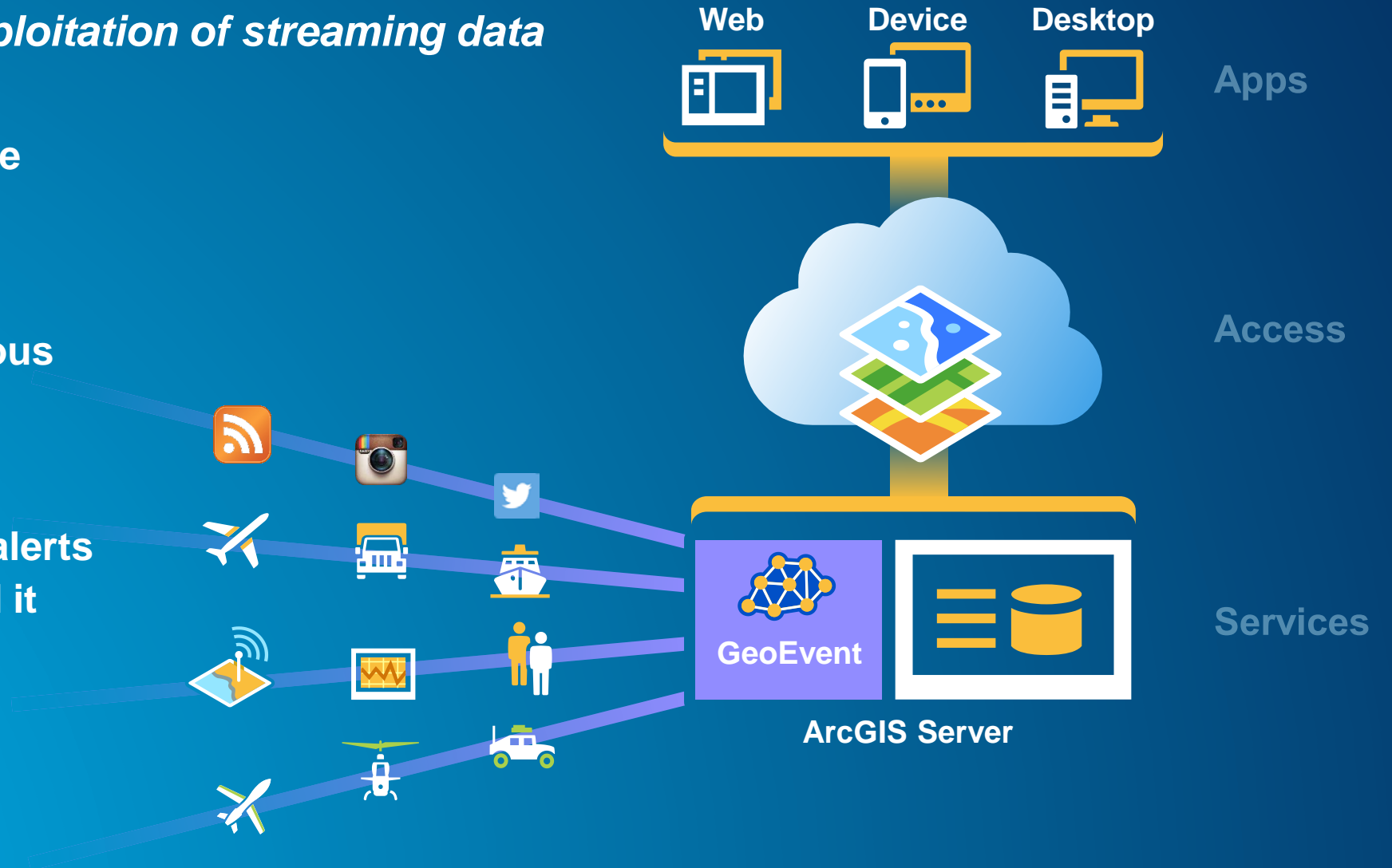
j.satchwell@esri.ch



Real-Time GIS

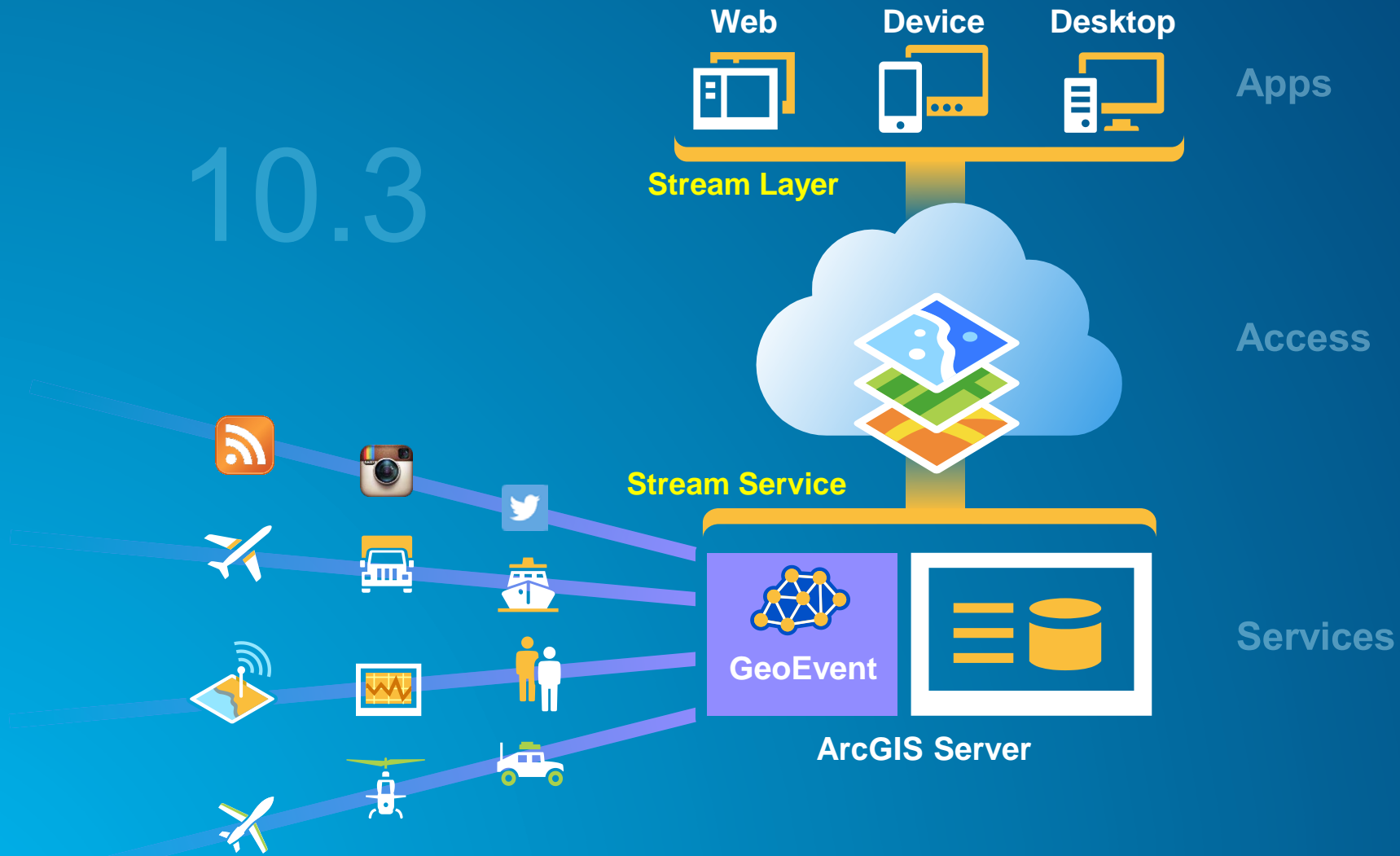
Real-Time GIS

- *Integration & exploitation of streaming data*
- Integrates real-time streaming data into ArcGIS
- Performs continuous processing & real-time analytics
- Sends updates & alerts to those who need it where they need it



Real-Time GIS

10.3



Getting Real-Time data into Web Applications

Receiving Real-Time Data

- Easily integrate real-time streaming data with ArcGIS by using an input connector.

The diagram illustrates the GeoEvent Extension architecture. It features a central orange box labeled "GeoEvent Services" with "Inputs" on the left and "Outputs" on the right. A network of nodes and lines connects these inputs and outputs. To the left, purple horizontal lines represent incoming data streams. To the right, a black box contains the text "You can create your own connectors."

Out of the Box

- Receive RSS
- Receive text from a TCP Socket
- Receive text from a UDP Socket
- Receive Features on a REST endpoint
- Receive JSON on a REST endpoint
- Receive JSON on a Web Socket
- Receive JSON on external Web Socket
- Poll an ArcGIS Server for Features
- Poll an external website for JSON
- Watch a folder for new .csv files
- Watch a folder for new .json files

Esri Gallery

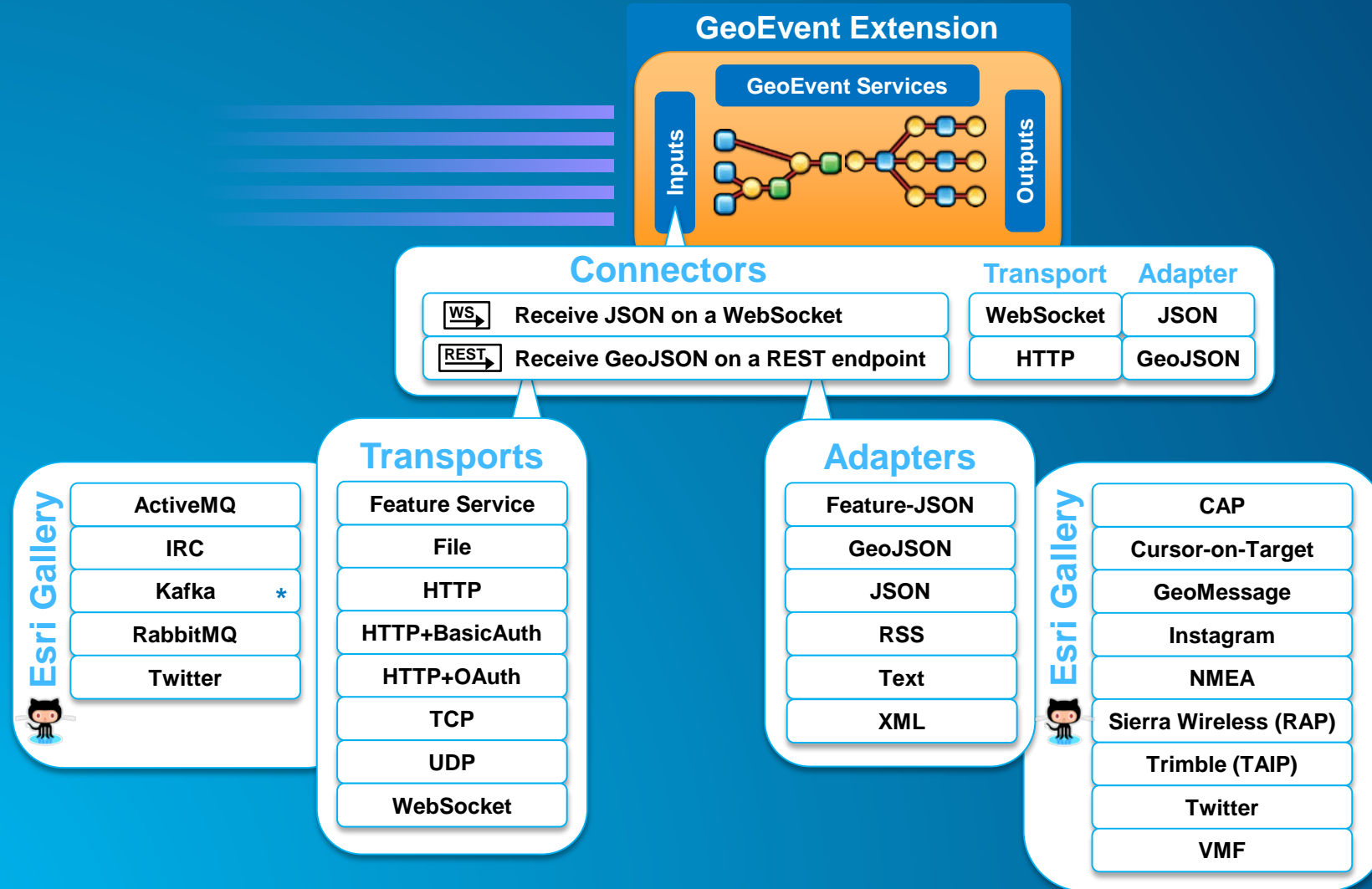
- Twitter
- Instagram
- CAP
- CoT Cursor-on-Target
- VMF VMF
- GeoMessage GeoMessage
- ActiveMQ ActiveMQ
- RabbitMQ
- NMEA
- TAIP (Trimble)
- RAP (Sierra Wireless)

Partner Gallery

- GNIP
- Geofeedia
- exactEarth
- ASDI (FAA)
- OSIsoft
- Valarm
- Harris
- CompassCom
- NetworkFleet
- Zonar

Receiving Real-Time Data

Input Connector = Transport + Adapter



Collecting Real-Time Data

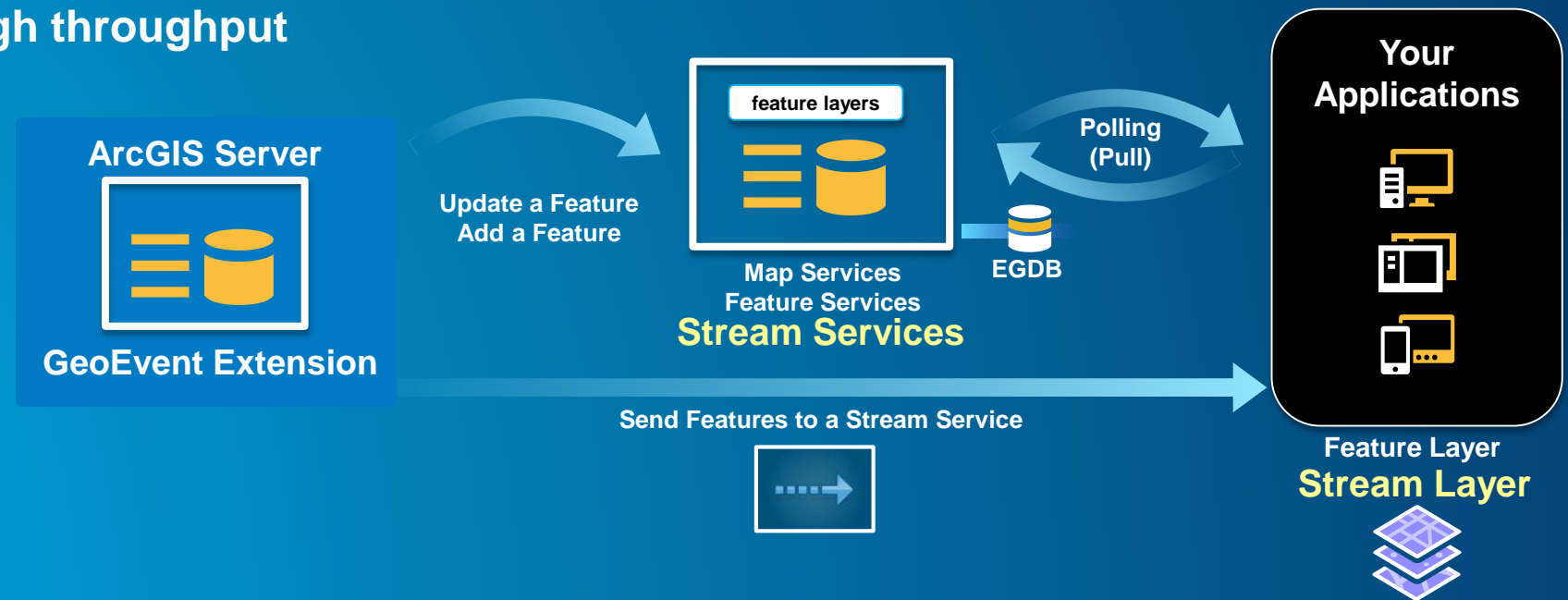
Stream Service Intro

International Space Station (ISS)



Getting Real-Time Data into Web Apps

- **Feature Layers pull from feature services**
 - Web app poll to get periodic updates
 - Must be backed by an enterprise geodatabase
- **Stream Layers subscribe to stream services**
 - Web apps subscribe to immediately receive data
 - Low latency and high throughput



Stream Services

The Foundation for Real-Time Web Apps

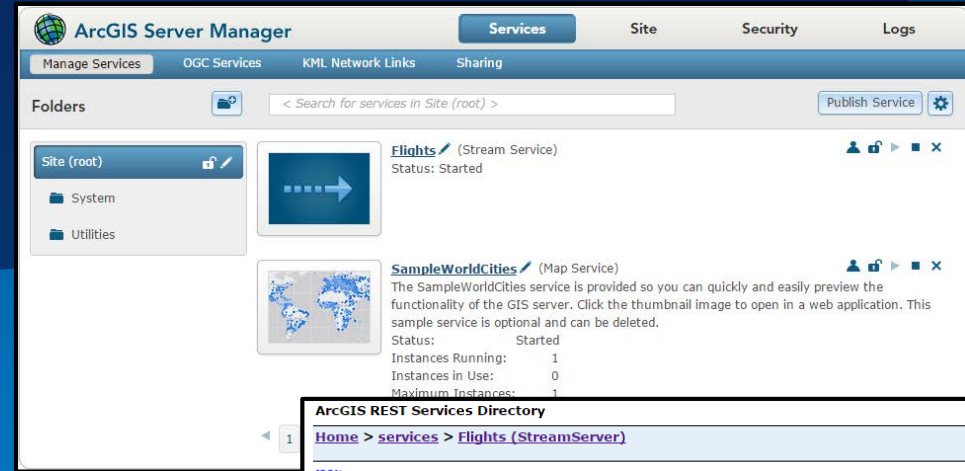


- Are **discoverable** via services directory
 - <http://<your server>/arcgis/rest/services/iss-stream/StreamServer>
- Can be **secured** just like any other ArcGIS Server service using
 - ArcGIS internal user store
 - Active Directory/LDAP
 - PKI
- Can be **scaled** using clustering

Demo

Real-Time in Server

Stream Service



ArcGIS REST Services Directory
[Home](#) > [services](#) > [Flights \(StreamServer\)](#)

[JSON](#)

Flights (StreamServer)

View In: [ArcGIS JavaScript](#)

Description: null

Object ID: null

Geometry Type: esriGeometryPoint

Geometry Field: location

Spatial Reference: 4326 (4326)

Fields:

- flight_id (type: esriFieldTypeInteger , alias: flight_id , nullable: true)
- aircraft_id (type: esriFieldTypeString , alias: aircraft_id , nullable: true)
- date_time_stamp (type: esriFieldTypeDate , alias: date_time_stamp , nullable: true)
- longitude (type: esriFieldTypeDouble , alias: longitude , nullable: true)
- latitude (type: esriFieldTypeDouble , alias: latitude , nullable: true)
- heading (type: esriFieldTypeDouble , alias: heading , nullable: true)
- ground_speed_knots (type: esriFieldTypeInteger , alias: ground_speed_knots , nullable: true)
- altitude_feet (type: esriFieldTypeInteger , alias: altitude_feet , nullable: true)
- aircraft_type (type: esriFieldTypeString , alias: aircraft_type , nullable: true)
- airline_id (type: esriFieldTypeString , alias: airline_id , nullable: true)
- origin_id (type: esriFieldTypeString , alias: origin_id , nullable: true)
- destination_id (type: esriFieldTypeString , alias: destination_id , nullable: true)
- aircraft_category (type: esriFieldTypeString , alias: aircraft_category , nullable: true)
- user_category (type: esriFieldTypeString , alias: user_category , nullable: true)
- flight_plan_status (type: esriFieldTypeString , alias: flight_plan_status , nullable: true)
- departure_time (type: esriFieldTypeString , alias: departure_time , nullable: true)
- arrival_time (type: esriFieldTypeString , alias: arrival_time , nullable: true)
- est_departure_time (type: esriFieldTypeString , alias: est_departure_time , nullable: true)
- est_arrival_time (type: esriFieldTypeString , alias: est_arrival_time , nullable: true)
- flight_class (type: esriFieldTypeString , alias: flight_class , nullable: true)

Web Socket URLs:

- ws://RYANE2.ESRI.COM:6180/arcgis/ws/services/Flights/StreamServer
- wss://RYANE2.ESRI.COM:6143/arcgis/ws/services/Flights/StreamServer

Stream Layers

Enabling real-time web wpps



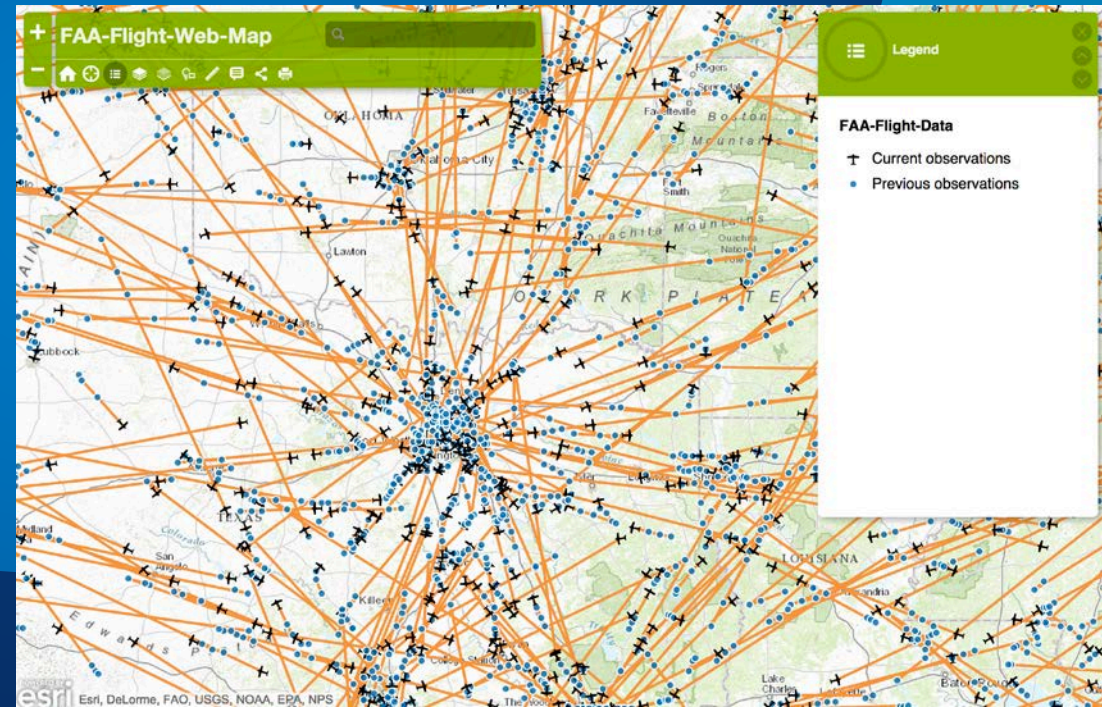
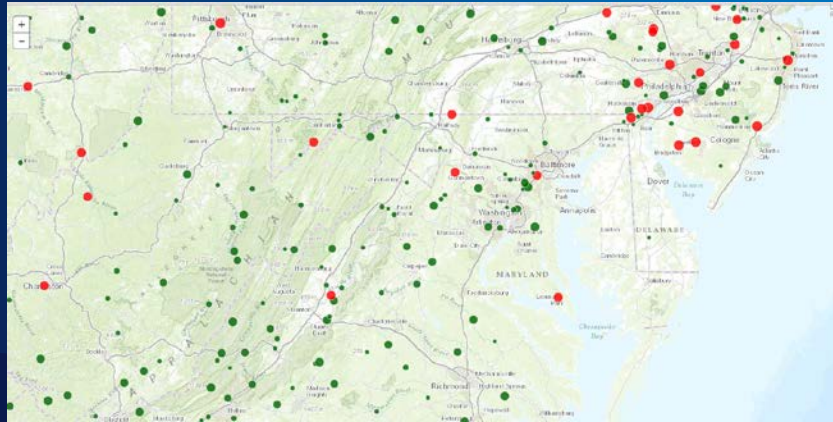
- Part of the ArcGIS API for JavaScript
- Subscribe to stream services
 - Immediately receive and render data
 - Configurable symbology with familiar api
 - Direct access to data on arrival
- Can filter on
 - An area of interest
 - Field Values
- ***Stream services communicate over a web socket***
 - ***Web socket protocol must be allowed on a network***
 - ***Client must have a browser that supports web sockets***
 - *<http://caniuse/websockets>*



Demo

Real-Time in Web Maps

Stream Service



Stream Layer Deployment Patterns

Enabling real-time web wpps

- **Configure in a Web Map and**
 - Just share it
 - Web App Template
 - Web App Builder
- **Custom JavaScript apps**

Building Real-Time Web Maps With the JavaScript API

ArcGIS JavaScript API

StreamLayer: API class

Class: StreamLayer

[[AMD Module Require](#) | [Legacy Module Require](#)]

```
require(["esri/layers/StreamLayer"], function(StreamLayer) { /* code goes here */ });
```

Class hierarchy

```
esri/layers/Layer  
|_esri/layers/GraphicsLayer  
  |_esri/layers/FeatureLayer  
    |_esri/layers/StreamLayer
```

<https://developers.arcgis.com/javascript/jsapi/streamlayer-amd.html>

ArcGIS JavaScript API

StreamLayer: Constructors

Constructors

Name

`new StreamLayer(url, options?)`

```
function makeStreamLayer() {  
    var url = "http://yourMachine:6080/arcgis/services/Flights/StreamServer",  
    options = {  
        purgeOptions: { displayCount: 10000 },  
        maximumTrackPoints: 1,  
        outFields: ["Name", "Altitude", "Destination"]  
    };  
    var layer = new StreamLayer(url, options);  
}
```

ArcGIS JavaScript API

StreamLayer: Methods

- Add / remove StreamLayer to / from a map

```
function addNewStreamLayer() {  
    streamLayer = makeStreamLayer();  
    map.addLayer(streamLayer);  
}
```

```
function removeStreamLayer() {  
    map.removeLayer(streamLayer);  
};
```

```
function connectStreamLayer() {  
    streamLayer.connect();  
};
```

```
function disconnectStreamLayer() {  
    streamLayer.disconnect();  
};
```

```
        purgeOptions: { displayCount: 10000 },  
        maximumTrackPoints: 1,  
        outFields: ["Name", "Altitude", "Destination"]  
    };  
    var layer = new StreamLayer(url, options);
```

ArcGIS JavaScript API

StreamLayer: Event handler

- Subscribe to event of theStreamLayer

```
//On connect, change UI
layer.on("Connect", function() {
    dojo.byId("txtWsUrl").style.backgroundColor = "green";
});
//On disconnect, change UI
layer.on("Disconnect", function() {
    dojo.byId("txtWsUrl").style.backgroundColor = "red";
});
```

StreamService: <http://localhost:6080/arcgis/rest/services/Flights/StreamServer>

Disconnect StreamService

Clear Graphics

StreamService: <http://localhost:6080/arcgis/rest/services/Flights/StreamServer>

Connect StreamService

ArcGIS JavaScript API

StreamLayer: Properties

- Set a renderer for the StreamLayer

```
//Make renderer
function makeRenderer() {
    var renderer = new SimpleRenderer(
        new PictureMarkerSymbol('./symbol/plane.png', 20, 20)
    );
    renderer.setRotationInfo({field: "heading"});
    return renderer;
};

return renderer;
};
```

- SimpleRenderer
- TemporalRenderer
- ClassBreaksRenderer
- UniqueValueRenderer
- DotDensityRenderer
- ScaleDependentRenderer



ArcGIS JavaScript API

StreamLayer: Properties

- Set a renderer for the StreamLayer

```
var temporalRenderer = new TemporalRenderer(  
    obsRenderer, latestObsRenderer, trackLineRenderer, obsAger  
);  
return temporalRenderer;
```

```
//Make renderer  
function makeRenderer() {  
    var renderer = new SimpleRenderer(  
        new PictureMarkerSymbol('./symbol/plane.png', 20, 20)  
    );  
    renderer.setRotationInfo({field: "heading"});  
    return renderer;  
};  
);
```

- SimpleRenderer
- TemporalRenderer
- ClassBreaksRenderer
- UniqueValueRenderer
- DotDensityRenderer
- ScaleDependentRenderer



ArcGIS JavaScript API

StreamLayer: Filtering

- Specify an attribute or spatial filter

```
//Set attribute filter
var expression = "Destination = 'DCA'";

function setWhere(expression) {
    streamLayer.setDefinitionExpression(expression);
};
```

```
//Set spatial filter
var extent = new esri.geometry.Extent({
    "xmin": -122.68, "ymin": 45.53, "xmax": -122.45, "ymax": 45.6,
    "spatialReference": {"wkid": 4326}
});

function setExtent(extent) {
    streamLayer.setGeometryDefinition(extent);
};
```

ArcGIS JavaScript API

StreamLayer: Intercepting Events

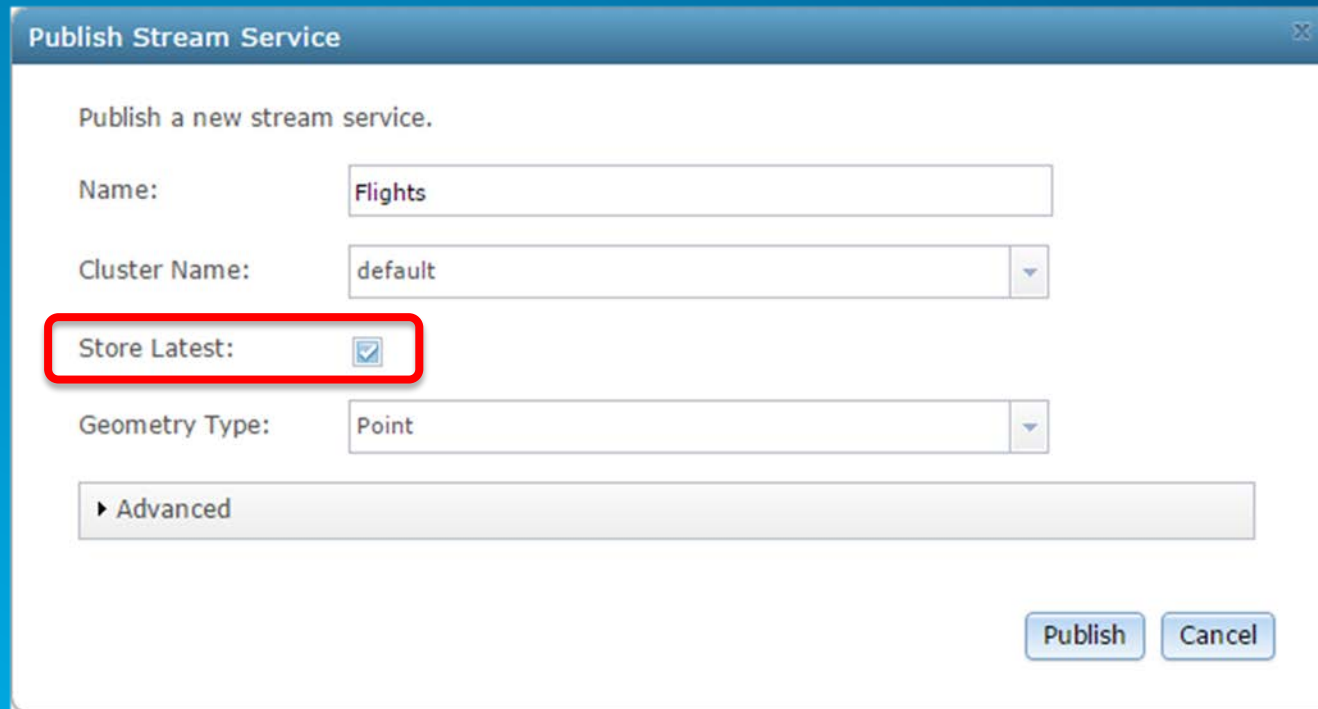
- Intercepting messages received by the StreamLayer

```
layer.on("message", function(evt) {  
    if (evt.attributes.Name == "ASA2") {  
        map.centerAt(evt.geometry);  
    }  
});
```


ArcGIS JavaScript API

StreamLayer: Functionalities

- Store latest Features



Publish Stream Service

Publish a new stream service.

Name:

Cluster Name:

Store Latest:

Geometry Type:

► Advanced

ArcGIS REST Services Directory

[Home](#) > [services](#)

[JSON](#) | [SOAP](#)

Folder: /

Current Version: 10.3

View Footprints In: [ArcGIS.com Map](#)

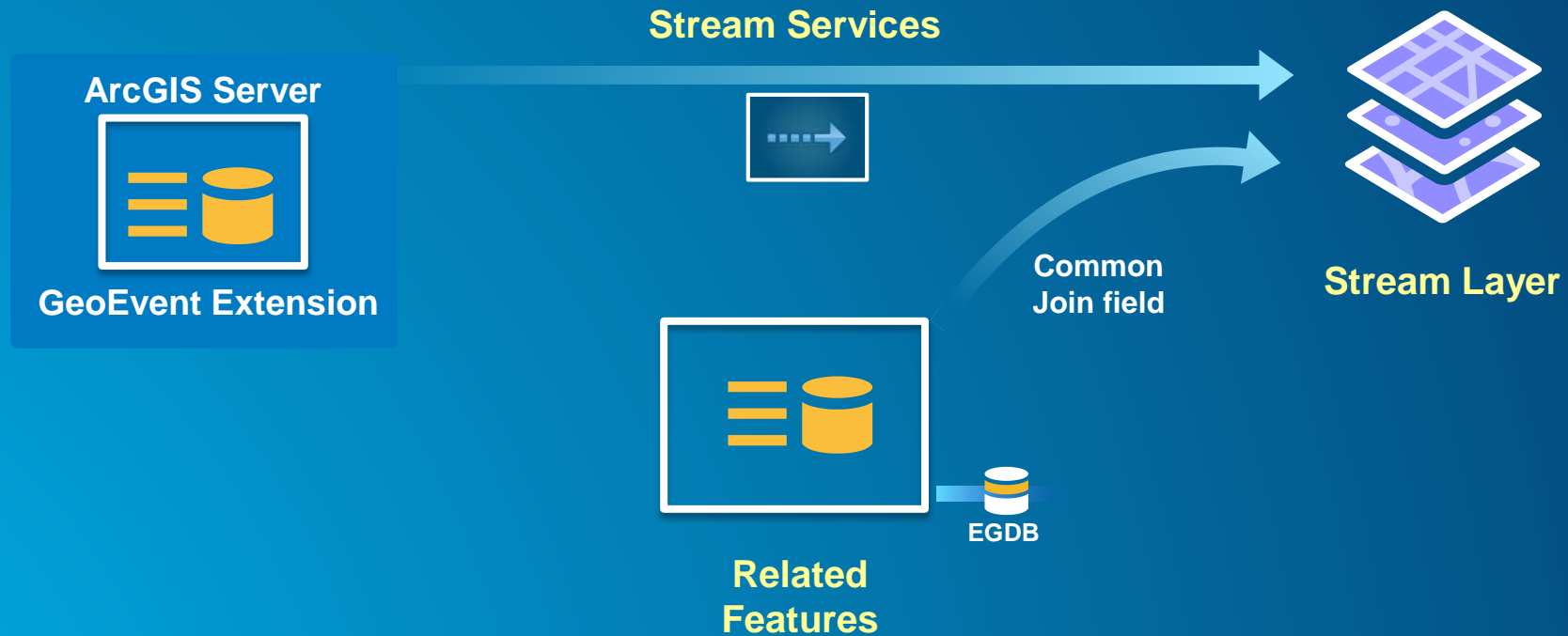
Folders:

- [System](#)
- [Utilities](#)

Services:

- [Flights](#) (FeatureServer)
- [Flights](#) (MapServer)
- [Flights](#) (StreamServer)

Combining real-time with static data



ArcGIS JavaScript API

StreamLayer: Functionalities

- Use a related Features

Publish Stream Service

Publish a new stream service.

Name:

Cluster Name:

Store Latest:

Geometry Type:

▼ Advanced

Related Features:

Summary

- **Stream Services**
 - Enable low-latency immediate delivery of data
 - Are discoverable, securable and scalable
- **StreamLayer**
 - Consume and display streams of features
 - Configurable symbology
 - Filter by geometry and attribute
 - Available in the ArcGIS online web maps
 - Available in the JavaScript API

GeoEvent What's Next?

- **10.4 – Spatiotemporal Big Data Store. Apache Elastic Search**
 - Publish from GeoEvent
 - Workflows in line with SDE for Enterprise projects
 - 4000 Events per second
 - 100,000 BDS events written per second
- **10.4.1**
 - 100,000+ events per second – per node

Let's Talk.

Where to learn more?

Resources

- To learn more, visit the 'Get Started' area of the GeoEvent Extension product page:

- <http://links.esri.com/geoevent>

- Introduction
- Notifications
- Stream Services
- RSS, HTTP, Files
- REST Admin API
- Clustering



The screenshot displays two tutorial cards for the ArcGIS GeoEvent Extension for Server. Each card features a thumbnail image with the product name and the Esri logo, and includes 'Open' and 'Details' buttons. The first card is titled 'Tutorial - Introduction to GeoEvent' and describes it as the first in a series. The second card is titled 'Tutorial - Stream Services in GeoEvent' and describes stream services as a new type of service for low latency data dissemination. Both cards include a 'Document Link by GeoEventTeam', a 'Last Modified' date of December 30, 2014, and a star rating system (0 ratings, 0 comments, 11 views for the first; 0 ratings, 0 comments, 18 views for the second).

- Ask questions on the GeoEvent Forum:

- <https://links.esri.com/geoevent-forum>

The GeoEvent SDK – Local Install dir:

<C:\Program Files\ArcGIS\Server\GeoEvent\sdk>

Find sample application at:

<https://github.com/tompa0003/FlightDemo>

GeoEvent and JavaScript at Dev Summit

- **Tuesday, 10 November**

- ArcGIS API for JavaScript: An Introduction

- **Wednesday, 11 November**

- ArcGIS API for JavaScript: What's New for 4.0
- ArcGIS API for JavaScript: Data Visualization
- Choosing the Best JavaScript Framework for You
- ArcGIS API for JavaScript: Tips and Tricks for Developing and Debugging Apps
- ArcGIS GeoEvent Extension for Server: An Introduction

- **Thursday, 12 November**

- ArcGIS API for JavaScript: What's New for 4.0 (second session)
- ArcGIS API for JavaScript: Build 3D Web Apps
- Web AppBuilder for ArcGIS: Customizing and Extending

Thank You to Our
Gold Sponsor

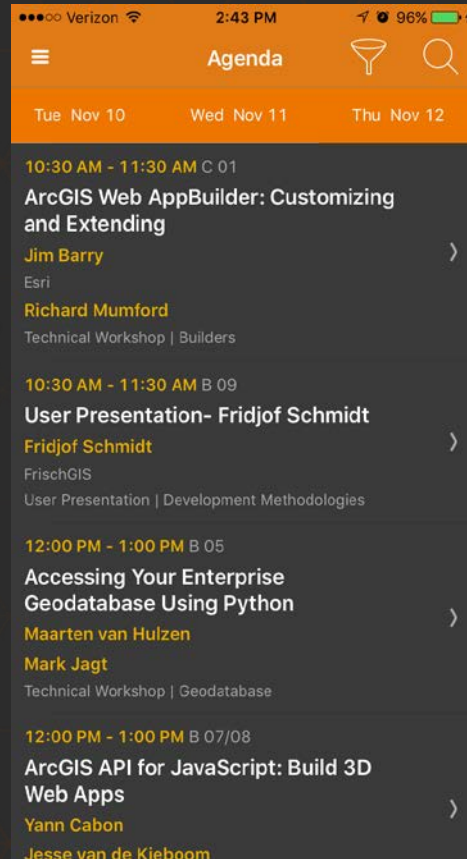
con•terra

Please Take Our Survey!

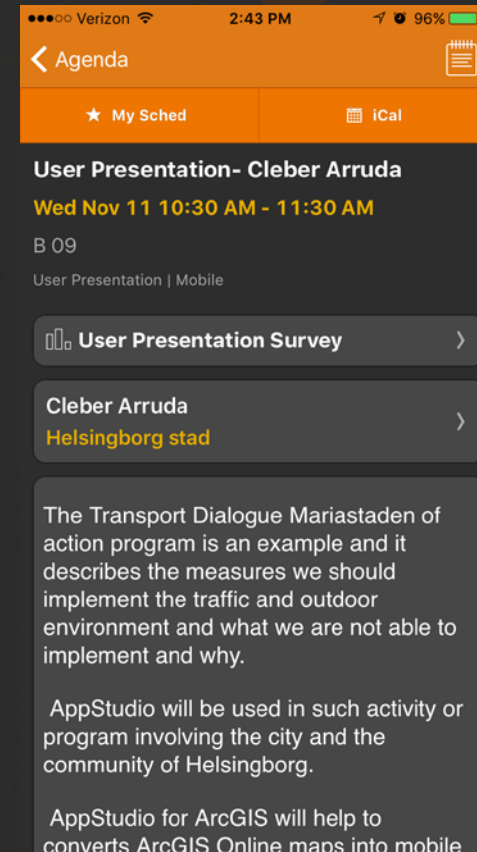
Download the Esri Events app
and find your event



Select the session you
attended



Select
"User Presentation Survey"
or
"Technical Workshop Survey"



Complete Answers
and Select "Submit"

