Developing Real-Time Web Apps with the ArcGIS API for JavaScript

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2. Publishing Stream Services
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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

- 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](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!
]

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
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
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
  }
});
```
Sample Applications & Tutorials
Sample Applications & Tutorials

helpful links

- **StreamLayer API help:**
  - 3.x: [https://developers.arcgis.com/javascript/3/jsapi/streamlayer-amd.html](https://developers.arcgis.com/javascript/3/jsapi/streamlayer-amd.html)

- **Sample applications on GitHub:**

- **Sample stream services with simulated data:**

- **Tutorials:**
  - [http://links.esri.com/geoevent-tutorials](http://links.esri.com/geoevent-tutorials)

- **Discussions & Blogs (on GeoNet)**
  - [https://geonet.esri.com/community/gis/enterprise-gis/geoevent/content](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**
  - Thu, 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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