ArcGIS GeoEvent Server:

Configuring Real-Time Web Apps

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2018 **Esri Federal GIS Conference** | Washington, DC

Agenda

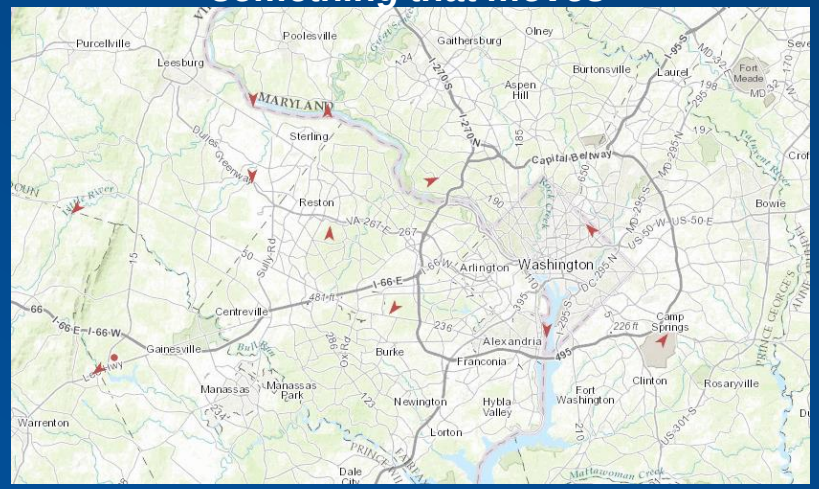
1. Overview of Stream Services & Stream Layers
2. Publishing Stream Services
3. Visualization of real-time data
4. Using Stream Layers with Web AppBuilder
5. Stream Layers in JavaScript
6. Additional Resources & Q&A

Real-Time GIS

types of observation data

moving

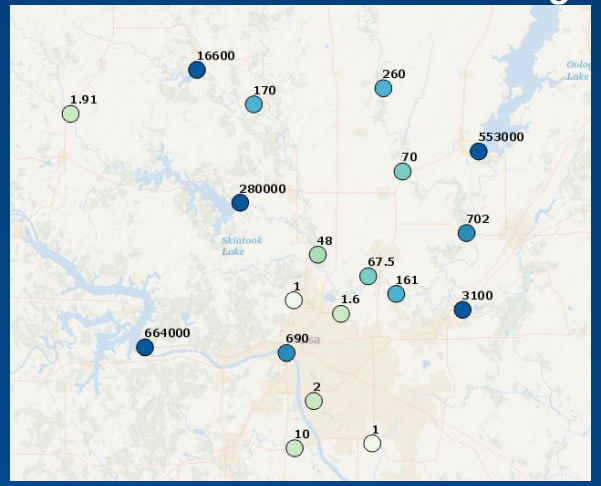
something that moves



- planes
- vehicles
- animals
- satellites
- storms

stationary

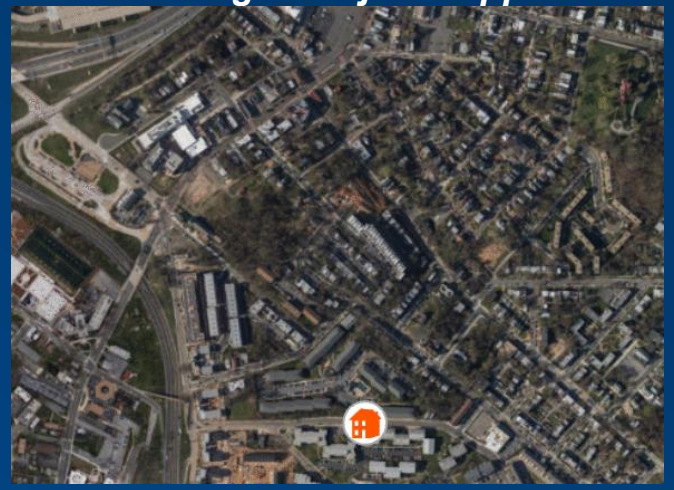
stands still but attributes change



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

discrete

something that "just happens"

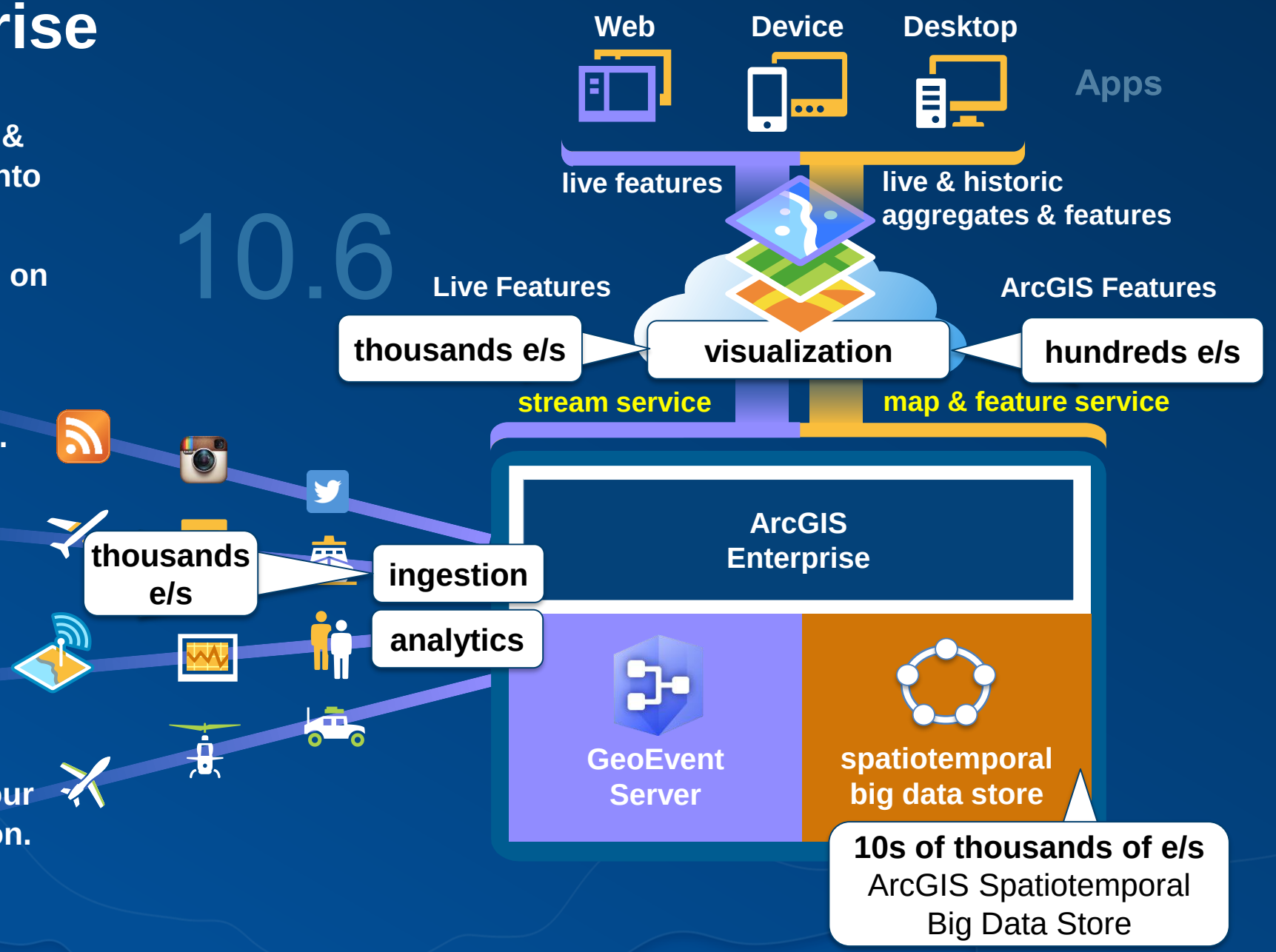


- crimes
- lightning
- accidents

ArcGIS Enterprise

with real-time capabilities

- Ingest high velocity real-time & Internet of Things (IoT) data into ArcGIS.
- Perform continuous analytics on events as they are received.
- Store observations in a spatiotemporal big data store.
- Visualize high velocity & volume data:
  - as an aggregation
  - or as discrete features.
- Notify about patterns of interest.
- Adjust behavior of things in our environment through actuation.

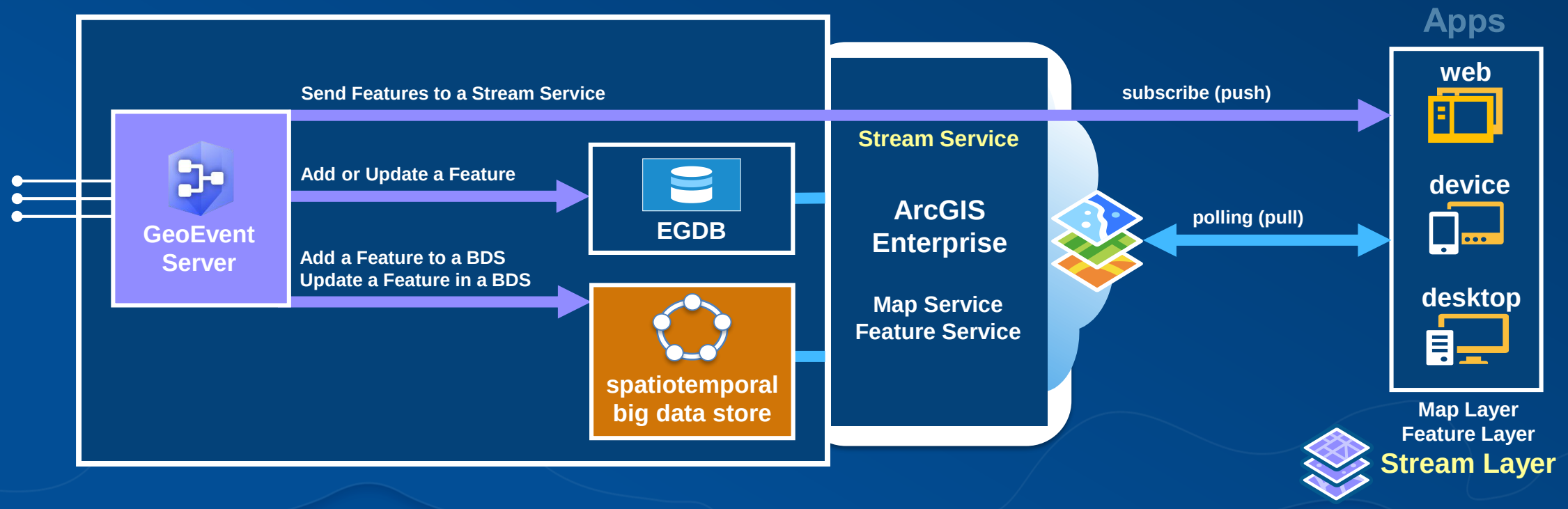


1 Overview of Stream Services & Stream Layers

Feature Layers vs Stream Layers

two patterns, two important differences

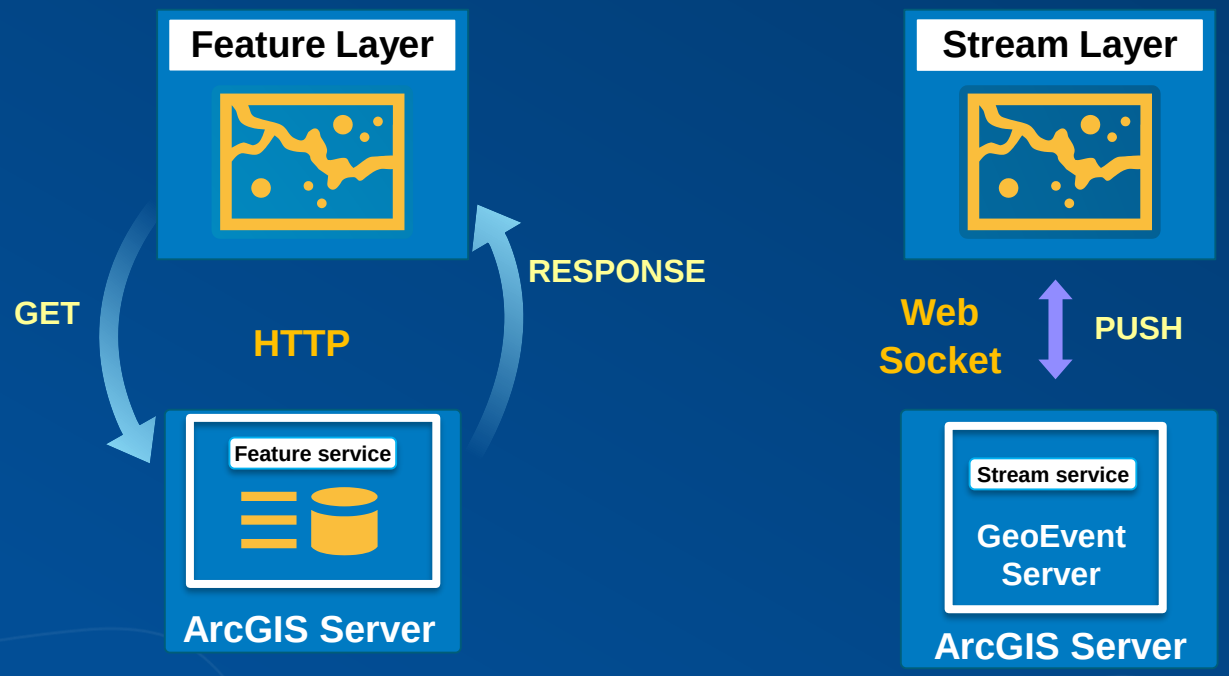
- Feature layers **pull** from feature services.
  - Layers poll to get periodic updates.
  - Must be backed by an enterprise geodatabase (EGDB) or the spatiotemporal big data store.
- Stream layers **subscribe** to stream services.
  - Stream Service **pushes** data to Stream Layer as soon as real-time data is received.
  - Data is not stored in database, cannot be replayed.



Stream Layers

advantages when working with 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 Layers

pre-requisites

- 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.

Stream Layers

where can I use stream layers?

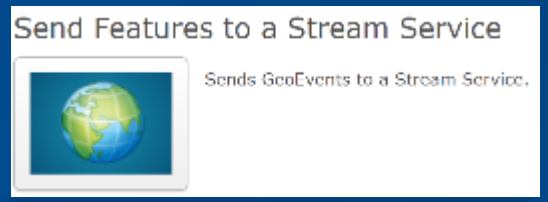
- ArcGIS Online & Portal for ArcGIS **Web Maps**.
- ArcGIS Online & Portal for ArcGIS **web application templates**.
- Web applications built using **Web AppBuilder**.
- **Your own web apps** that use the ArcGIS API for JavaScript.

2 Publishing Stream Services

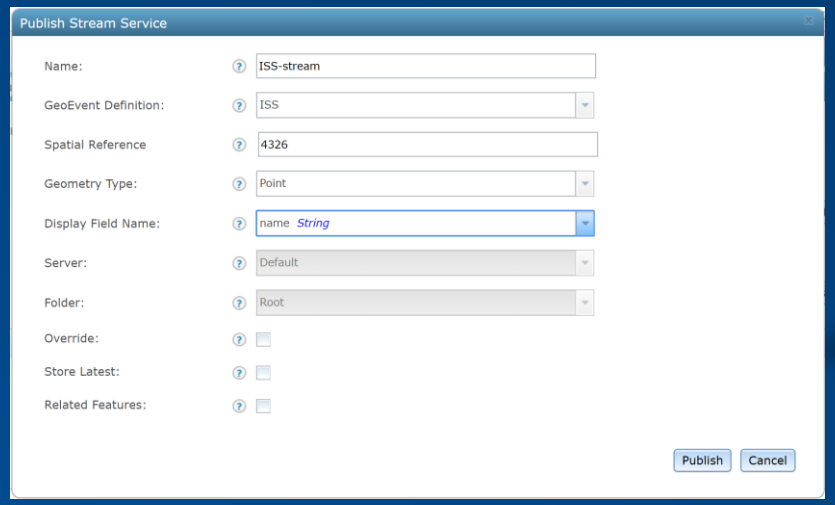
Publishing Stream Services

using GeoEvent Server

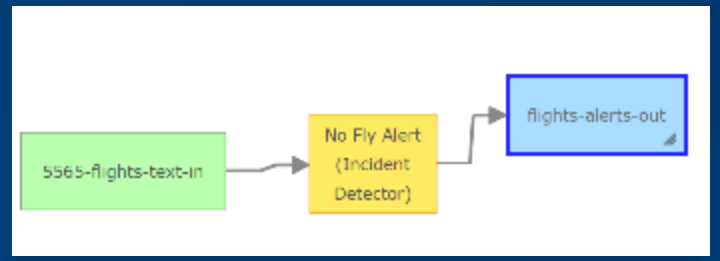
Create Output Connector



Publish Service



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:

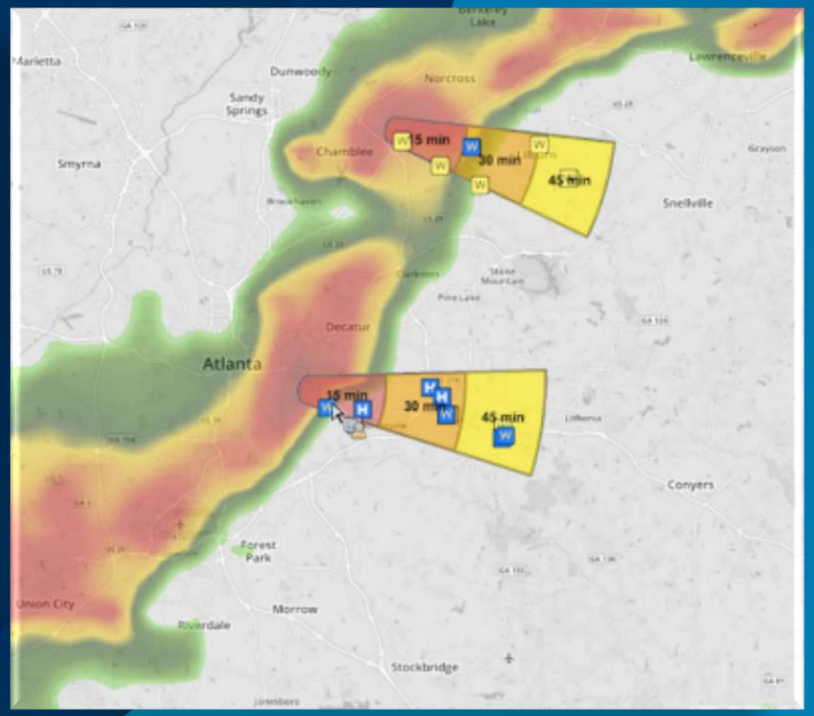
- MsgTime *(type: esriFieldTypeDate , alias: MsgTime , nullable: true)*
- DepArpt *(type: esriFieldTypeString , alias: DepArpt , nullable: true)*
- FltId *(type: esriFieldTypeString , alias: FltId , nullable: true)*
- Heading *(type: esriFieldTypeInteger , alias: Heading , nullable: true)*
- AltitudeFeet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

Demo



Publishing

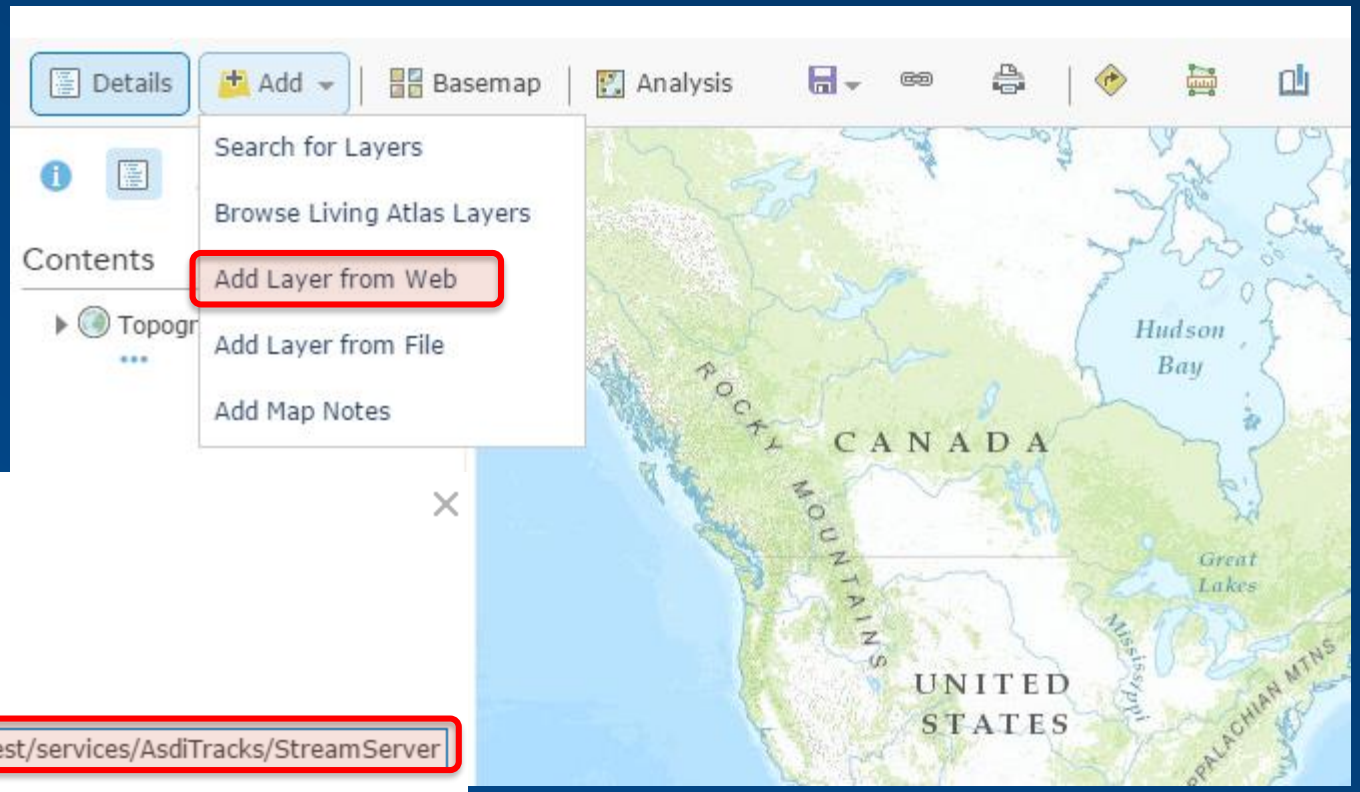
stream service & the REST endpoint

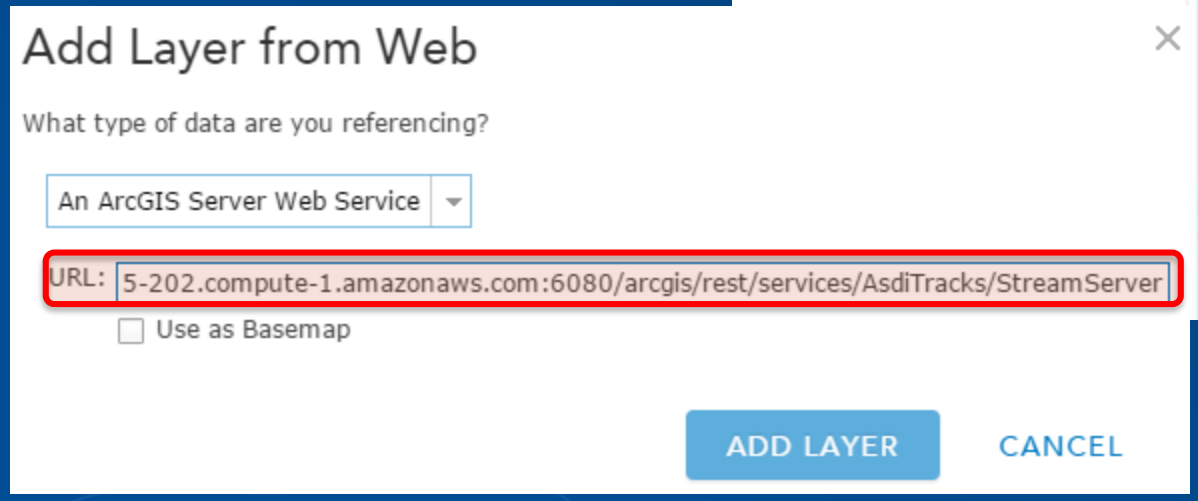
3 Visualization of real-time data

Real-time Data in a Web Map

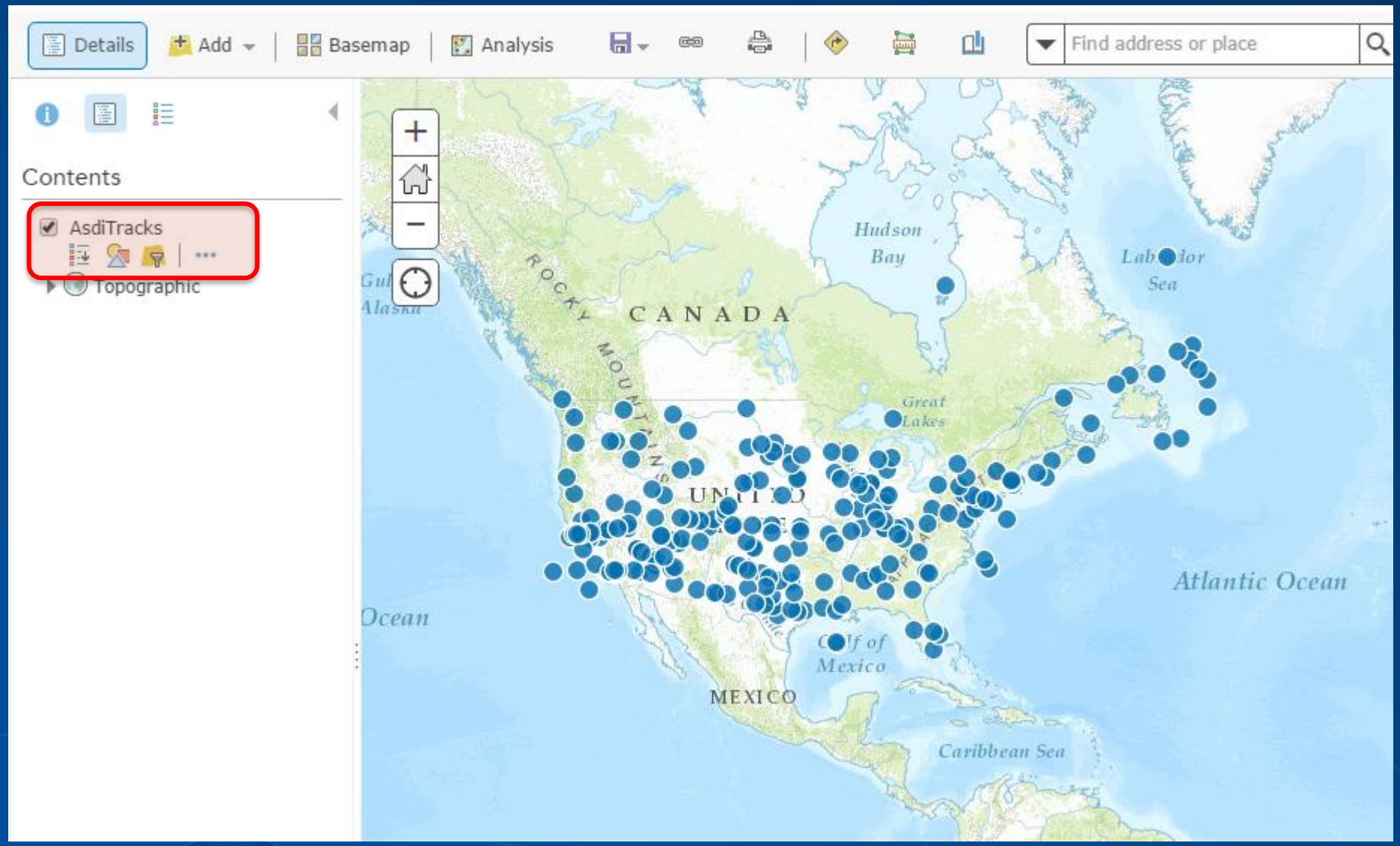
Adding a stream service

- **Add menu…**
- **Add layer from web…**
- **Add stream service URL**



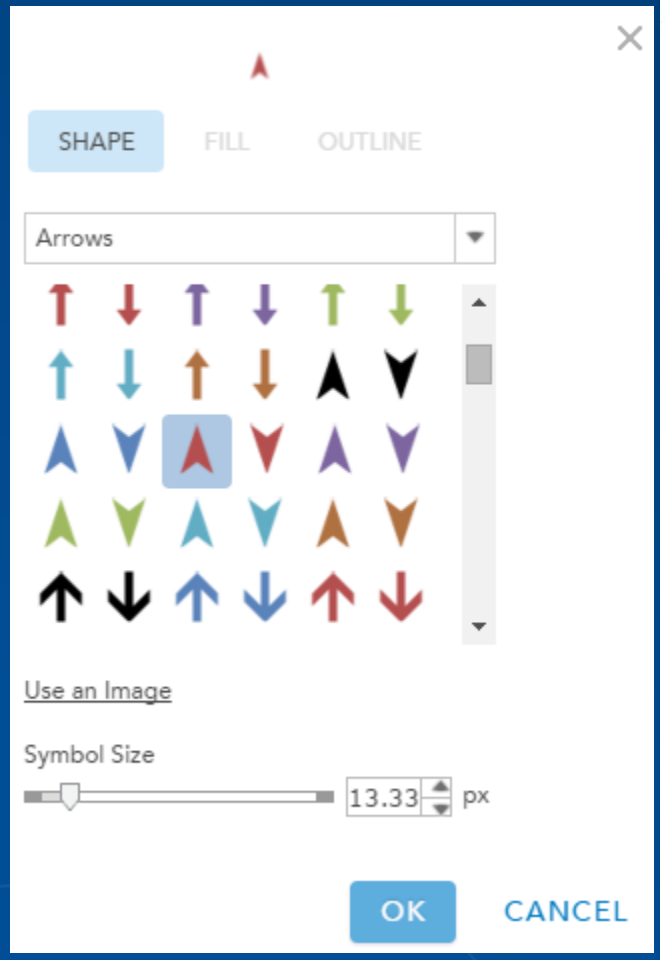


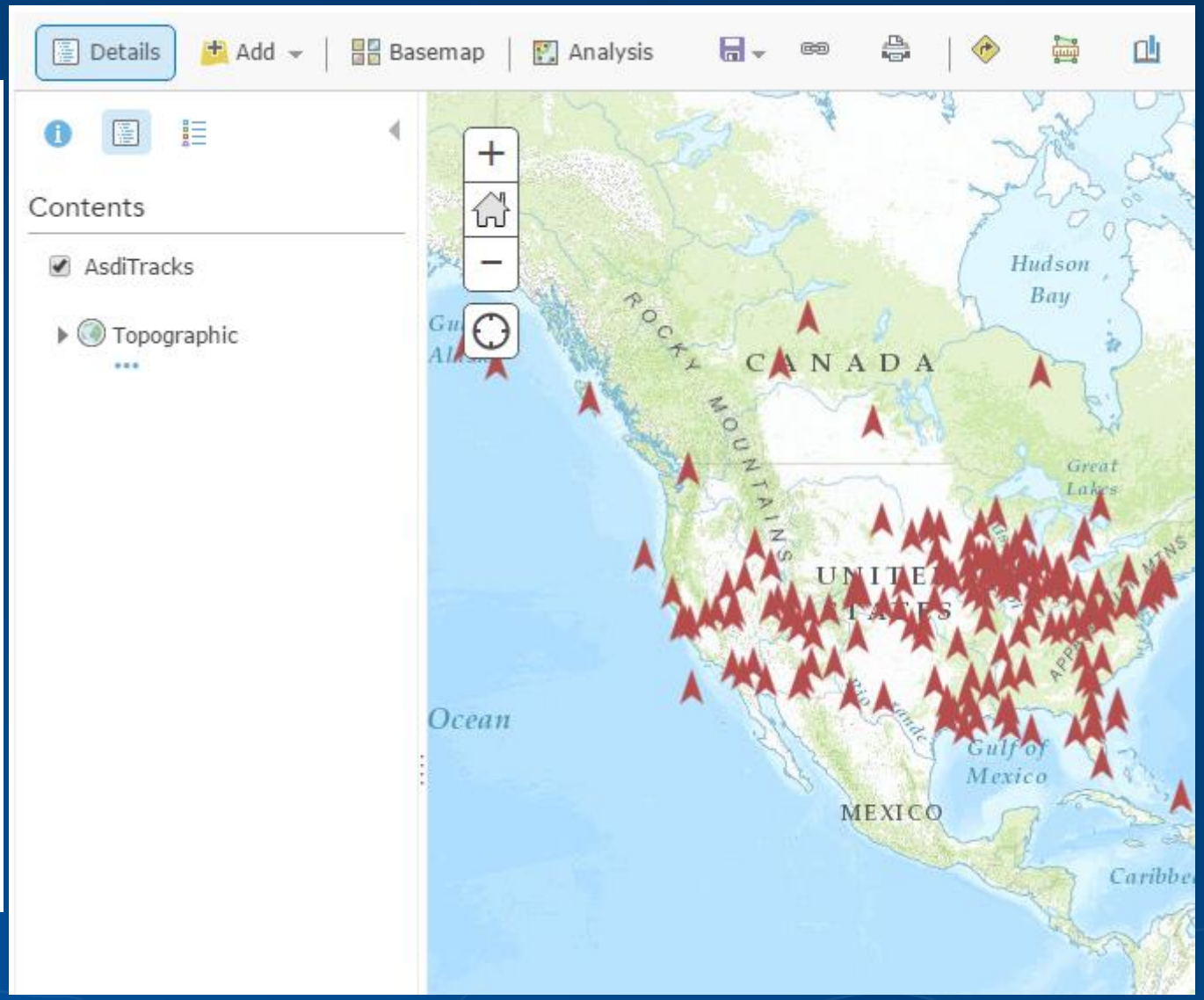
Real-time Data in a Web Map



Real-time Data in a Web Map

Change symbology

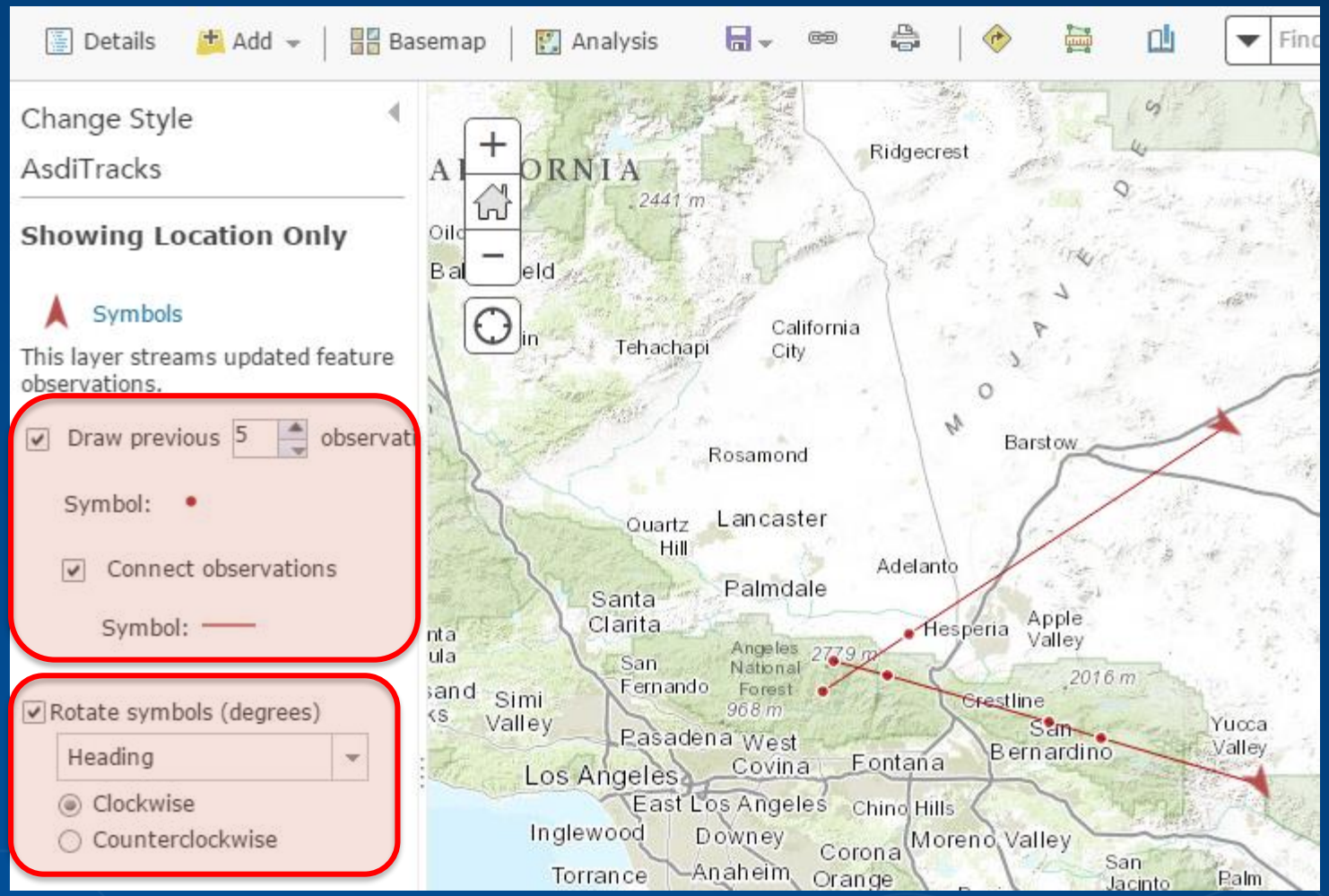




Real-time Data in a Web Map

Change symbology

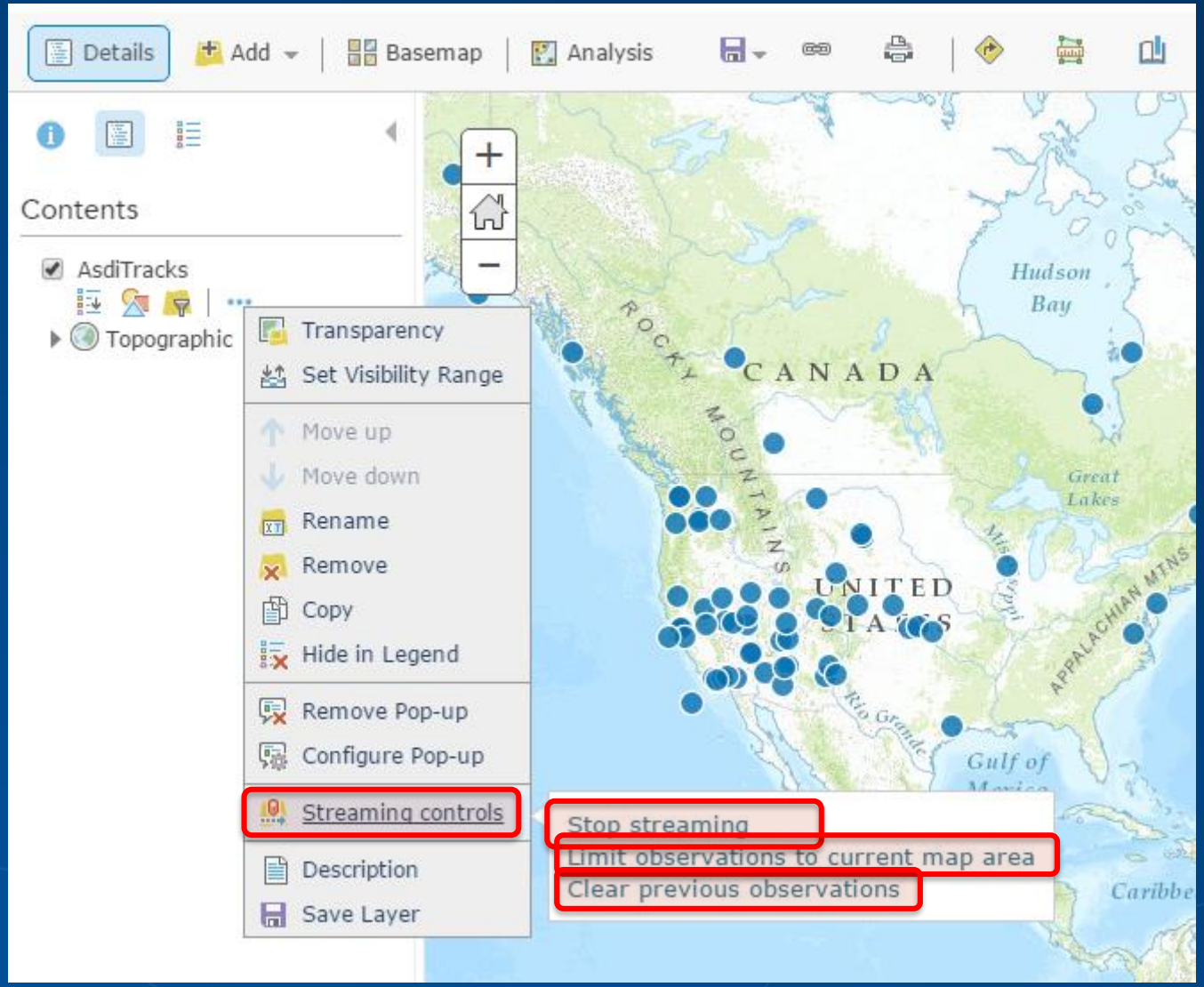
- **Heading**
- **Tracks**



Real-Time Data in a Web Map

Streaming controls

- **Stop/Start**
- **Spatial Filter**
- **Clear**



Demo

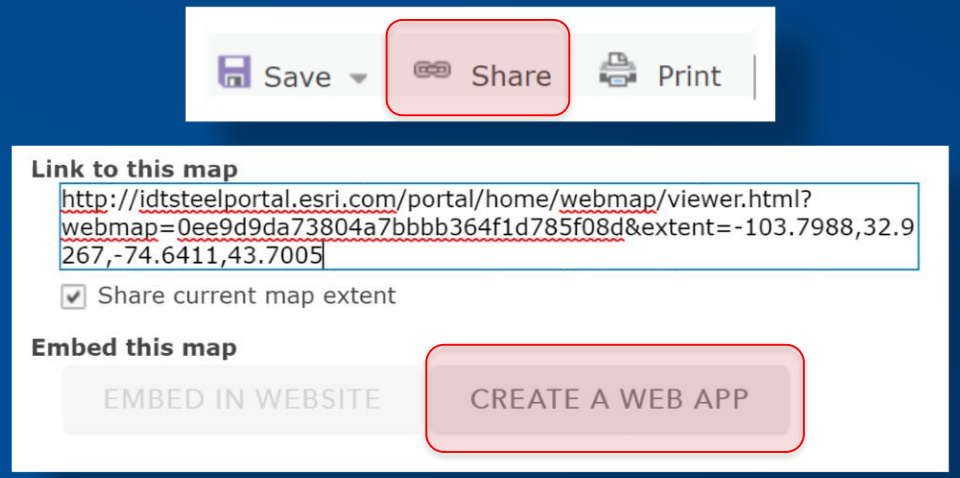
Visualization of Real-Time Data

4 Using Stream Layers with Web AppBuilder

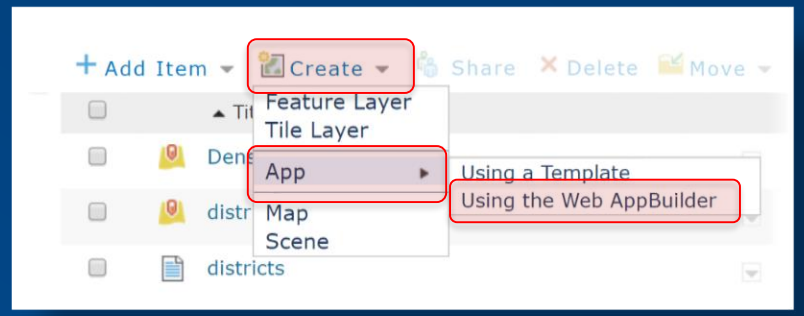
Visualization of real-time data

In a web app using web AppBuilder

From The Map Viewer

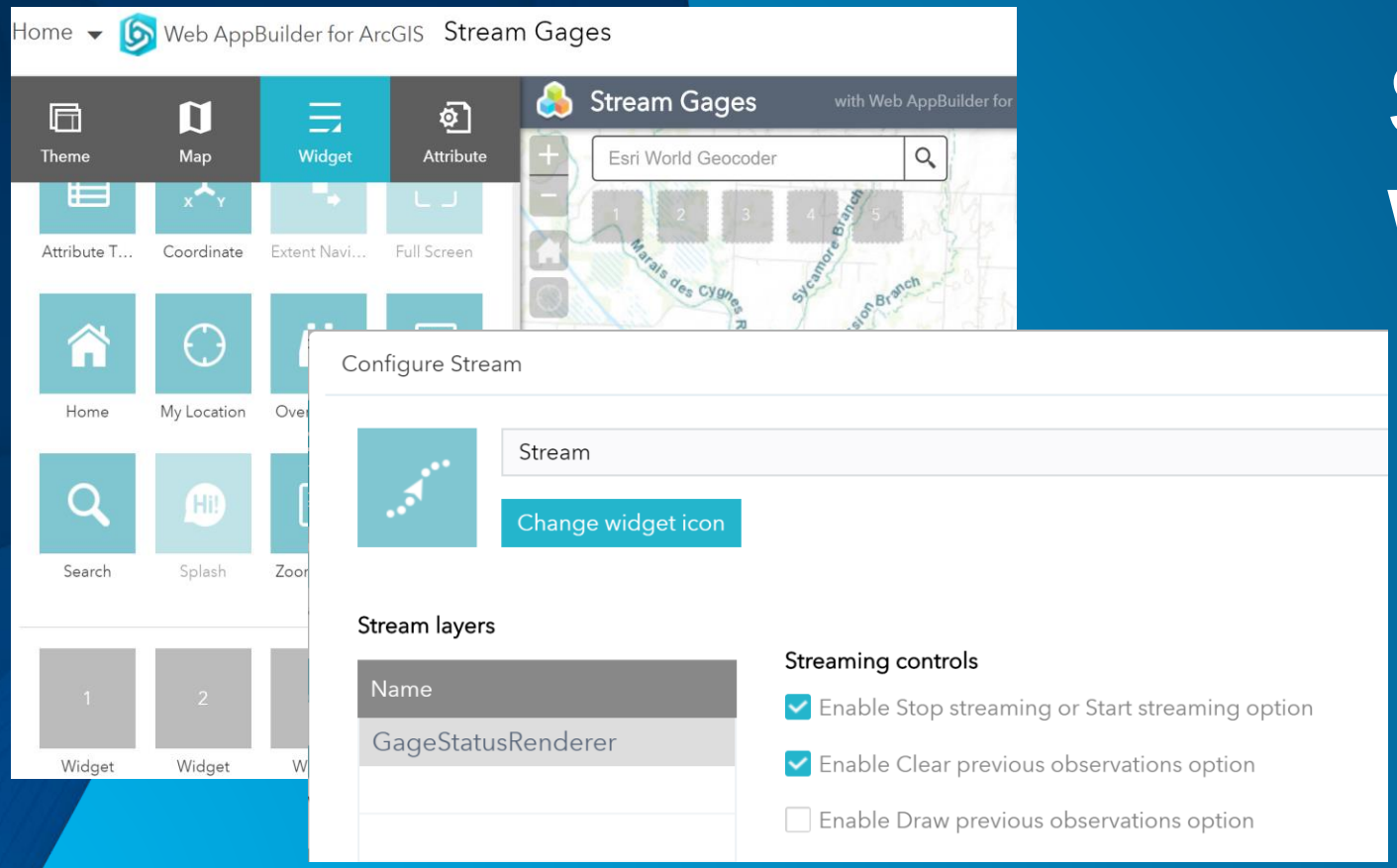


From My Contents



Demo

Stream Layers in Web AppBuilder



5 Stream Layers in JavaScript

Stream Layers in custom applications

very little code required using the ArcGIS API for JavaScript

- ArcGIS API for JavaScript 3.x
  - 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 );
```

Stream Layers in custom applications

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- ArcGIS API for JavaScript 4.x
  - 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 Layers in custom applications

remove unneeded capabilities

- **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
  },
  maximumTrackPoints: 5,
  purgeInterval: 1
});
```

Note: GeoEvent definition “TIME_END” field is honored

Stream Layers in custom applications

applying filters to real-time 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”
});


    ymin: 38,
    xmax: -115,
    ymax: 42,
    spatialReference: {
      wkid: 4326
    }
  })
});
```

Demo

Stream Layers in JavaScript

6 Additional Resources & Q&A

Sample Applications & Tutorials

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/
- **Tutorials:**
  - http://links.esri.com/geoevent-tutorials
  - http://links.esri.com/geoevent-streamservices
- **Discussions & Blogs (on GeoNet)**
  - https://geonet.esri.com/community/gis/enterprise-gis/geoevent/content

Real-Time & Big Data **Sessions**!

• **Real-Time GIS:** Best Practices	Tue, 1:45 - 2:45 pm, 152 B Wed, 2:45 - 3:45 pm, 152 B
• **ArcGIS GeoEvent Server:** Configuring Real-Time Web Apps	Tue, 3:20 - 4:20 pm, 152 B Wed, 5:15 - 6:15 pm, 152 B
• **ArcGIS GeoEvent Server:** An Introduction	Wed, 8:15 - 9:15 am, 152 B
• **Real-Time & Big Data GIS:** The Road Ahead	Wed, 1:30 - 2:30 pm, 152 B
• **ArcGIS GeoEvent Server:** Applying Real-Time Analytics	Wed, 4:00 – 5:00 pm, 152 B
• **Real-Time and Big Data:** Leveraging the Spatiotemporal Big Data Store	Tue, 4:30pm - 5:30 pm, 152 B Wed, 11:00 am -12:00 pm, 152 B

Print Your Certificate of Attendance

Print stations located in the 140 Concourse

Tuesday

12:30 pm – 6:30 pm
GIS Solutions Expo
Hall B

5:30 pm – 6:45 pm
GIS Solutions Expo Social
Hall B

Wednesday

10:30 am – 5:15 pm
GIS Solutions Expo
Hall B

6:30 pm – 9:00 pm
Networking Reception
Smithsonian National Portrait Gallery

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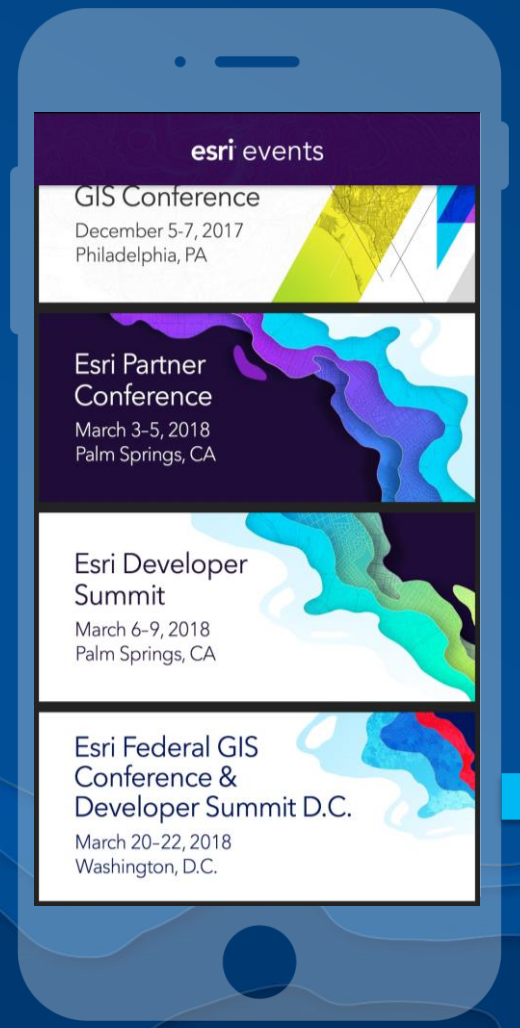
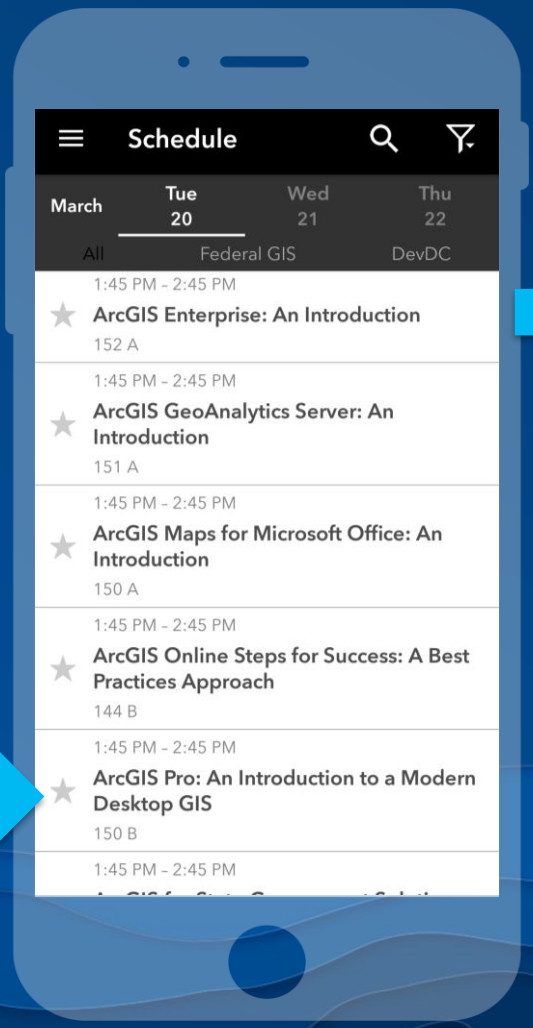
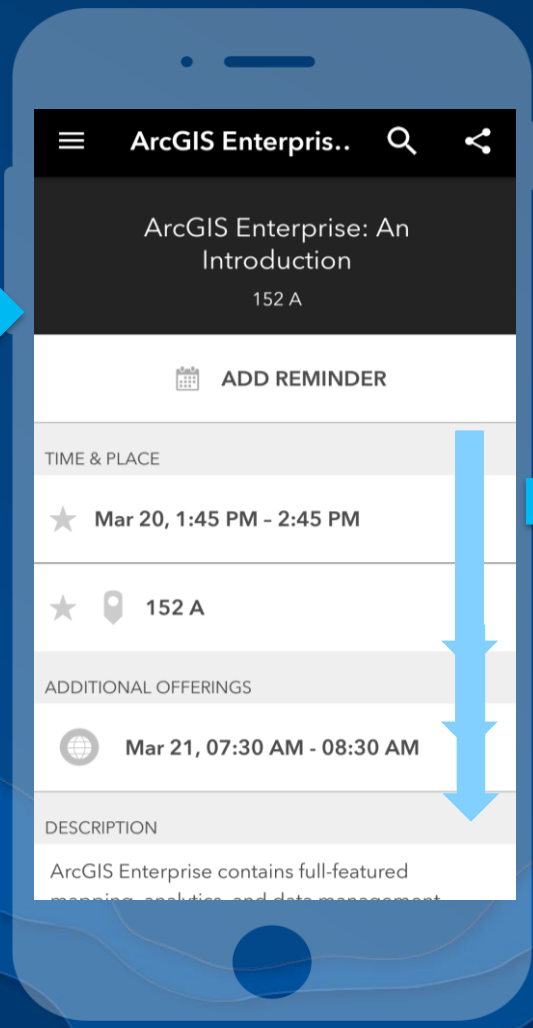


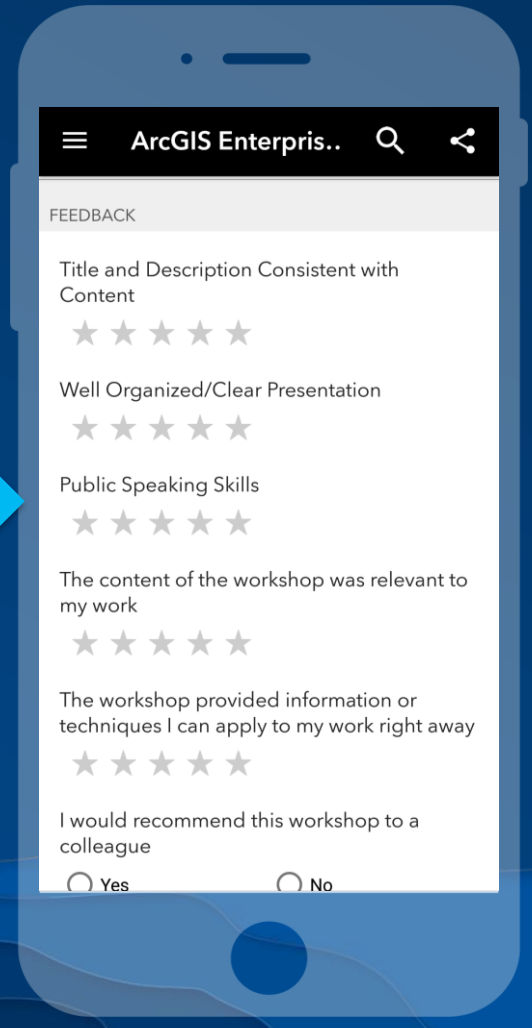
Select the session you attended



Scroll down to find the feedback section



Complete answers and select "Submit"



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