ArcGIS GeoEvent Server:

Leveraging Stream Services

Ken Gorton
Product Engineer, Esri
kgorton@esri.com

Morakot Pilouk, Ph.D.
Senior Software Developer / Consultant, Esri
mpilouk@esri.com

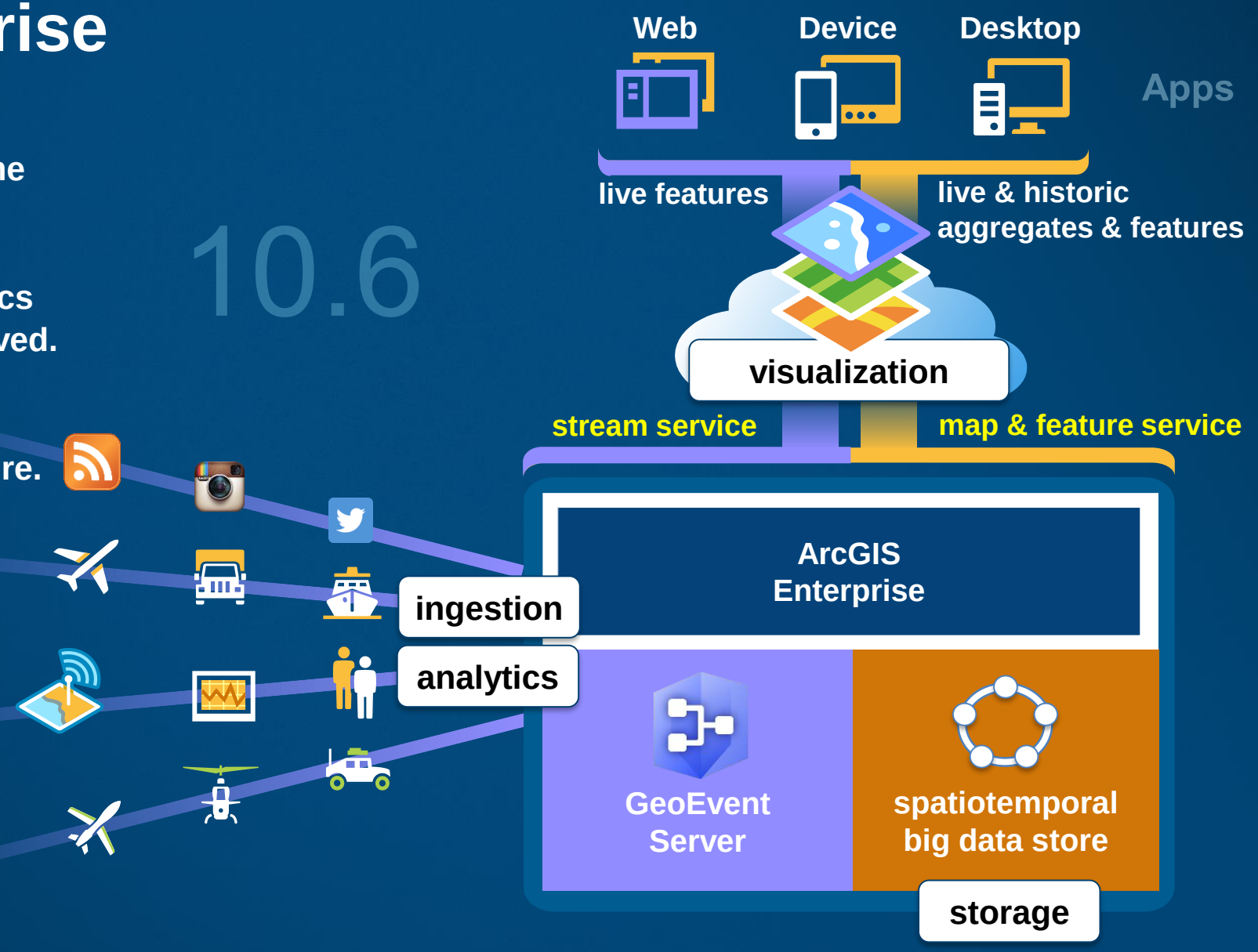
Agenda

1. Overview of Stream Services & Stream Layers
2. Publishing Stream Services
3. Visualization of Real-Time Data
4. Using Stream Layers in Custom Applications
5. Sample Applications and Tutorials

ArcGIS Enterprise

with real-time 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.
- Visualize high velocity & volume data:
  - as an aggregation
  - or as discrete features.
- Notify about patterns of interest.

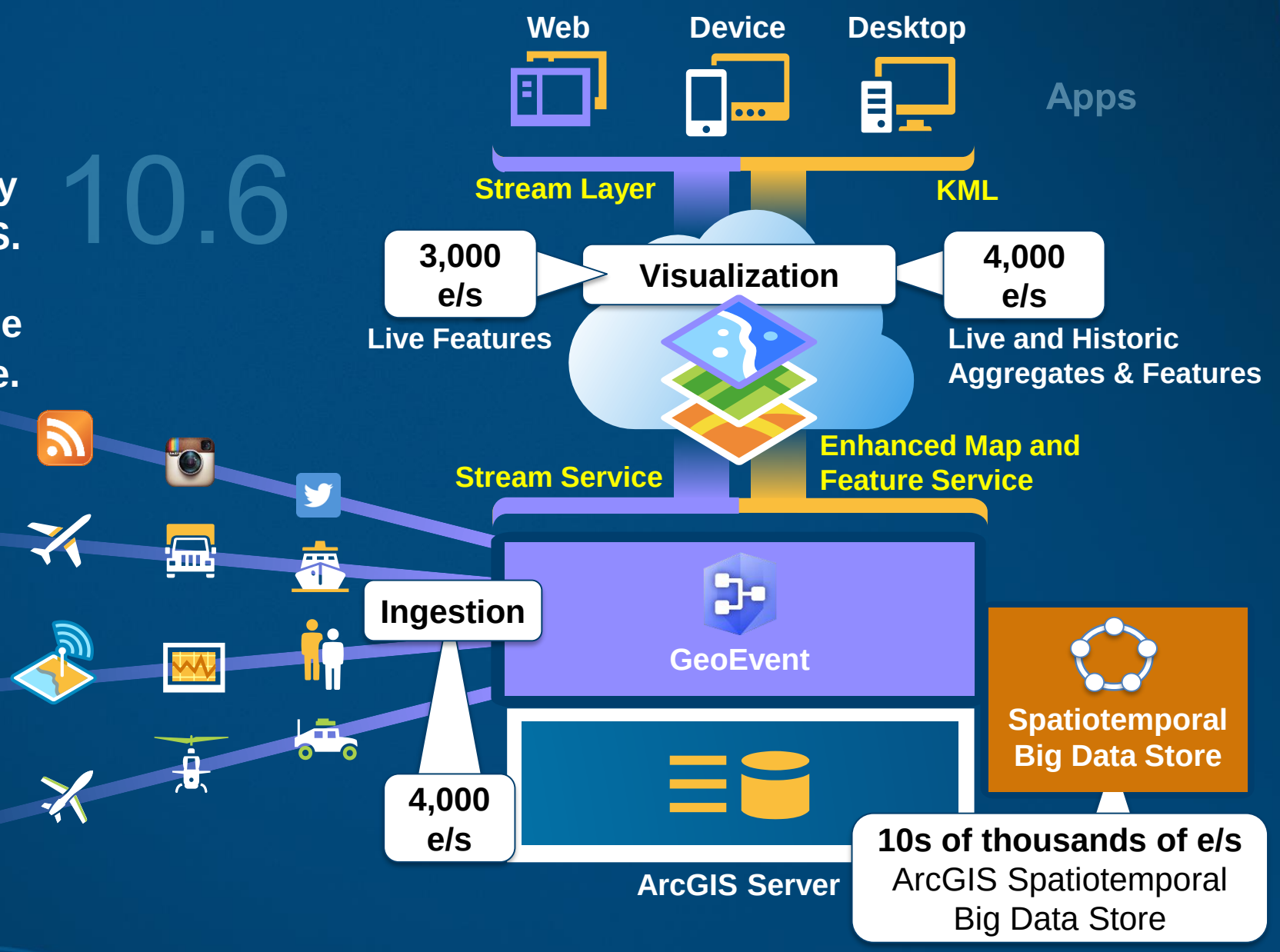


Real-Time GIS

ArcGIS 10.6

10.6

- Can ingest higher velocity real-time data into ArcGIS.
- Observations CAN now be stored in a Big Data Store.
- Can visualize high velocity and volume data
  - as an AGGREGATION,
  - as discrete FEATURES,
  - live & HISTORICALLY.
- Visualization CAN scale.

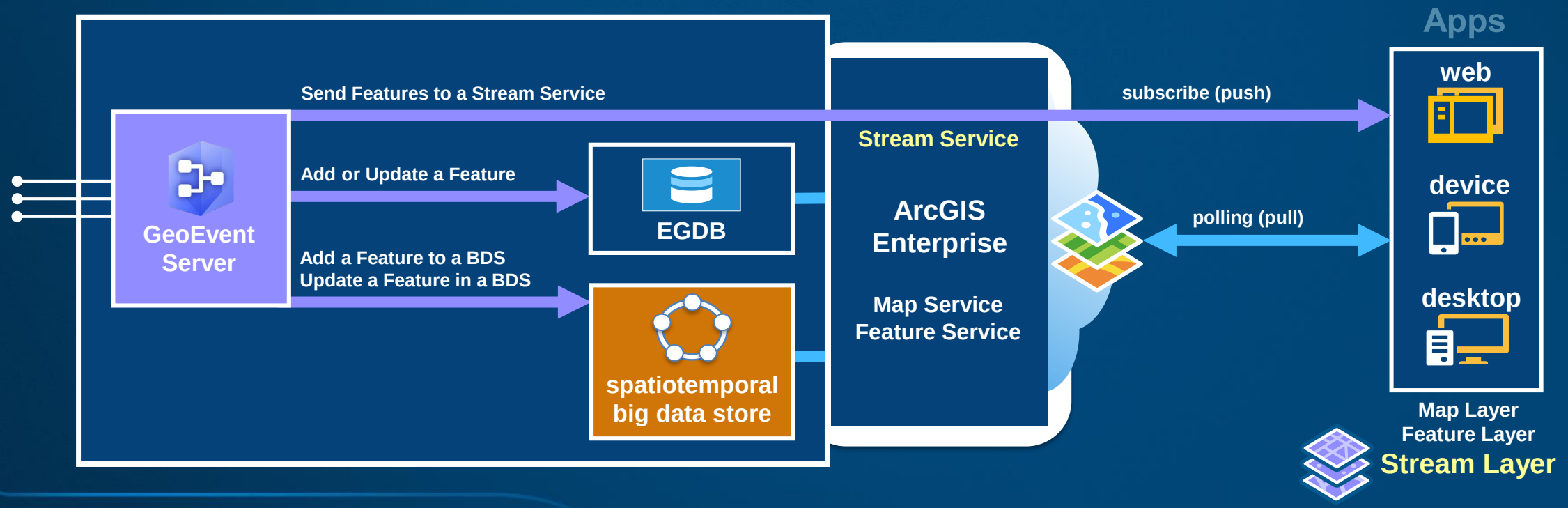


1 Overview of Stream Services & Stream Layers

Feature Layers vs Stream Layers

two patterns, two important differences

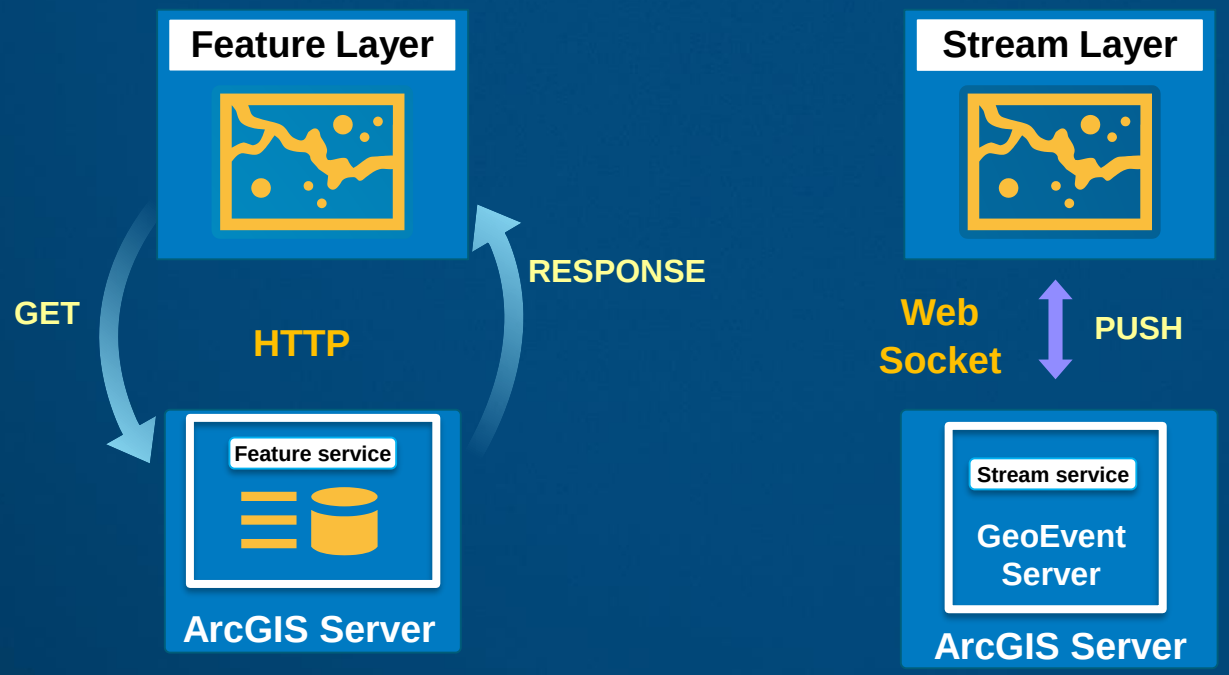
- Feature layers **pull** from feature services.
  - Layers poll to get periodic updates.
  - Must be backed by an enterprise geodatabase (EGDB) or the spatiotemporal big data store.
- Stream layers **subscribe** to stream services.
  - Stream Service **pushes** data to Stream Layer as soon as real-time 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.

Demo

2

Publishing Stream Services & Using the REST Endpoint

Demo

3 Visualization of Real-Time Data

4 Using Stream Layers in Custom Applications

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

very little code required using the ArcGIS API for JavaScript

- 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
    }
  })
});
```

5 Sample Applications & Tutorials

Sample Applications & Tutorials

helpful links

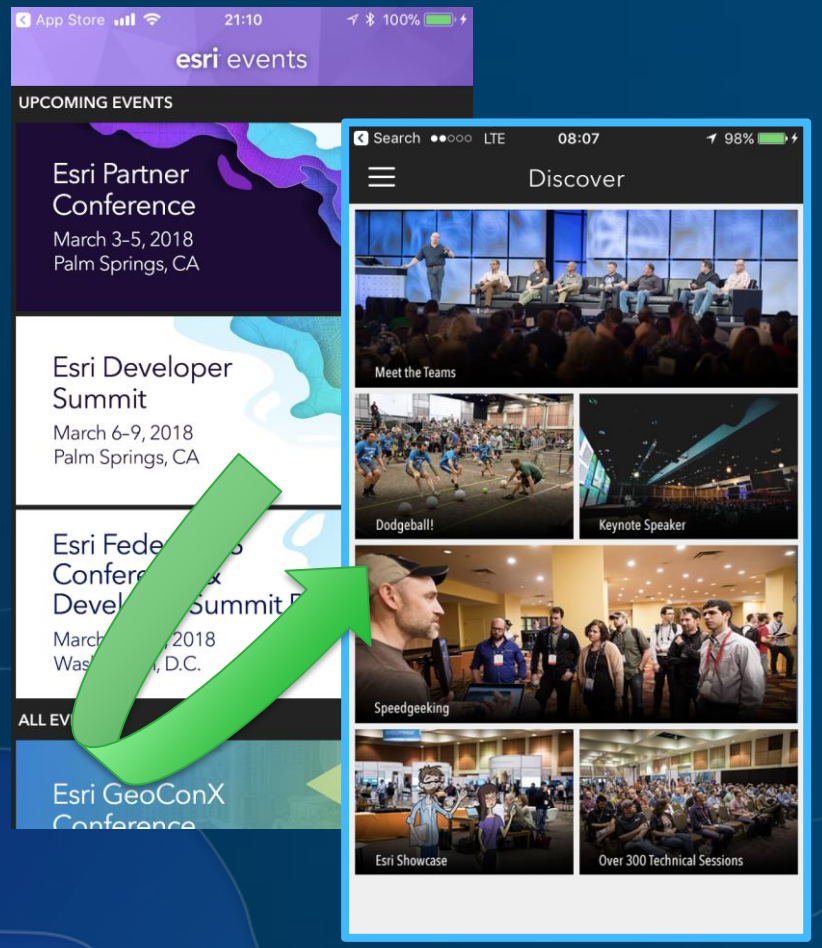
- **StreamLayer API help:**
  - 4.x: https://developers.arcgis.com/javascript/latest/api-reference/esri-layers-StreamLayer.html
  - 3.x: https://developers.arcgis.com/javascript/3/jsapi/streamlayer-amd.html
- **Sample applications on GitHub:**
  - https://github.com/jcardonadcdev/esri-uc-2017
- **Sample 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

Please Attend Our Other **Sessions**!

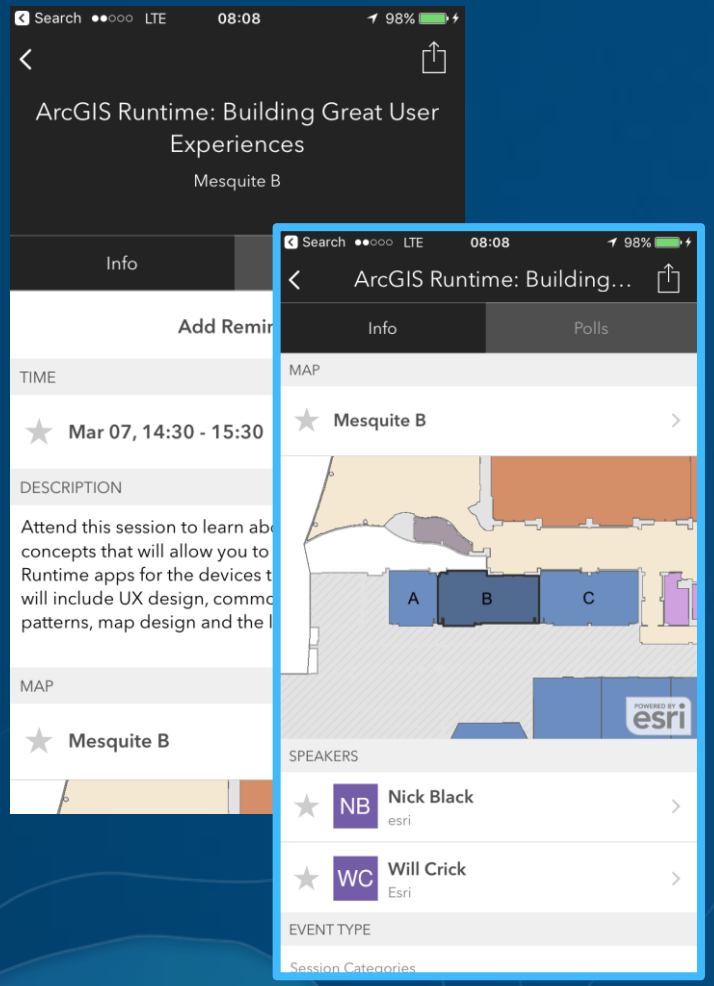
• **GeoEvent Server: An Introduction**	Tue, 2:30-3:30 pm, Primrose B
• **GeoEvent Server: Applying Real-Time Analytics**	Tue, 5:30pm-6:30 pm, Primrose A
• **Real-Time and Big Data GIS: Best Practices**	Wed, 10:30-11:30 am, Primrose B Fri, 1:00-2:00 pm, Catalina/Madera
• **ArcGIS and the Internet of Things (IoT)**	Wed, 2:30-3:30 pm, Primrose B
• **Real-Time and Big Data GIS: Leveraging the Spatiotemporal Big Data Store**	Wed, 4:00-5:00 pm, Primrose A
• **Developing Real-Time Web Apps with the ArcGIS API for JavaScript**	Tue, 9:00-9:30 am, Demo Theater 1: Oasis 1-2
• **Real-Time GIS: Road Ahead**	Thu, 4:00-5:00 pm, Pasadena/Sierra/Ventura
• **GeoEvent Server: Creating Connectors and Processors Using the GeoEvent SDK**	Fri, 8:30-9:30 am, Mesquite B

Please Take Our Survey!

Download the Esri Events app and find your event

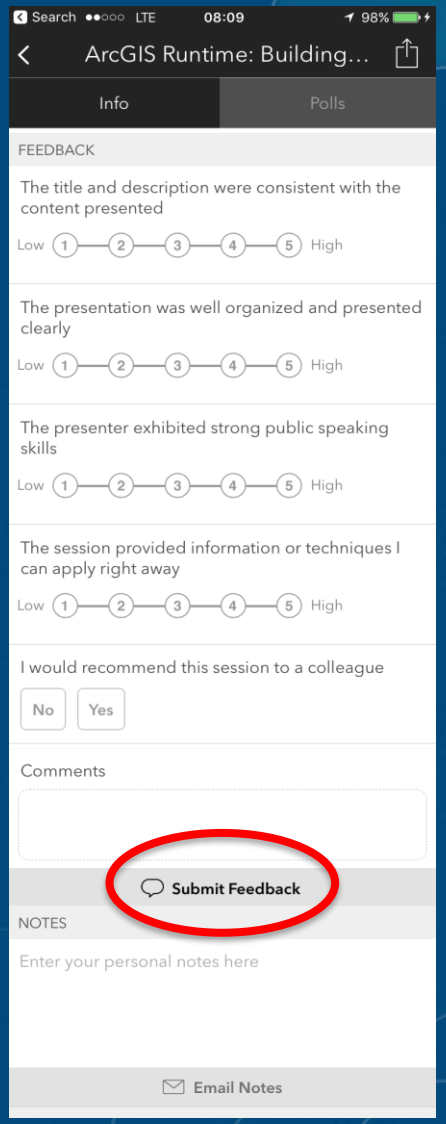


Select the session you attended



Scroll down to the "Feedback" section

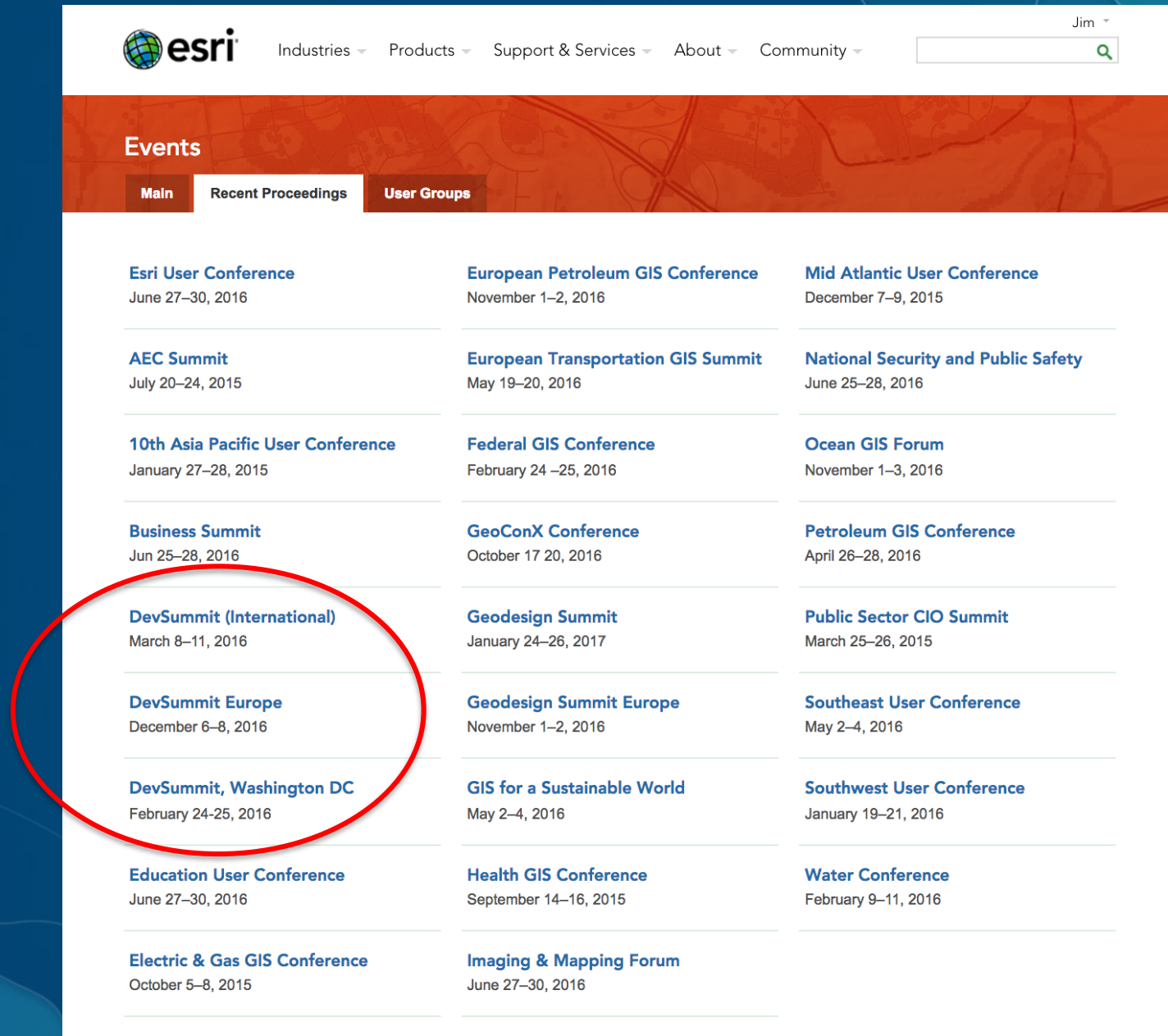
Complete Answers, add a Comment, and Select "Submit"



Esri.com Proceedings page

http://proceedings.esri.com

Where users can find PDF'ed slides after DevSummit



Questions / Feedback?

Ken Gorton
Product Engineer, Esri
kgorton@esri.com

Morakot Pilouk, Ph.D.
Senior Software Developer / Consultant, Esri
mpilouk@esri.com

esri | THE SCIENCE OF WHERE