ArcGIS GeoEvent Server:
Leveraging Stream Services

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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.

ArcGIS Enterprise
with real-time capabilities

Web
Device
Desktop
Apps

Visualization

Stream service
Map & feature service

GeoEvent Server
Spatiotemporal big data store
Storage

Ingestion
Analytics

Live & historic aggregates & features
Live features
Real-Time GIS
ArcGIS 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.
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.
Publishing Stream Services & Using the REST Endpoint
Visualization of Real-Time Data
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

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

```javascript
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

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


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.

Note: GeoEvent definition “TIME_END” field is honored

```javascript
var streamLayer = new StreamLayer(url, {
    purgeOptions: {
        displayCount: 1000,
        age: 20
    },
    maximumTrackPoints: 5,
    purgeInterval: 1
});
```
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.

```javascript
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:
  - 3.x: https://developers.arcgis.com/javascript/3/jsapi/streamlayer-amd.html

- Sample applications on GitHub:

- Sample stream services with simulated data:
  - https://geoeventsamp;le3.esri.com:6443/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, 5:30 pm-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
  - Wed, 4:00-5:00 pm, Primrose A

- **Real-Time and Big Data GIS: Leveraging the Spatiotemporal Big Data Store**

- **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
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