Real-Time GIS: Leveraging Stream Services

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• If you have downloaded these slides and are viewing them on your own computer, please view the slides in “Slide Show” mode. There are animations in the slides that replicate demo-like workflows.
• If you do not view in slide show mode many slides will appear cluttered and unintuitive when all of the slide’s graphics appear at once.
In this presentation:
Leveraging Stream Services

• What are stream services?
  - How are stream services different from traditional feature services?
  - What are some advantages to using stream services?

• What are stream layers?
  - How are stream layers added to a web map?
  - How can stream layers be used to support real-time spatial analytics?
  - How can real-time web maps be incorporated into a web application?
This is a beginner level technical workshop
Leveraging Stream Services

• We expect that you know and have probably used:
  - Web maps and feature layers in web maps

• This presentation will demonstrate and discuss:
  - How stream services are published using the GeoEvent Manager
  - How stream services are discovered in the ArcGIS REST Services Directory
  - Advantages stream services provide vs. traditional feature services
  - Support for stream services available in the 10.3 and 10.3.1 product releases
What are Stream Services
Demo – Stream Services

Publishing a real-time data feed
Real-Time GIS
Integration and exploitation of streaming data

- Integrates real-time streaming data into ArcGIS
- Performs continuous processing and real-time analytics
- Sends updates and alerts to those who need it where they need it
Real-Time GIS
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Stream services vs. traditional feature services

Two patterns of Real-time GIS

- Feature layers **pull** from feature services
  - Web apps poll to get periodic updates

- Stream layers **subscribe** to stream services
  - Web apps subscribe to immediately receive data
  - Low latency and high throughput

![Diagram of ArcGIS Server, GeoEvent Extension, Feature Services, and Stream Services](image-url)
Stream services vs. traditional feature services

Two patterns, two important differences

- Feature services **persist** their data in a Geodatabase
- Stream services **broadcast** their data without first persisting the data
Stream services are published using the GeoEvent Manager
Publish your stream service as part of configuring your GeoEvent output

Check to make sure you have specified the correct GeoEvent Definition ...
Stream services are published using the GeoEvent Manager

Publish your stream service as part of configuring your GeoEvent output

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Cardinality</th>
<th>Tags</th>
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</table>
Stream services are published using the GeoEvent Manager
Publish your stream service as part of configuring your GeoEvent output

- Click ‘Publish Stream Service’
- Your event definition will be part of the stream service you publish
Stream services are published using the GeoEvent Manager

Publish your stream service as part of configuring your GeoEvent output

- Optional store latest (uses feature service)
- Click ‘Publish’
Stream services are published using the GeoEvent Manager

Publish your stream service as part of configuring your GeoEvent output

Don’t Forget to Save your GeoEvent output
Stream services are discoverable in the ArcGIS REST Services Directory.
Logging is as an administrator will expose additional capabilities such as publishing content to the stream.

- Click the service to open its REST specification page...
Stream services are discoverable in the ArcGIS REST Services Directory

- Click the JSON link to view a more complete specification of the service...

- Click the Subscribe link to jump to an HTML page and see the JSON being broadcast by the service...
Stream services broadcast Esri Feature JSON

Subscribe to view JSON broadcast by the stream service

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<tr>
<th>InternationalSpaceStation (StreamServer)</th>
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</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

Subscribe | Unsubscribe

You have subscribed
Stream service administration
Stream services are started, stopped, and configured using ArcGIS Server Manager
Click to view stream service content in a java script web map
What are Stream Layers
Stream Layer
What is it?

• A layer in the Javascript API
  - Available since version 3.6
• Draws data on map using client-side graphics
Demo – Stream Layers

Locating the International Space Station
Stream layer

The lifecycle of a stream layer

FeatureCollection:
{ layerDefinition:
  { geometryType: esriGeometryPoint,
    timeInfo: {
      startTimeField: "StartTime",
      trackIdField: "Name",
    },
    fields: [ ... ],
    featureSet: null
  }

Options
- webSocketUrl: ws://gep:6180/urlpath
- purgeOptions: { displayCount: 500 }
Advantages to using stream layers
Stream layers are more responsive and more efficient than feature layers

- Stream layers display immediately and refresh automatically
- Data is only sent to the client once
- Messages are sent without extra headers
Stream layer requirements
Browser support for web sockets / JavaScript application support

• ArcGIS GeoEvent Extension for Server
  - Stream services are published as GeoEvent output connectors

• Web Browser that supports Web Sockets
  - http://caniuse.com/websockets

• Network support for the Web Socket protocol
  - ws:// wss://

• No custom plug-in required: Standard JavaScript implementation
Dynamic GeoFences
Applying real-time analytics
Stream services enable dynamic GeoFences

- A GeoEvent Service configures the flow of GeoEvents
- Processors and Filters rely on GeoFences for spatial analytics
- GeoFence synchronization can receive data broadcast from a stream service
Demo – Stream Services

Dynamic GeoFences
Web Maps and Apps
Support for stream services in the 10.3 and 10.3.1 product releases

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 AppBuilder
- Your own web apps that use the ArcGIS API for JavaScript
Web Maps and Apps

Web Maps
Stream Services in a Web Map

- “Add” menu...
- “Add layer from web”...
- Add stream service endpoint URL

Add Layer from Web

What type of data are you referencing?

An ArcGIS Server Web Service

URL: http://mbramer2:5080/arcgis/rest/services/FAA/StreamServer

Use as Basemap

ADD LAYER CANCEL
Real-Time Data in Portal Web Map
Real-Time Data in Portal Web Map

*Streaming Controls*

- Stop/Start
- Spatial Filter (map extent)
- Clear
Symbology

- Editable, like other layers
- “Change Symbols”
Symbology

- Heading
- Tracks
Real-Time Data in Portal Web Map

Streaming Controls

- Filter on data content
  - i.e. “WHERE” clause
Real-Time Data in Portal Web Map

*User-specific*

- Each user has unique session
- Stream service knows what to send to each user
Web Maps and Apps

Web Application Templates
Real-Time Data in Web App Templates
Share in ArcGIS Online

- “Share” button
Web App Templates
“Pre-packaged” Web Apps

- “Configurable Apps” tab
- Many to choose from
- Many are theme-focused
  - Compare
  - Elevation Profile
  - Impact Summary
- Can publish, download or preview
“Classic Viewer” Web App Template

Preview

Layer List
Layer List
Measure
Measure
Locator
Locator
Print
Print
Basemaps
Basemaps
Share
Share

Title
Title
Legend
Legend
Navigation
Navigation

FAA stream map
FAA stream map
Web App Templates

**Publish**

- Enter a title, add some tags, write a summary…
- “Save & Publish”
- Saves app to your content
Web App Templates
*Published*

- Discoverable
Web Maps and Apps

Web AppBuilder
Real-Time Data in Web AppBuilder Apps

Share in ArcGIS Online

- Also via the “Share” button
- Also use “Make a Web Application”
Web AppBuilder

Pre-packaged Web App … **Builder!**

- “Web AppBuilder” tab
- Enter a title, add some tags, enter a summary
- “Get Started”
Web AppBuilder

WYSIWYG

• “What You See Is What You Get” user interface
• Style/Colors
• Layout
• Widgets
• Map, extent
• Widget config
• Branding
• Previews
• Launch
Web AppBuilder

Launch (Preview)

• “Launch” – shows preview of final app
Web AppBuilder

Previews

- Shows preview of final app on 16 of the most common devices
  - iPad Air
  - Samsung Note
  - Nexus 7
  - 13 more
- Real-time data is live
Web AppBuilder

- Save
- Save As
- Export as Template
  - Create custom web app template by exporting the app
Web AppBuilder

Published

- Discoverable
Advantages to using stream services vs. traditional feature services
Conclusion:
Leveraging Stream Services

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