

ArcGIS GeoEvent Server: Leveraging Stream Services

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GeoEvent Server

Real-Time Capabilities

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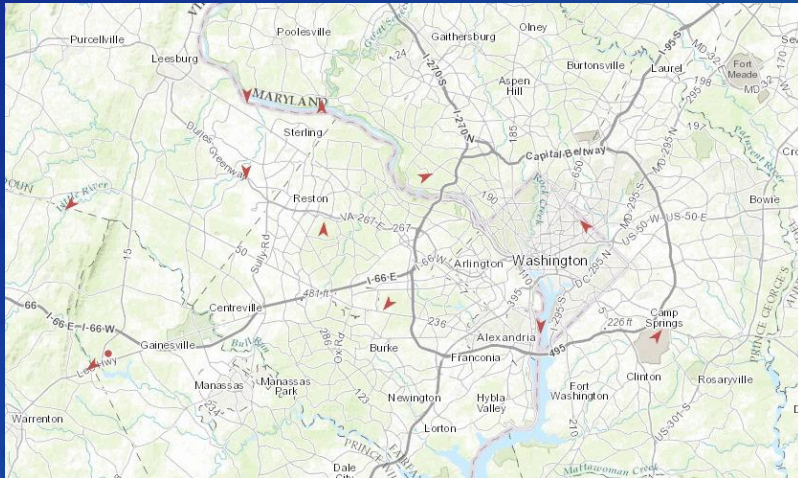
Agenda

- Overview of Stream Services and Stream Layers
- Publishing Stream Services
- Viewing Real-Time Data in Web Maps and Web Application Templates
- Building Web Applications with Web AppBuilder using Stream Layers
- Using the Stream Layer in Custom Applications
- Questions

What is Real-Time Data

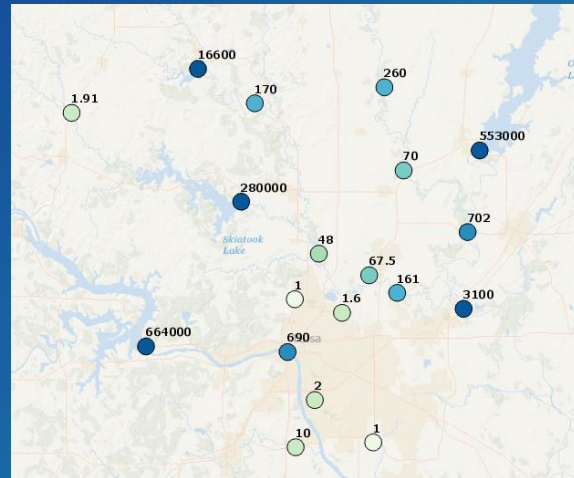
observations whose location and/or attributes change over time

Things that Move



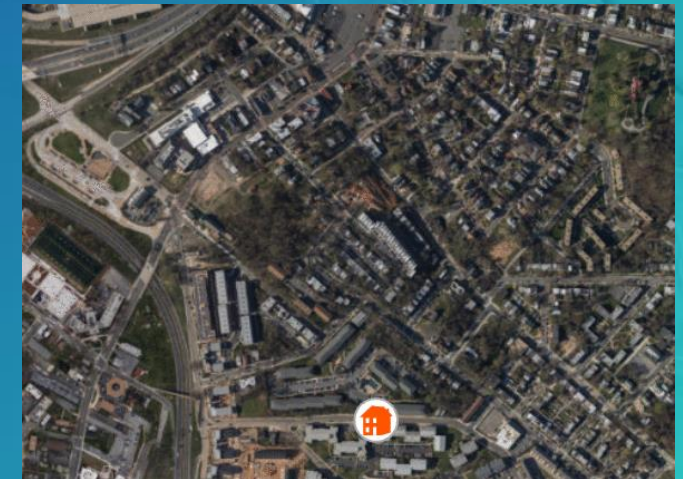
- planes
- vehicles
- satellites
- storms
- animals

Stationary Sensors



- water gauges
- weather stations
- traffic sensors
- air quality sensors

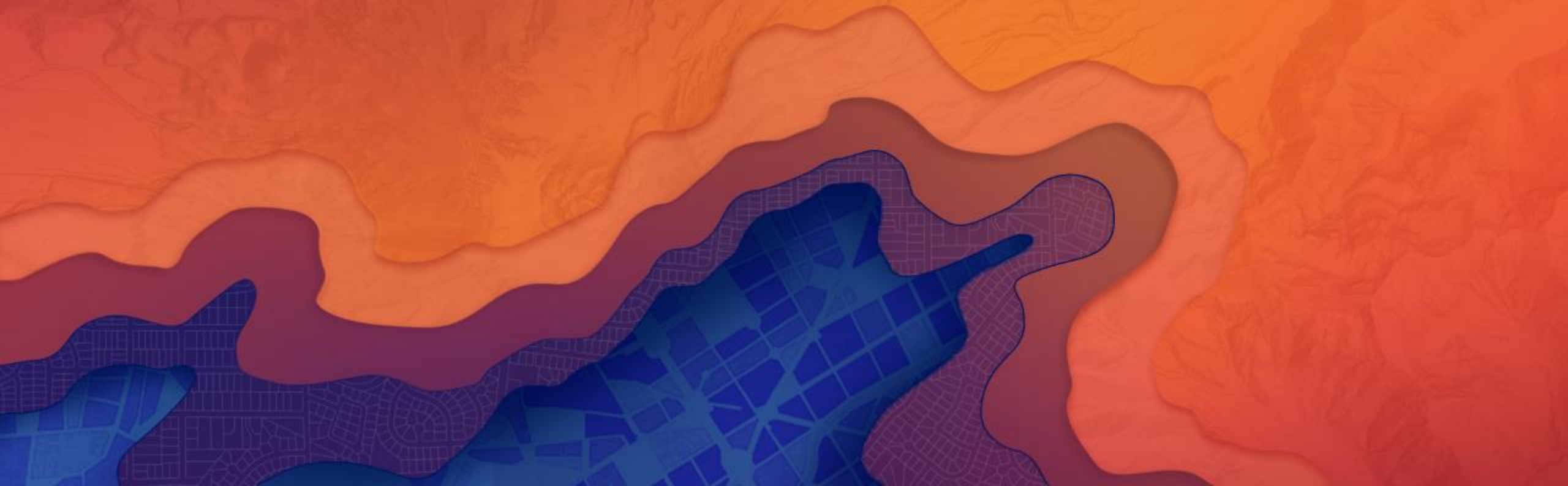
Things that Just Happen



- crime incidents
- lightning strikes
- accidents

Stream Services and StreamLayers

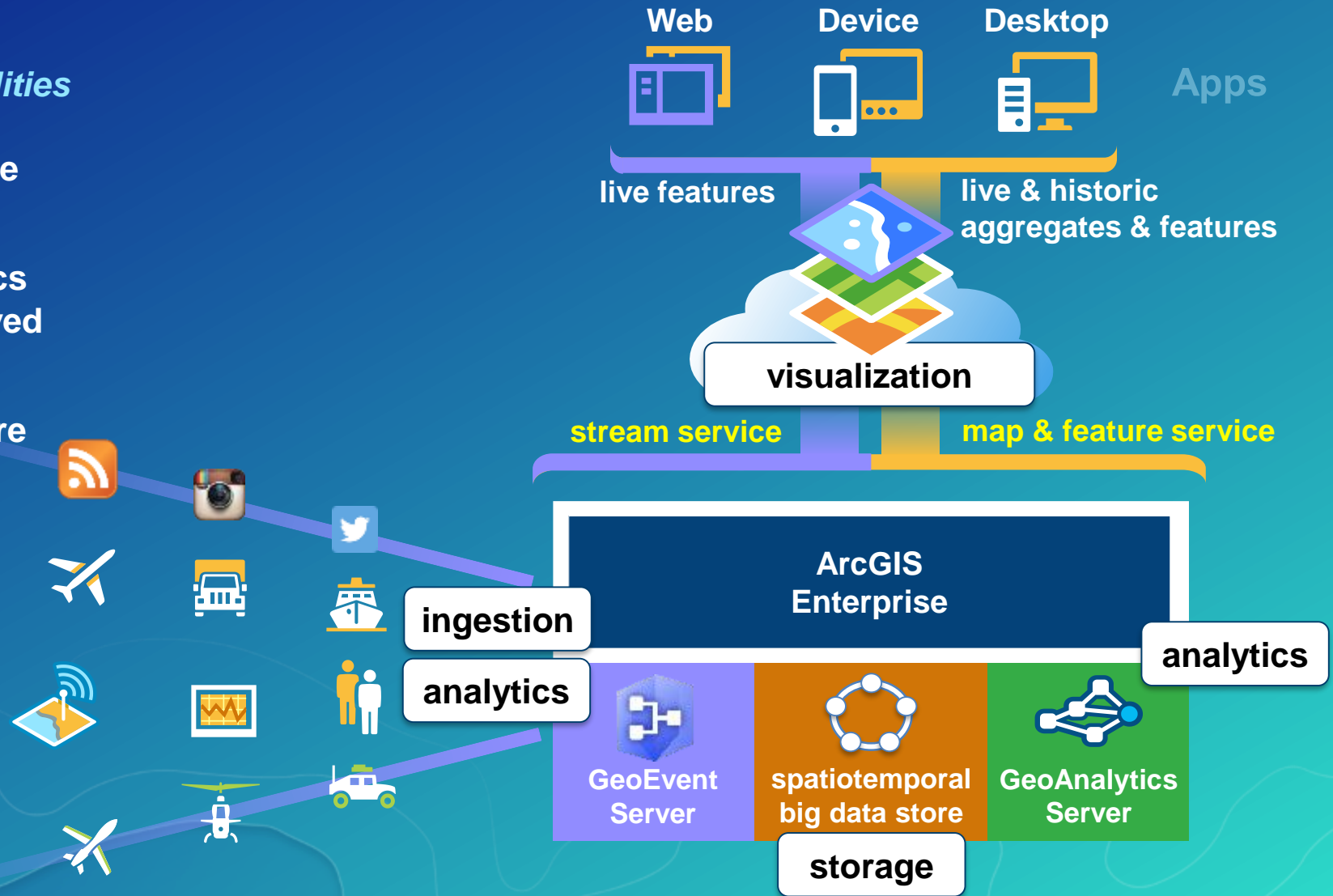
An overview



ArcGIS Enterprise

with real-time & big data capabilities

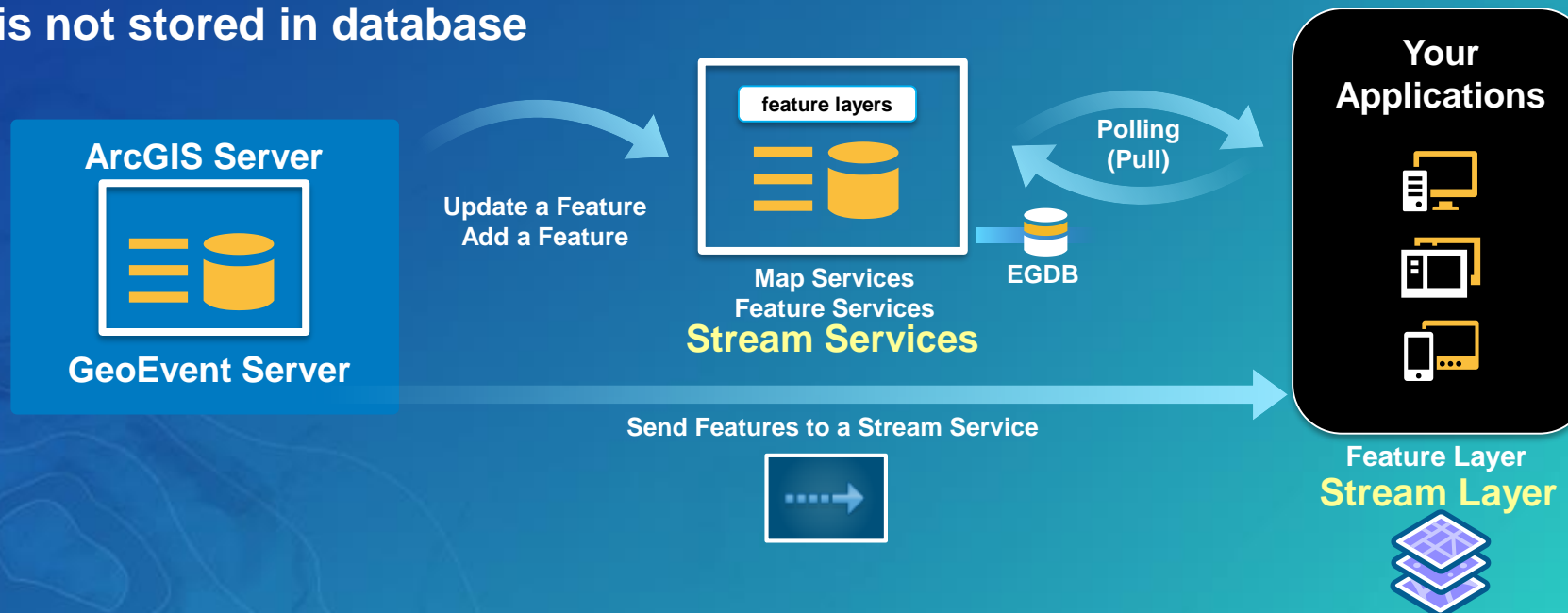
- Ingest high velocity real-time data into ArcGIS
- Perform continuous analytics on events as they are received
- Store observations in a spatiotemporal big data store
- Run batch analytics on stored observations
- Visualize high velocity & volume data:
 - as an aggregation
 - as discrete features
- Notify those who need to know about patterns of interest



Stream services vs traditional feature services

Two patterns, two important differences

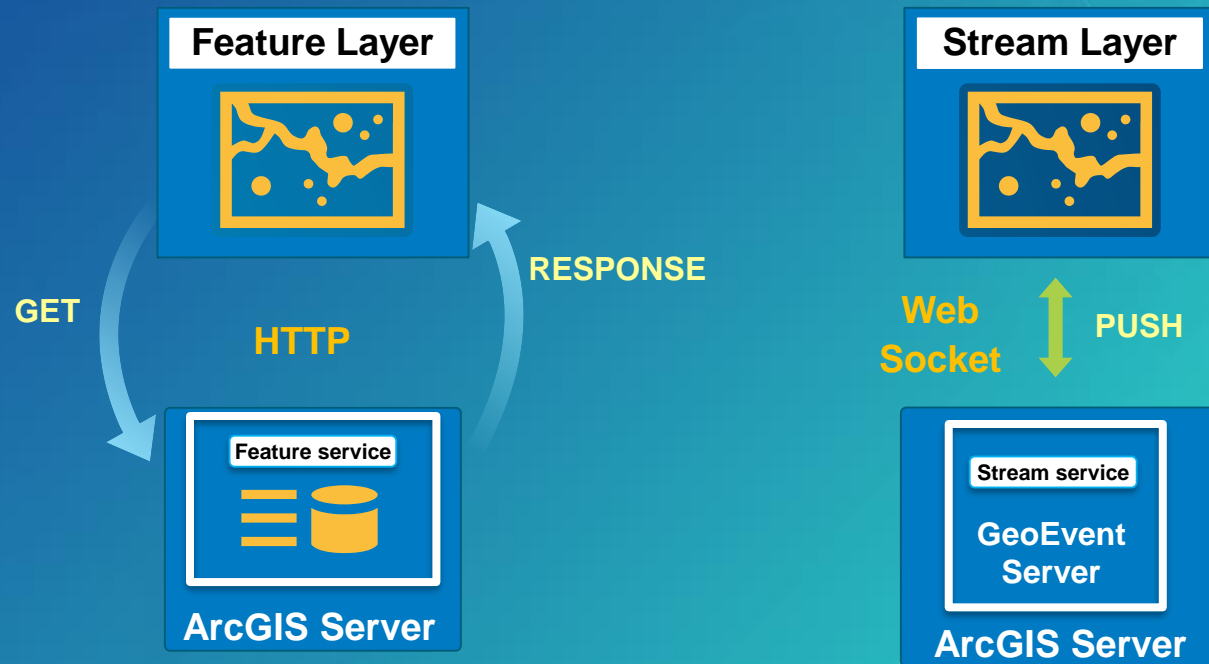
- Feature layers **pull** from feature services
 - Layers poll to get periodic updates
 - Must be backed by an enterprise geodatabase (EGDB) or Spatiotemporal Big Data Store
- Stream layers **subscribe** to stream services
 - Service **pushes** data to layer as soon as it is received
 - Data is not stored in database



Stream Layer

Advantages when using real-time data

- More **responsive** and more **efficient** than feature layers
- Stream layers display **immediately** and refresh **automatically**
- Data is only sent to the client **once**



Stream Layer

Requirements

- **ArcGIS GeoEvent Server**
 - Stream services are published as part of the configuration of an outbound connector
- **Web Browsers** that support Web Sockets
 - <http://caniuse.com/websockets>
- **Network** support for the **Web Socket** protocol
 - ws:// wss://
- **No custom plug-in required: Standard JavaScript implementation**



10 +



6 +



14 +



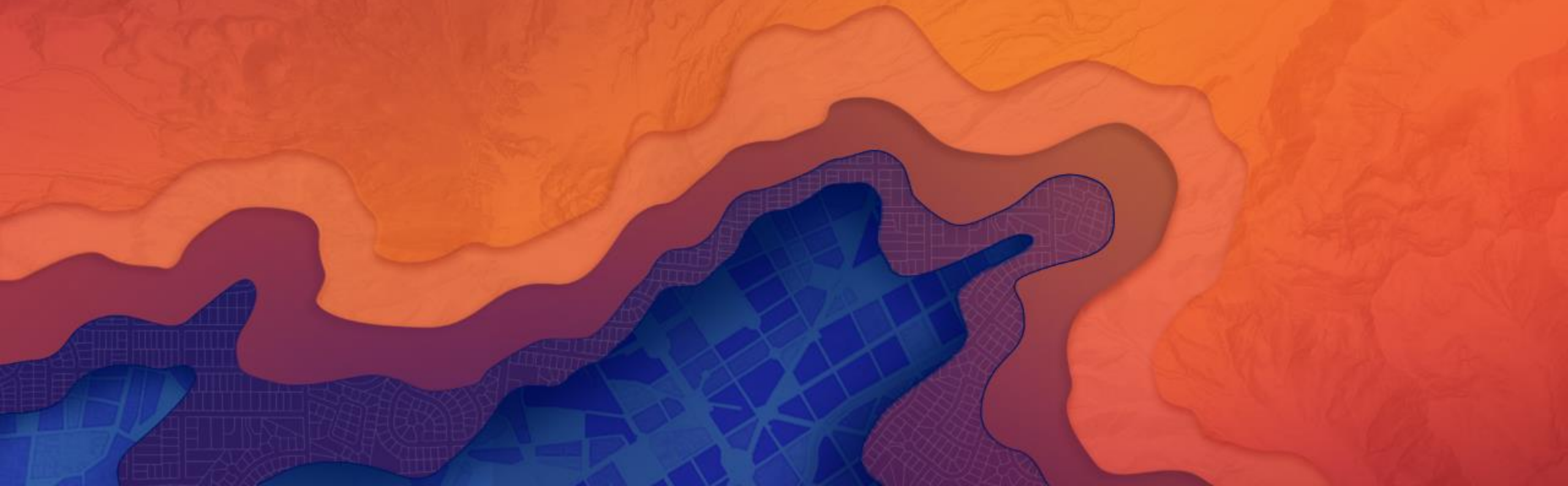
6 +

Stream Services

What can I use to consume stream services?

- ArcGIS Online and Portal for ArcGIS **Web Maps**
- ArcGIS Online and Portal for ArcGIS web application **templates**
- Web applications built using **Web App Builder**
- **Your own web apps** that use the ArcGIS API for JavaScript

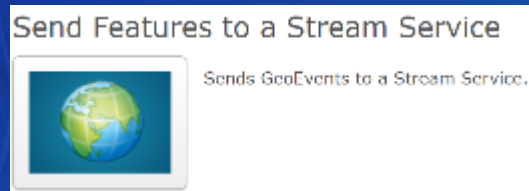
Publishing Stream Services



Publishing Stream Services

Use GeoEvent Manager

Create Output Connector

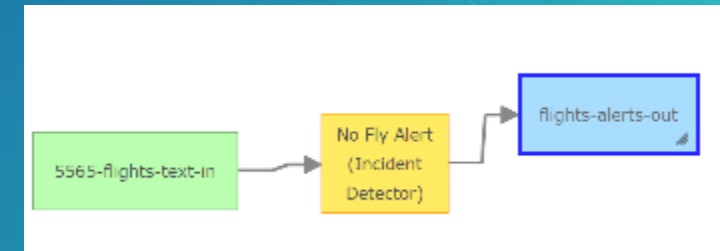


Publish Service

Publish Stream Service

| | |
|----------------------|--|
| Name: | <input type="text" value="ASDTrackInformation"/> |
| GeoEvent Definition: | <input type="text" value="ASDTrackInformation"/> |
| Geometry Type: | <input type="text" value="Point"/> |
| Display Field Names: | <input type="text" value="Attribute: integer"/> |
| Server: | <input type="text" value="Default"/> |
| Folder: | <input type="text" value="Root"/> |
| Override: | <input type="checkbox"/> |
| Store Latest: | <input type="checkbox"/> |
| Related Features: | <input type="checkbox"/> |

Wire Together With Input



Publishing Stream Services

ArcGIS REST Services Directory

ArcGIS REST Services Directory

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

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

Folder: /


Current Version: 10.4

View Footprints In: [ArcGIS Online map viewer](#)

Folders:

- [Utilities](#)

Services:

-  [ASDITrackInformation](#) (StreamServer)
- [Flights](#) (StreamServer)
- [Gages](#) (MapServer)
- [SampleWorldCities](#) (MapServer)

Supported Interfaces: [REST](#) [SOAP](#) [Sitemap](#) [Geo Sitemap](#)

ArcGIS REST Services Directory

[Home](#) > [services](#) > [Flights \(StreamServer\)](#)

[JSON](#)

Flights (StreamServer)

View In: [ArcGIS JavaScript](#)

View In: [ArcGIS Online Map Viewer](#)

Geometry Type: esriGeometryPoint

Geometry Field: Location

Spatial Reference: 4326 (4326)

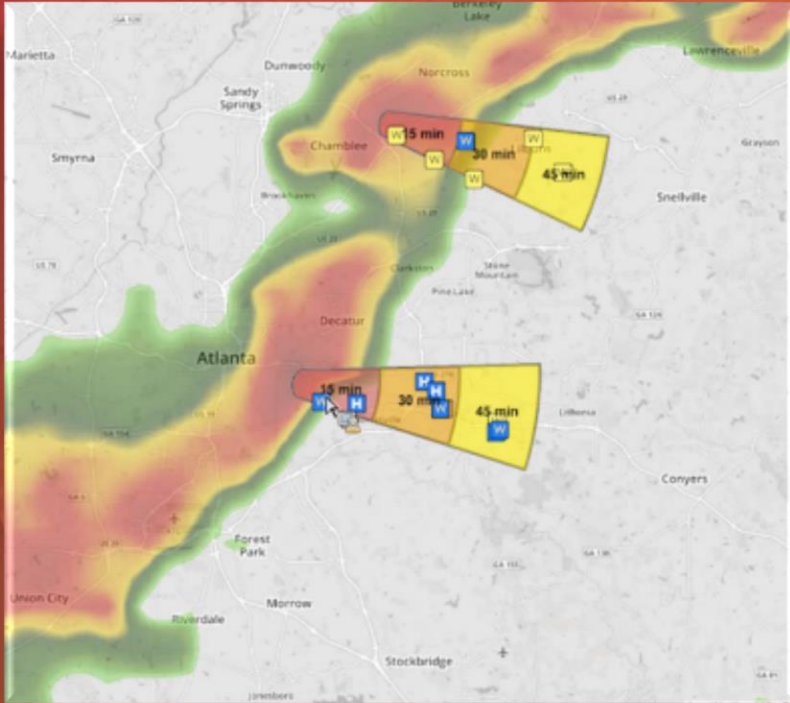
Fields:

- MsgTime (type: esriFieldTypeDate , alias: MsgTime , nullable: true)
- DepArpt (type: esriFieldTypeString , alias: DepArpt , nullable: true)
- FltId (type: esriFieldTypeString , alias: FltId , nullable: true)
- Heading (type: esriFieldTypeInteger , alias: Heading , nullable: true)
- AltitudeFeet (type: esriFieldTypeInteger , alias: AltitudeFeet , nullable: true)
- FID (type: esriFieldTypeInteger , alias: FID , nullable: true)

Web Socket URLs:

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

Capabilities: [Subscribe](#)

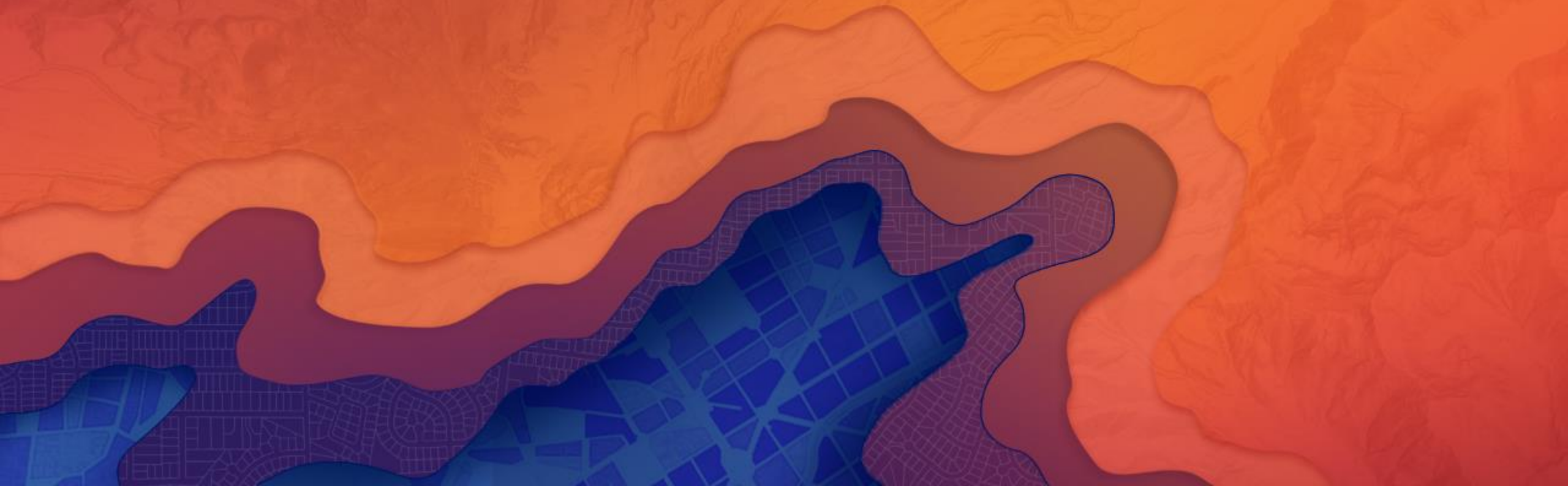


Publishing

Stream Service and the REST Endpoint

Web Maps and Apps

Real-time Data in a Web Map



Real-time Data in a Web Map

Adding a Stream Service

Add Stream Service

Item from the web ?

Reference an item on the Web.

Type: ☒ ArcGIS Server web service ☐ KML
☐ WMS (OGC) ☐ WFS (OGC)
☐ WMTS (OGC) ☐ Document

URL:

Title:


Tags:

Configure the Layer

Change Style


ASDITrackInformation

Showing Location Only


 Symbols

This layer streams updated feature observations.

☒ Draw previous observa

Symbol: 

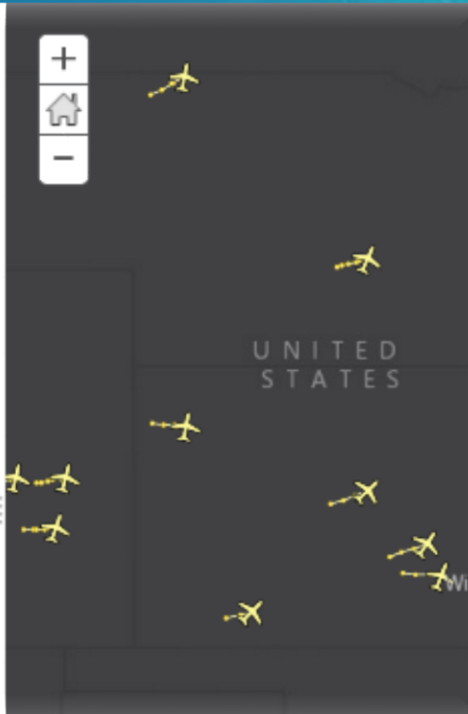
☒ Connect observations

Symbol: 

☒ Rotate symbols (degrees)

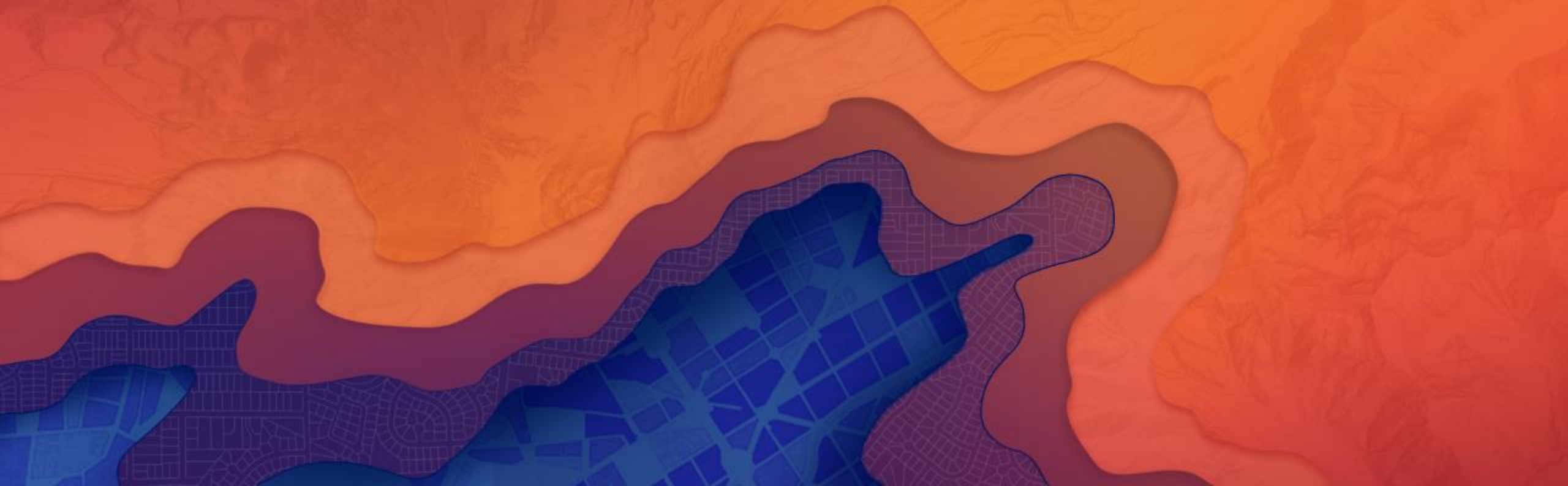
☒ Clockwise from 12
☐ Counterclockwise from 3

Transparency



Web Maps and Apps

Real-time Data in Web AppBuilder



Custom Applications

Using the JavaScript API

Real-time data in Your Own Web App

Very little code!! 3.x API

- Dojo “require”
- Construct and add to map

```
require([  
    "esri/map",  
    "esri/layers/StreamLayer",  
    "dojo/domReady!"  
])
```

```
var url = "http://ec2-75-101-155-202.compute-1.amazonaws.com:6080/arcgis/rest/services/AsdiTracks/StreamServer";  
var streamLayer = new StreamLayer ( url );  
var map = new Map( "mapDiv", {  
    basemap: "topo"  
});  
map.addLayer ( streamLayer );
```

Real-time data in Your Own Web App

Very little code!! 4.x API

- Dojo “require”
- Construct and add to map

```
require([  
    "esri/Map",  
    "esri/views/MapView",  
    "esri/layers/StreamLayer",  
    "dojo/domReady!"  
])
```

```
var url = "http://ec2-75-101-155-202.compute-1.amazonaws.com:6080/arcgis/rest/services/AsdiTracks/StreamServer";  
var streamLayer = new StreamLayer ( { url: url } );  
var map = new Map( {  
    basemap: "topo",  
    layers: [ streamLayer ]  
} );  
var view = new MapView( { container: "mapDiv", map: map } );
```

Stream Layer

Get rid of unneeded features

- **purgeOptions**
 - **displayCount**: Maximum number of features to display
 - **age**: Maximum age of features (in minutes). Defaults to no maximum.
- **maximumTrackPoints**: Maximum features per trackId to display. Defaults to 1
- **purgeInterval**: The purge method is automatically called at this interval (in minutes). Defaults to 0 so purging performed when new message is received.

```
var streamLayer = new StreamLayer(url, {  
  purgeOptions: {  
    displayCount: 1000,  
    age: 20  
  }  
});
```

Note: GeoEvent definition “TIME_END” field is honored

Stream Layer

Setting Filters on Data

- **definitionExpression:** The where clause used to filter data using attributes.
- **geometryDefinition:** The Extent used as a spatial filter. Only Extent is allowed.

```
var streamLayer = new StreamLayer(url, {  
    definitionExpression: "AltitudeFeet > 18000",  
    geometryDefinition: new Extent ( {  
        xmin: -120,  
        ymin: 38,  
        xmax: -115,  
        ymax: 42,  
        spatialReference: {  
            wkid: 4326  
        }  
    })  
});
```

Sample Applications

Available on my GitHub repository

Real-time: Leveraging Stream Services

Helpful links

- **StreamLayer API help:**

- 4.x: <https://developers.arcgis.com/javascript/latest/api-reference/esri-layers-StreamLayer.html>
- 3.x: <https://developers.arcgis.com/javascript/3/jsapi/streamlayer-amd.html>

- **Sample Applications on Github:**

- <https://github.com/jcardonadcdev/esri-uc-2017>

- **Sample Stream Services with Simulated Data:**

- <https://geoeventsample3.esri.com:6443/arcgis/rest/>
- <http://ec2-75-101-155-202.compute-1.amazonaws.com:6080/arcgis/rest/>

Real-time: Leveraging Stream Services

Helpful links

- **GeoEvent Server Tutorials**

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

- **GeoEvent Server Discussions and Blogs (on GeoNet)**

- <https://geonet.esri.com/community/gis/enterprise-gis/geoevent/content>

Other Real-Time and Big Data Technical Workshops

Remaining sessions this conference

Thursday

| | | |
|---|-----------------|----------|
| GeoEvent Server: Best Practices | SDCC – Room 09 | 10:15 am |
| GeoEvent Server: Internet of Things (IoT) | SDCC – Room 14B | 10:15 am |
| GeoEvent Server: An Introduction | Hilton Sapphire | 1:30 pm |
| Leveraging the Spatiotemporal Big Data Store | SDCC – Room 15A | 1:30 pm |
| GeoEvent Server: Applying Real-Time Analytics | SDCC – Room 14A | 3:15 pm |

Esri Showcase

Exhibit Halls A - C

| | | |
|---------------|-------------------|-------------------|
| Real-Time GIS | Tonight until 6pm | Thurs 9:00 - 1:30 |
|---------------|-------------------|-------------------|

Friday

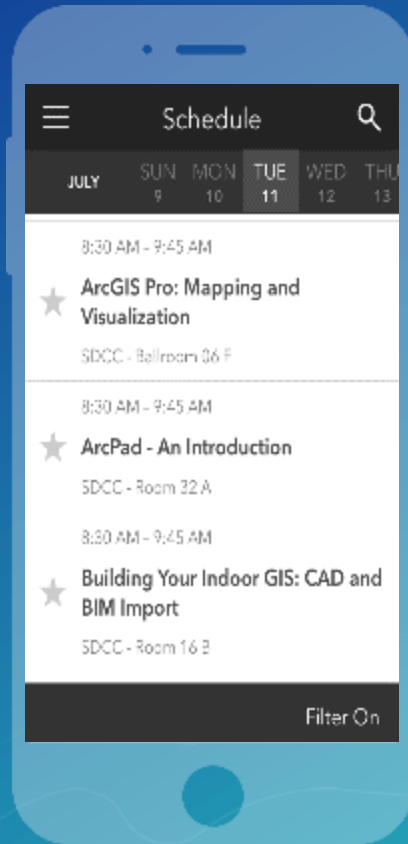
| | | |
|---|----------------|---------|
| Real-Time & Big Data GIS at Massive Scale | SDCC – Room 08 | 9:00 am |
|---|----------------|---------|

Please Take Our Survey on the Esri Events App!

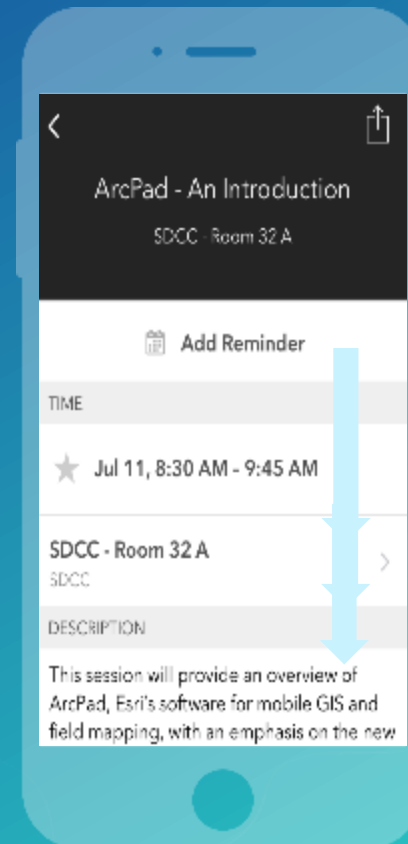
Download the Esri Events app and find your event



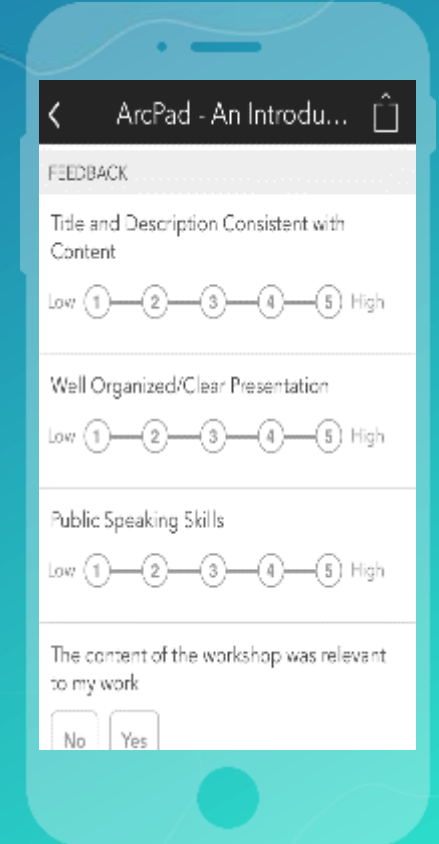
Select the session you attended



Scroll down to find the survey



Complete Answers and Select "Submit"



Questions



esri

THE
SCIENCE
OF
WHERE