ESRI DEVELOPER SUMMIT

10-12 November | Berlin, Germany

ArcGIS GeoEvent Extension for Server: Building Real Time Web Applications

Jon Satchwell
Professional Services

Esri Switzerland

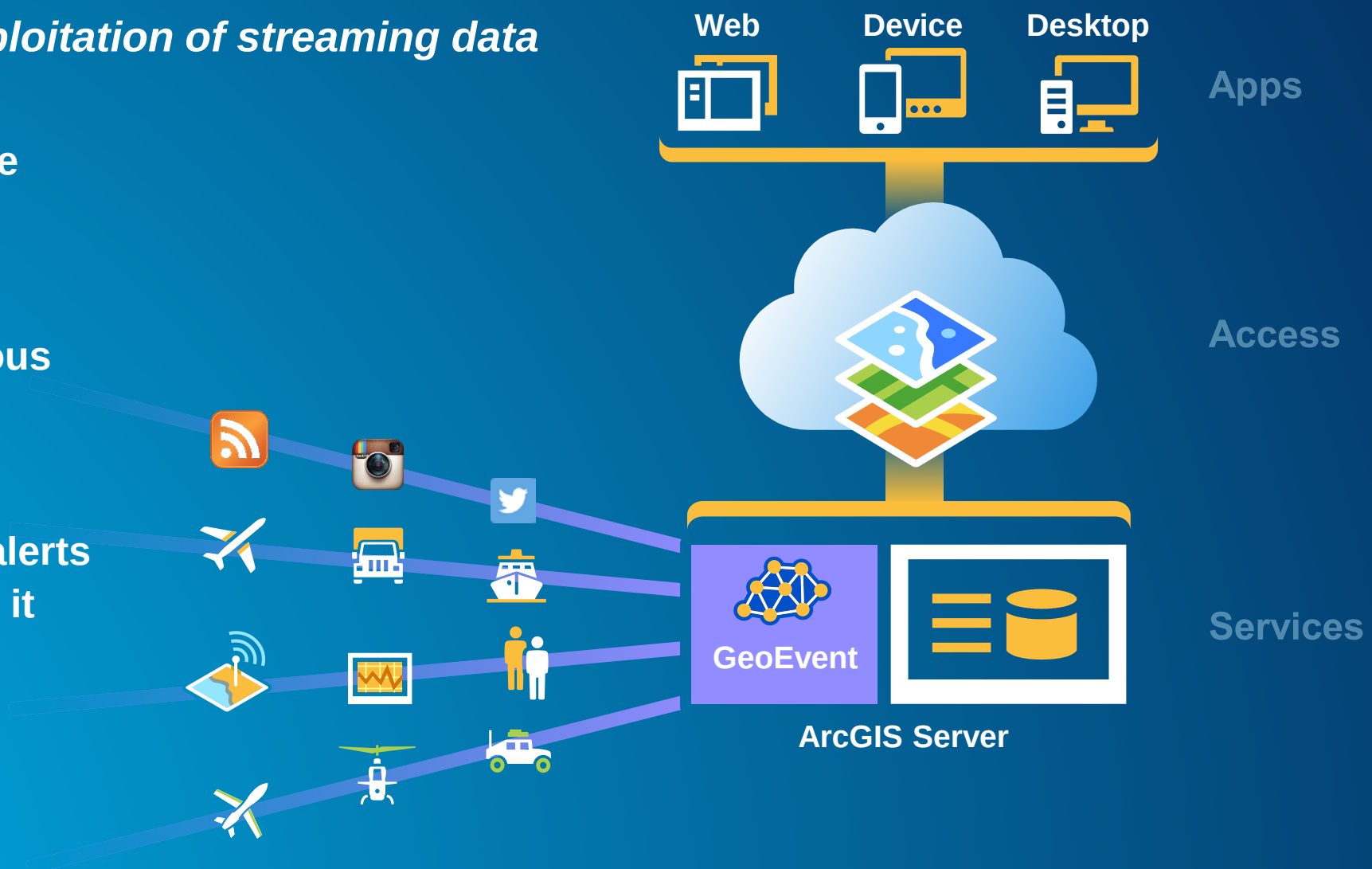
j.satchwell@esri.ch

Real-Time GIS

Real-Time GIS

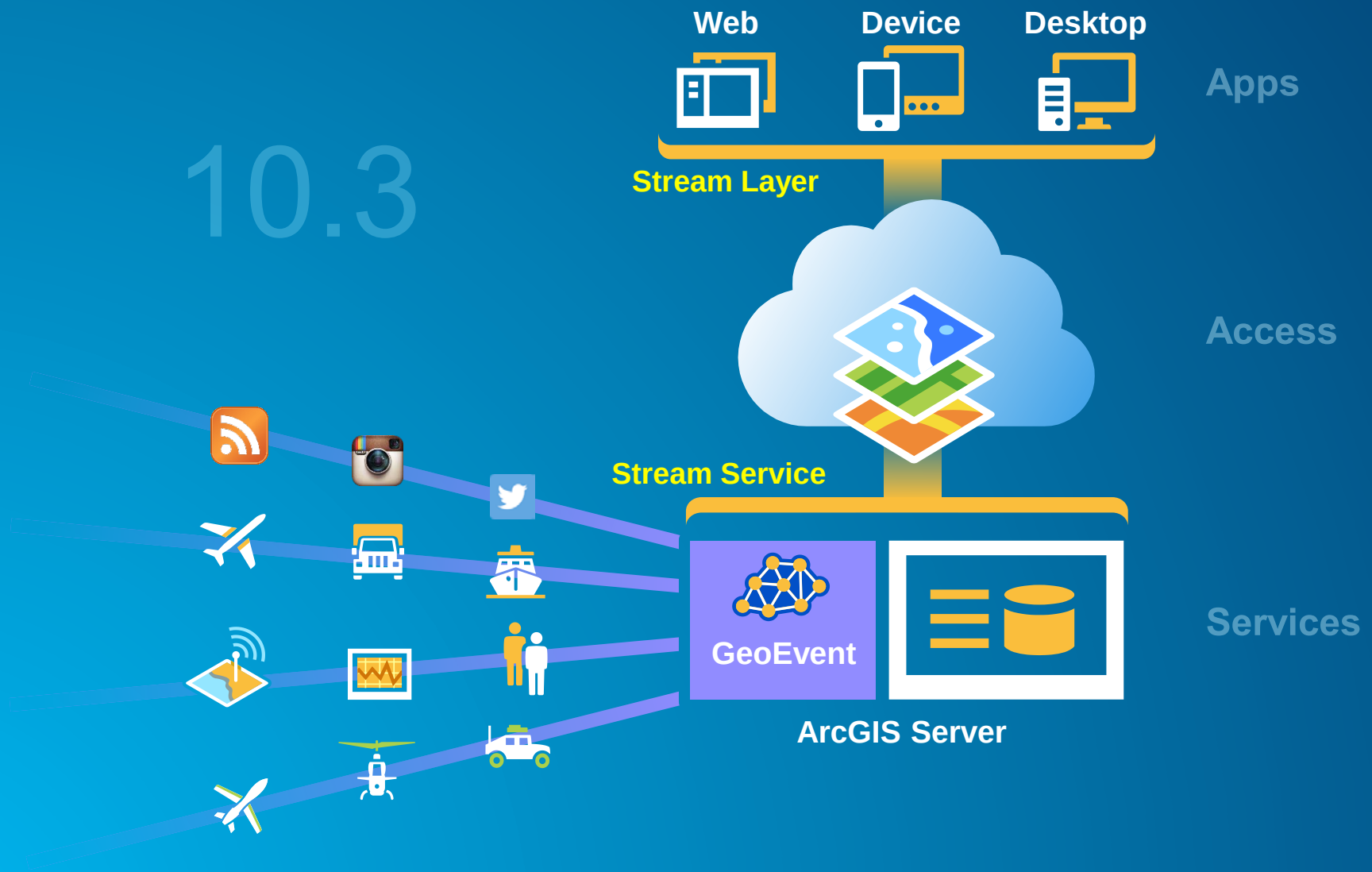
- *Integration & exploitation of streaming data*

- 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

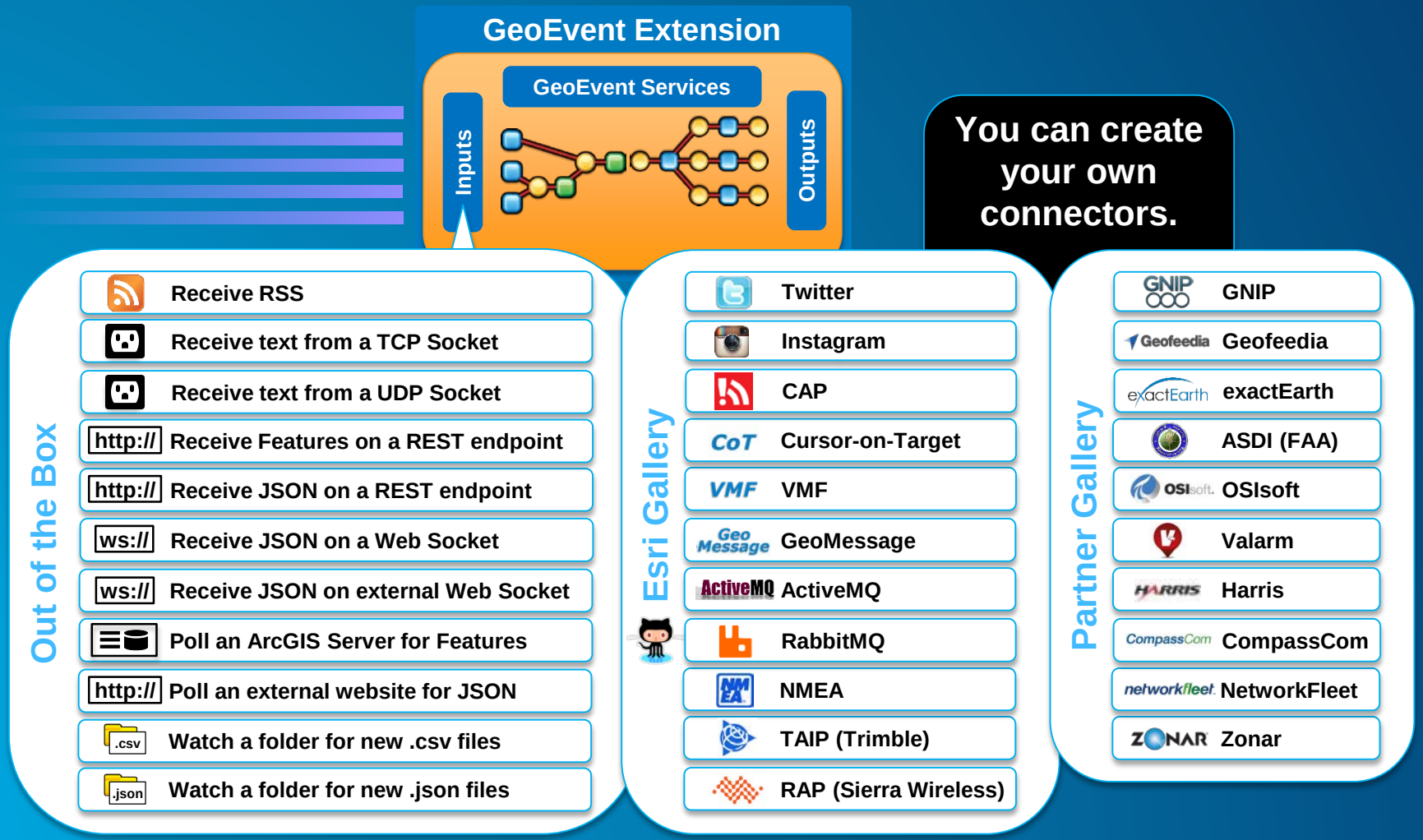
10.3



Getting Real-Time data into Web Applications

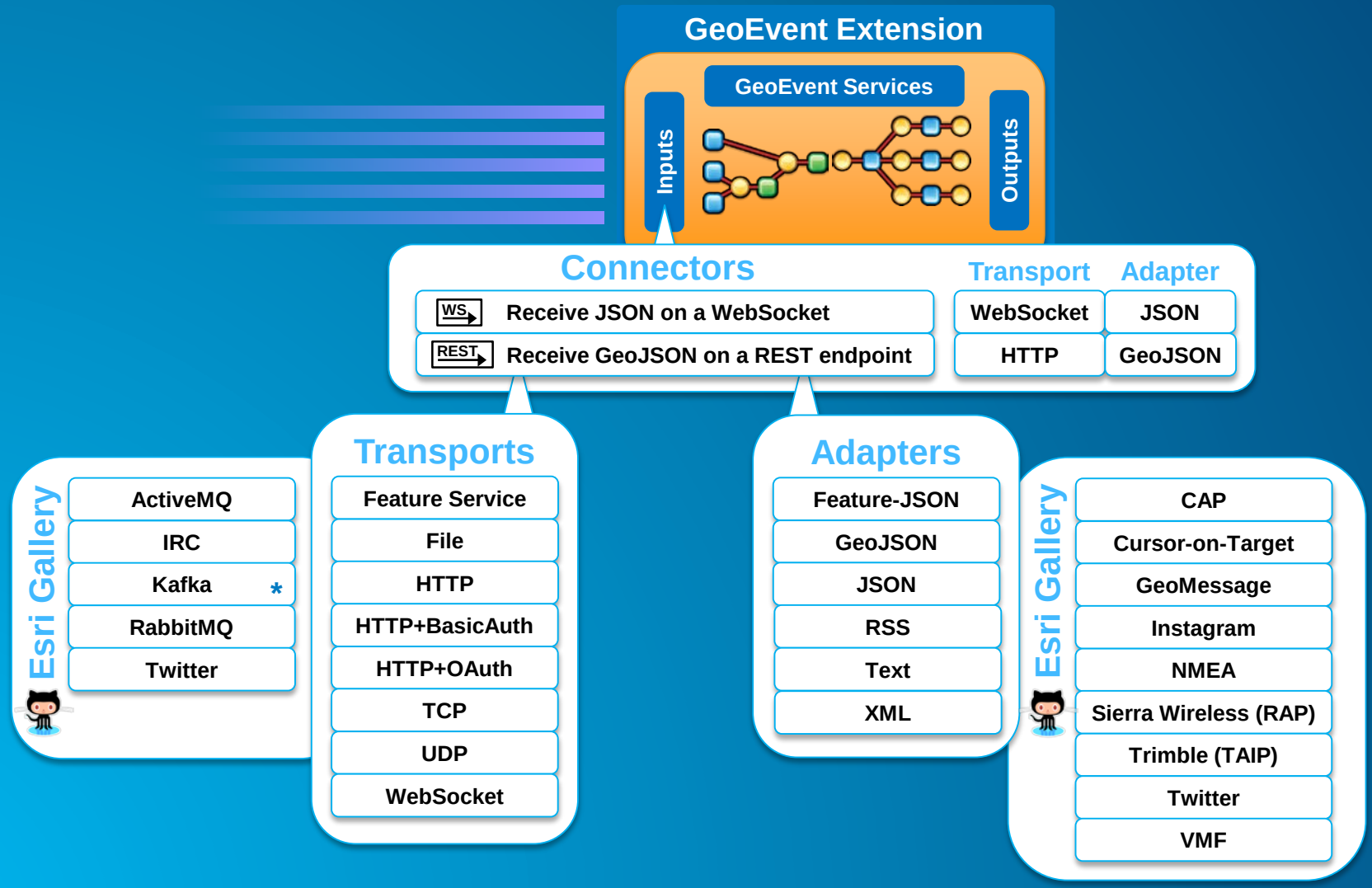
Receiving Real-Time Data

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



Receiving Real-Time Data

Input Connector = Transport + Adapter



Collecting Real-Time Data

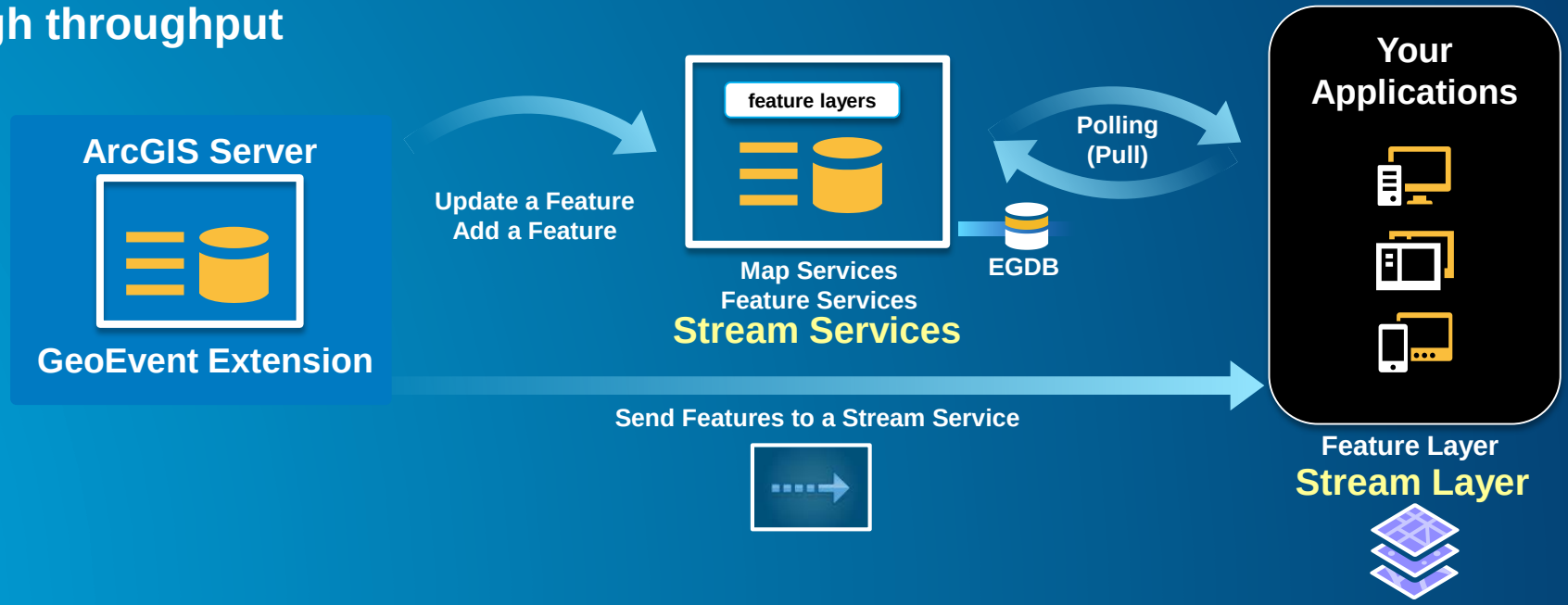
Stream Service Intro

International Space Station (ISS)

Getting Real-Time Data into Web Apps

- **Feature Layers pull from feature servcices**
  - **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

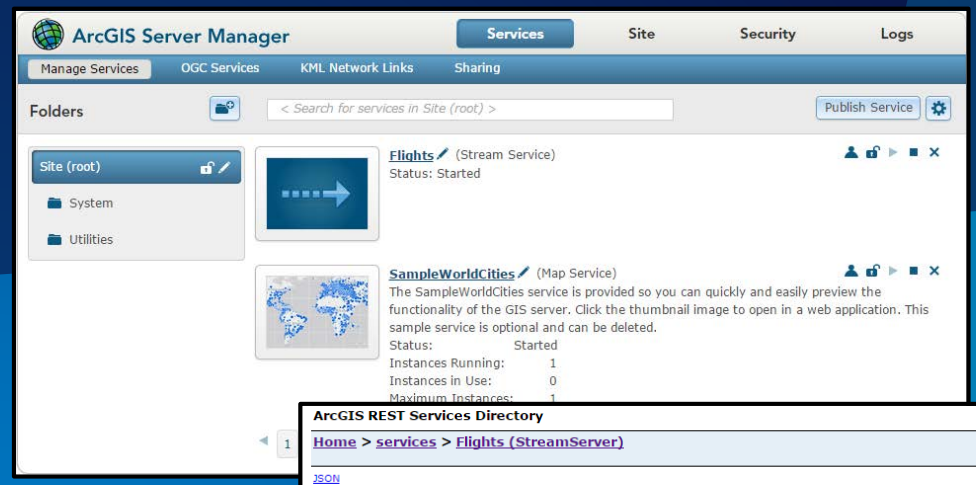
The Foundation for Real-Time Web Apps

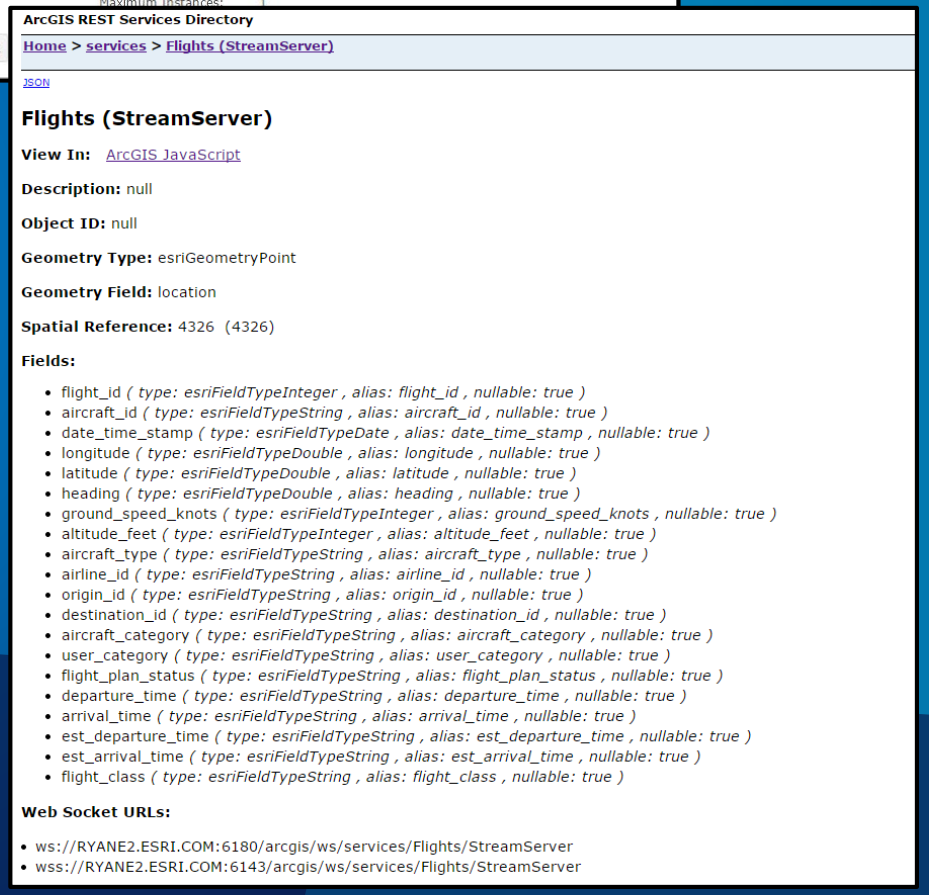
- Are discoverable via services directory
  - http://<your server>/arcgis/rest/services/iss-stream/StreamServer
- Can be secured just like any other ArcGIS Server service using
  - ArcGIS internal user store
  - Active Directory/LDAP
  - PKI
- Can be scaled using clustering

Demo

Real-Time in Server

Stream Service





Stream Layers

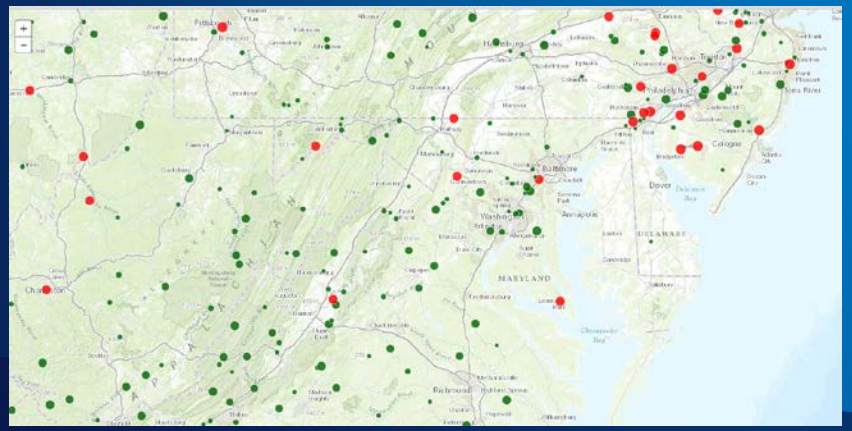
Enabling real-time web wpps

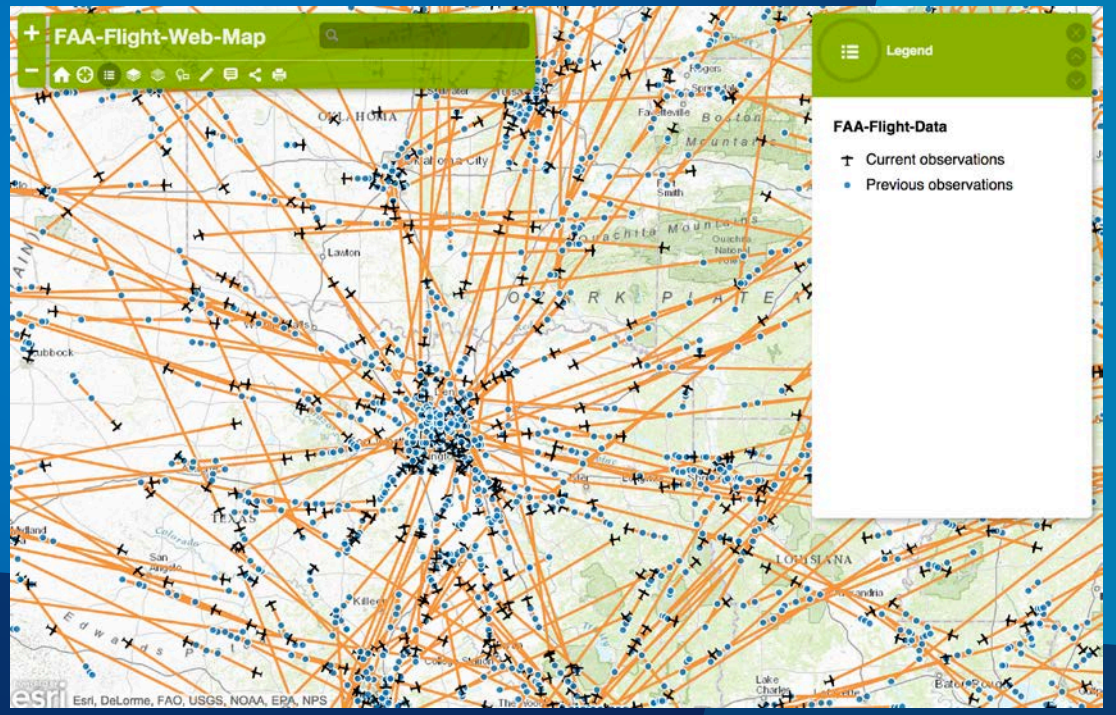
- Part of the ArcGIS API for JavaScript
- Subscribe to stream services
  - Immediately receive and render data
  - Configurable symbology with familiar api
  - Direct access to data on arrival
- Can filter on
  - An area of interest
  - Field Values
- *Steam services communicate over a web socket*
  - *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();
};
```

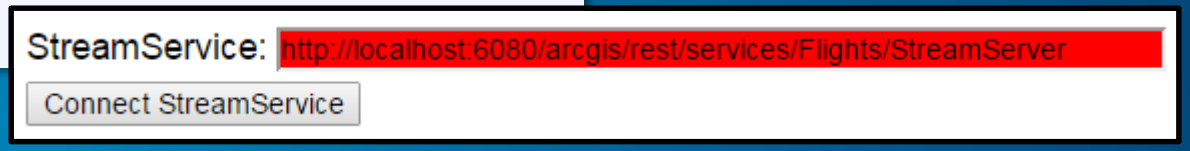
```
yer(){
/yourMachine                                    Server",
        purgeOptions: { displayCount: 10000 },
        maximumTrackPoints: 1,
        outFields: ["Name","Altitude","Destination"]
    };
    var layer = new StreamLayer(url, options);
```

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";
 });
```



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

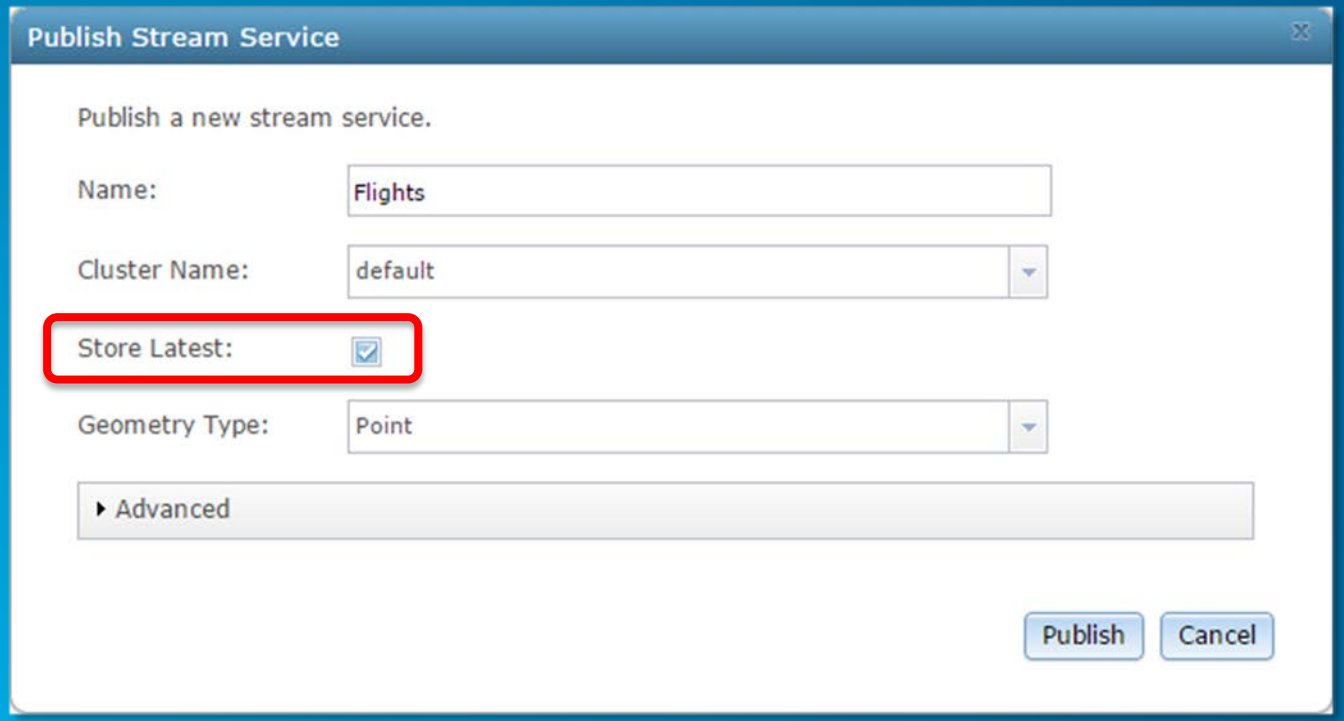
- **Intercepting messages received by the StreamLayer**

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

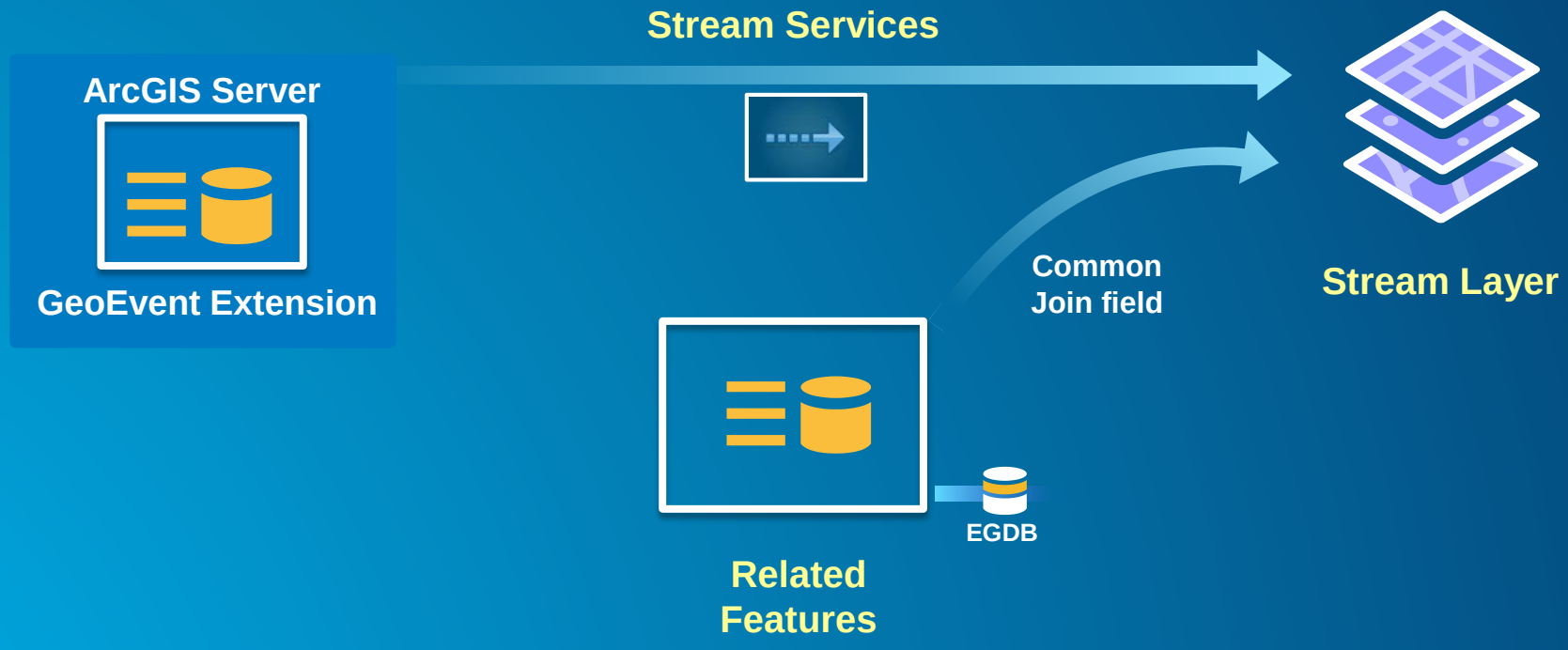
ArcGIS JavaScript API

StreamLayer: Functionalities

- **Store latest Features**



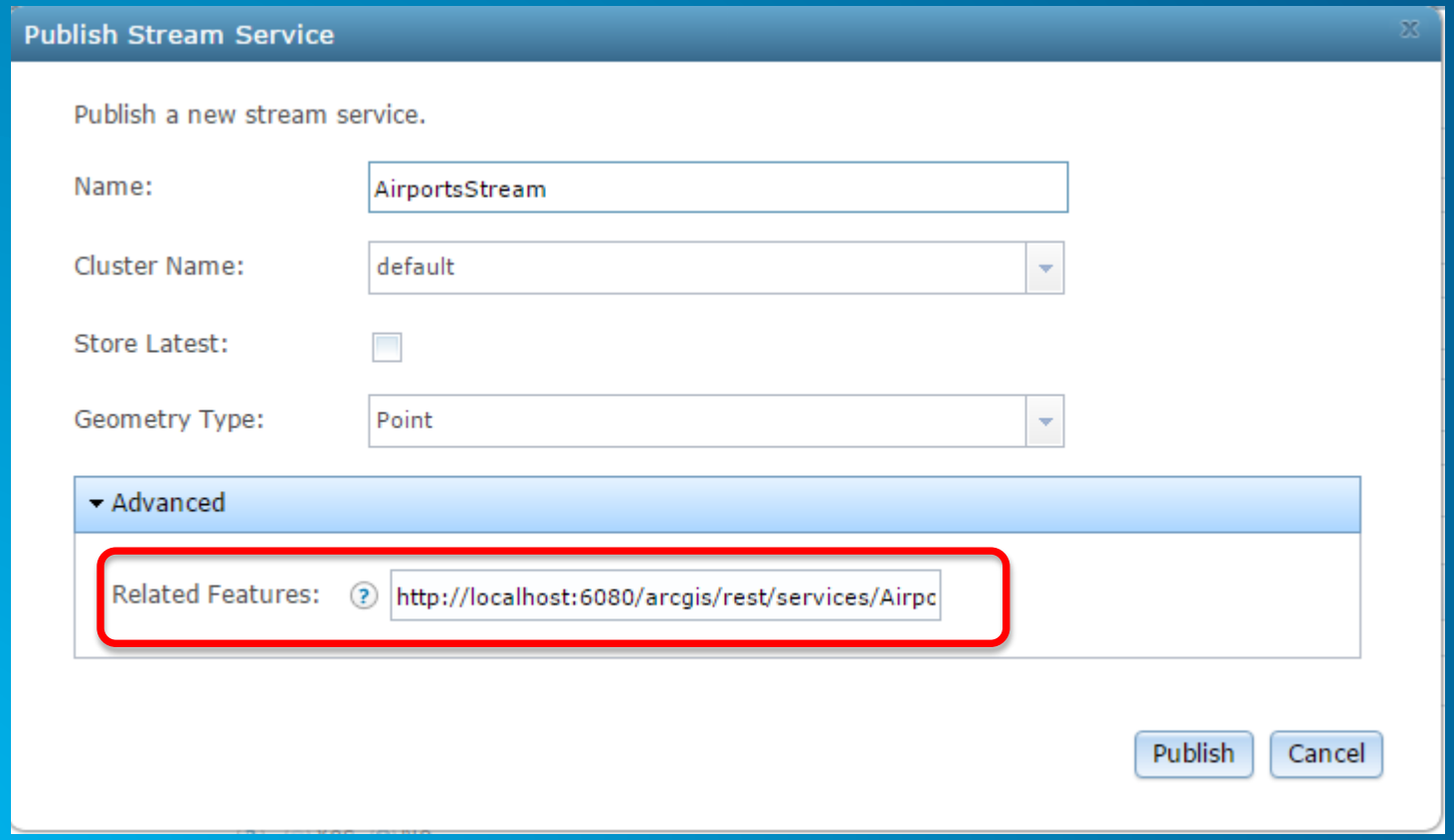
Combining real-time with static data



ArcGIS JavaScript API

StreamLayer: Functionalities

- **Use a 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 geoemtry 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

- 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

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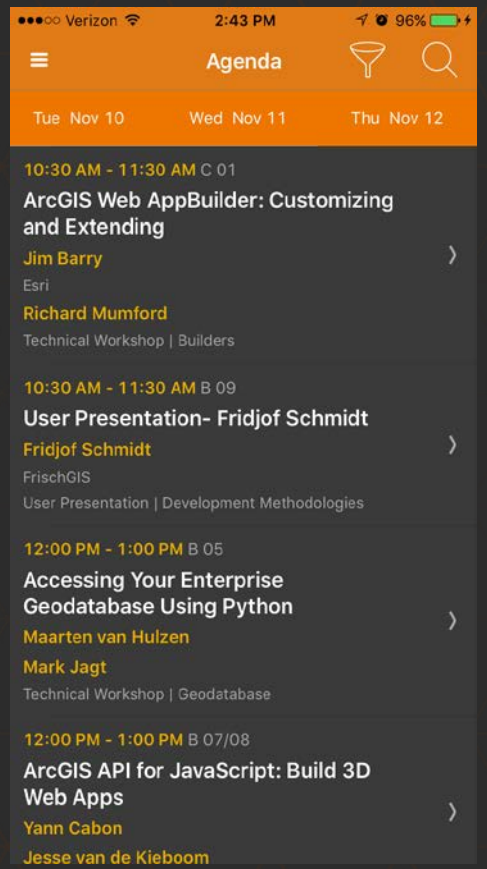

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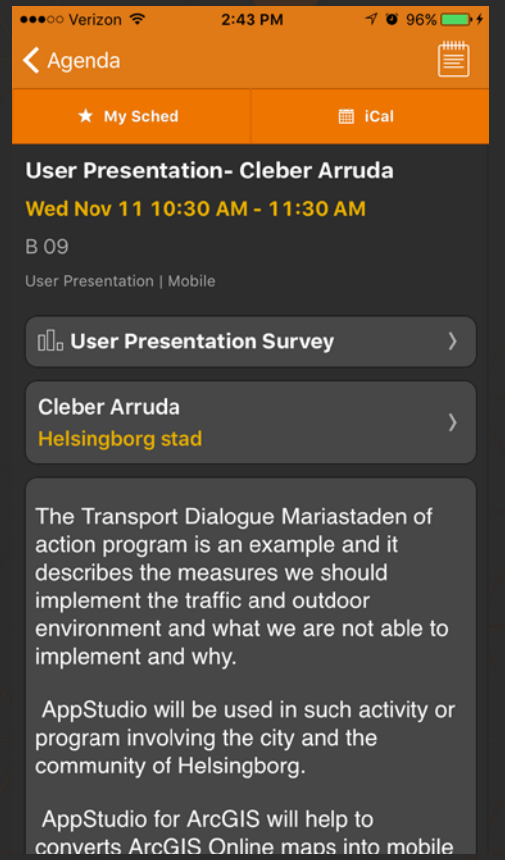
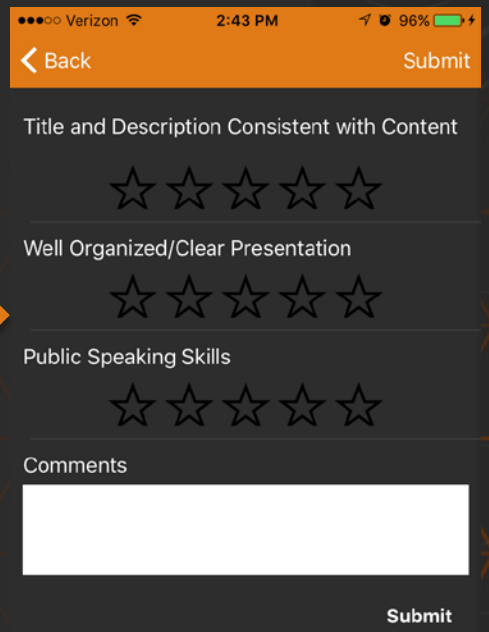
Complete Answers and Select “Submit”