



ArcGIS GeoEvent Server: An Introduction

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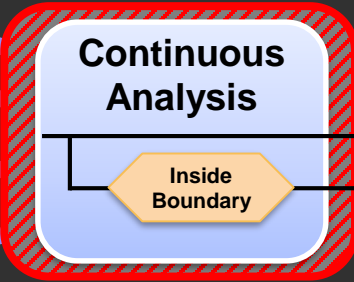
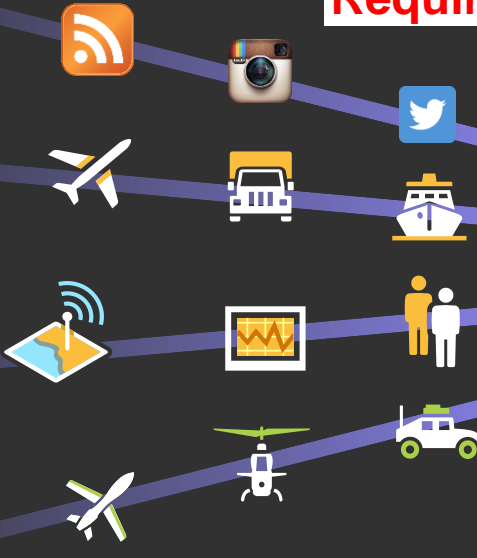


What is Real-Time GIS?

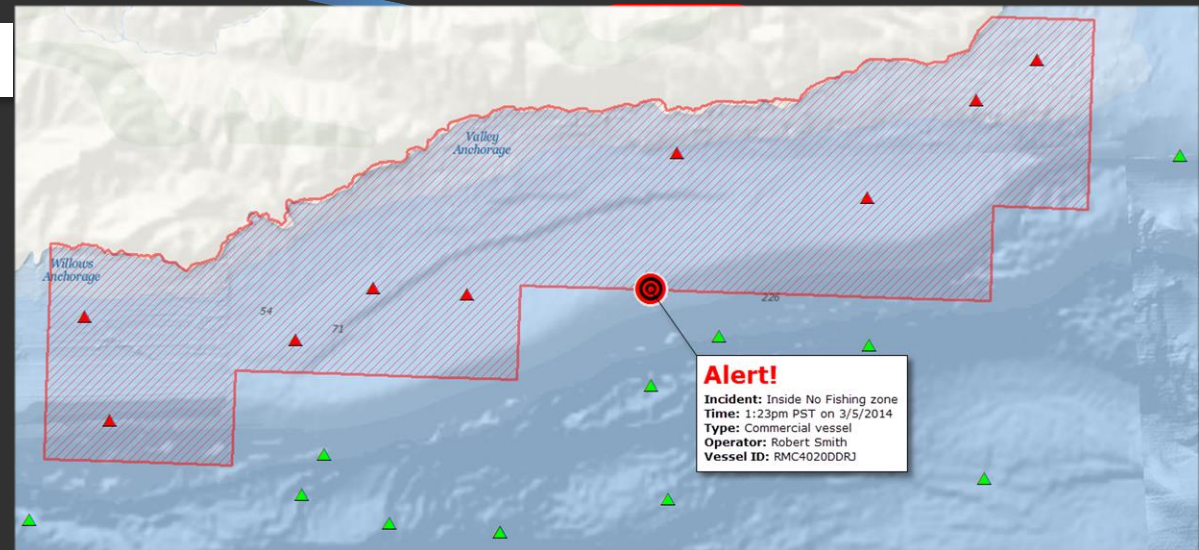
Real-Time GIS Requirements

Ingestion, Analytics, Notifications and Alerting

Requirement #1



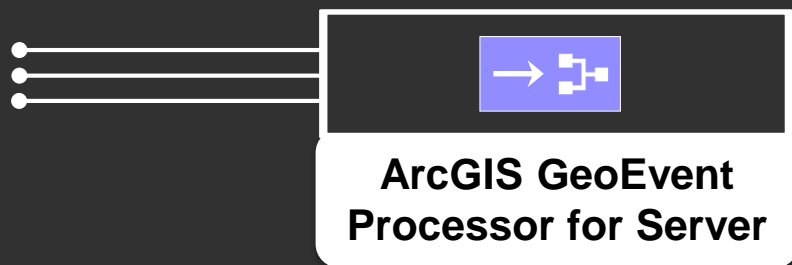
Requirement #2



ArcGIS Server

with real-time capability

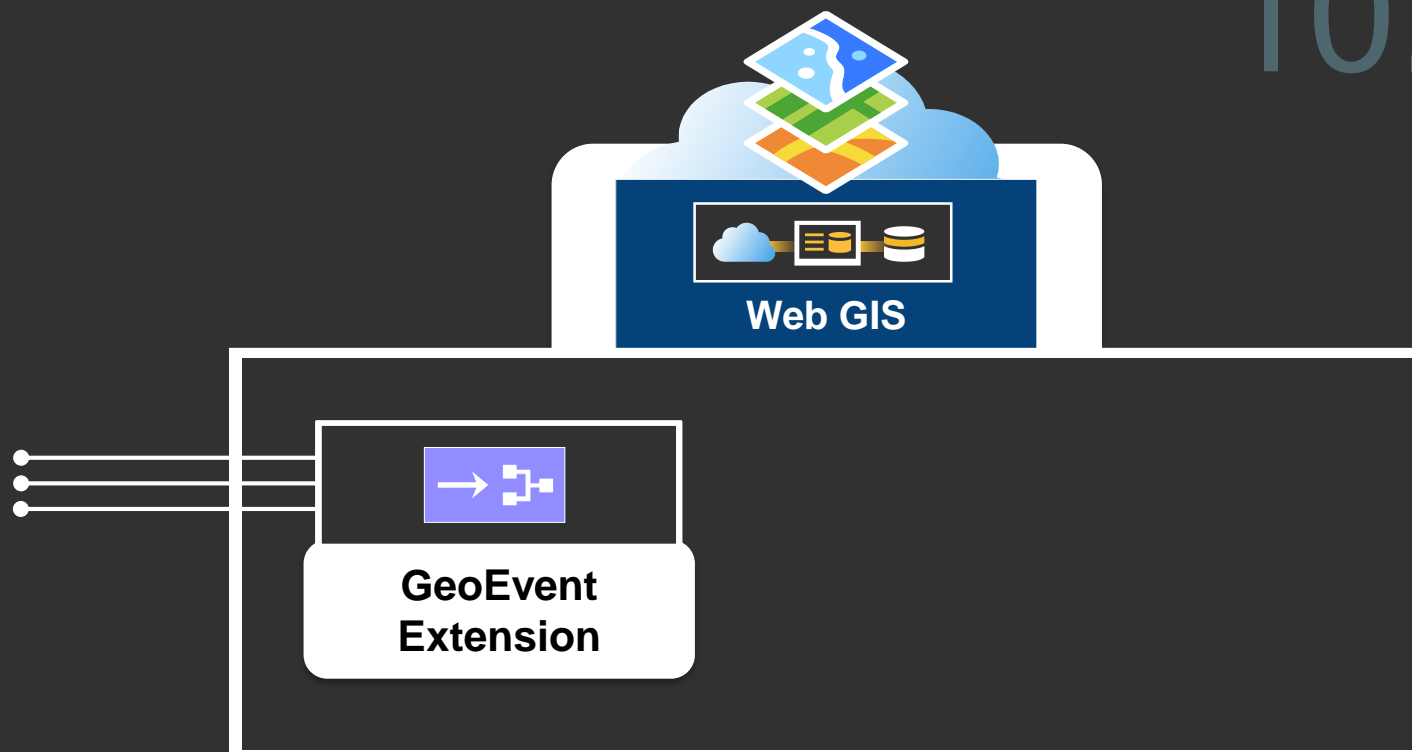
10.2



Web GIS

with real-time capability

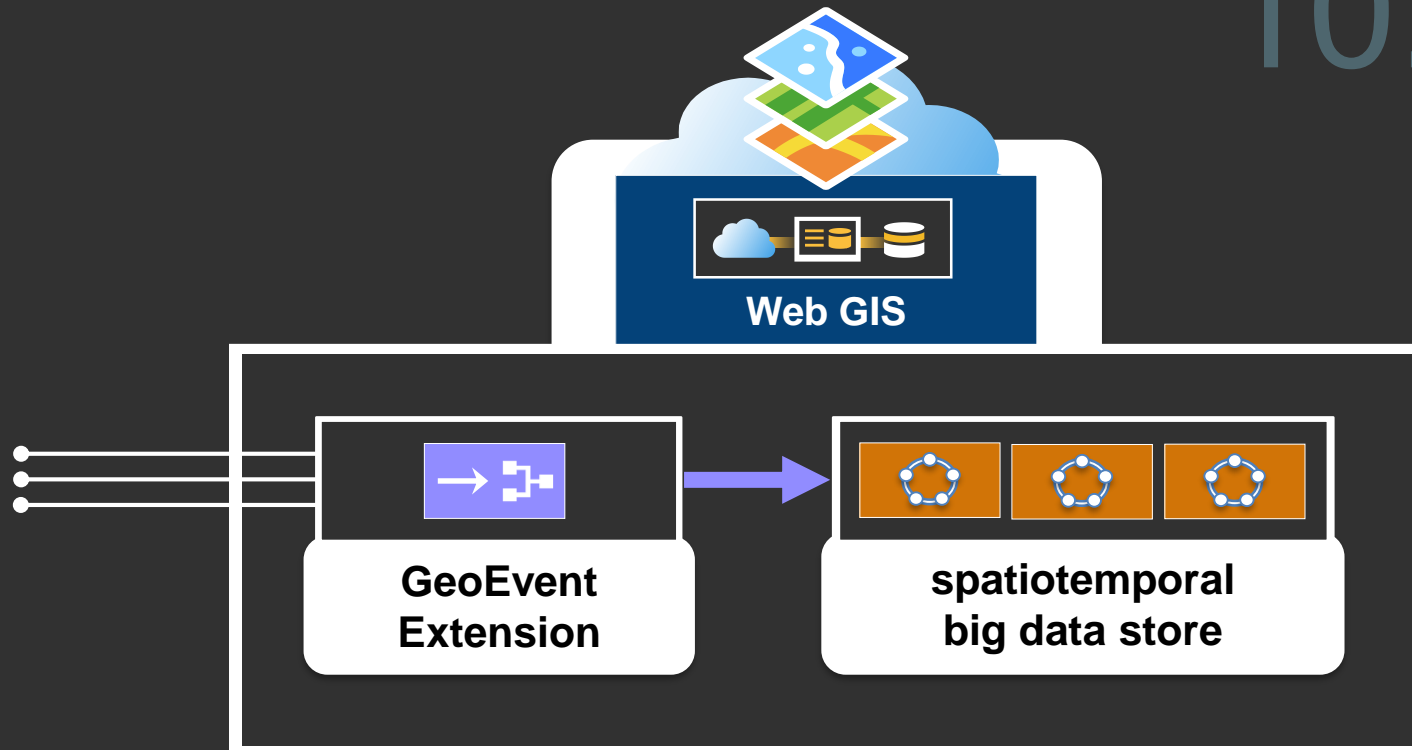
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Web GIS

with real-time & big data capabilities

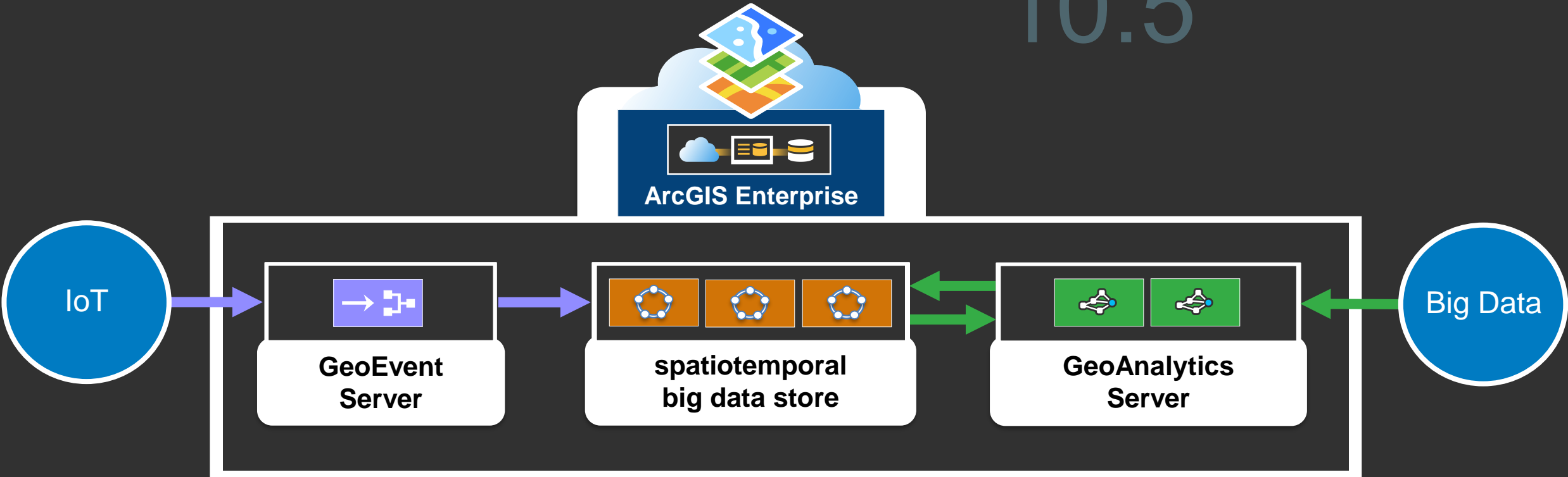
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ArcGIS Enterprise

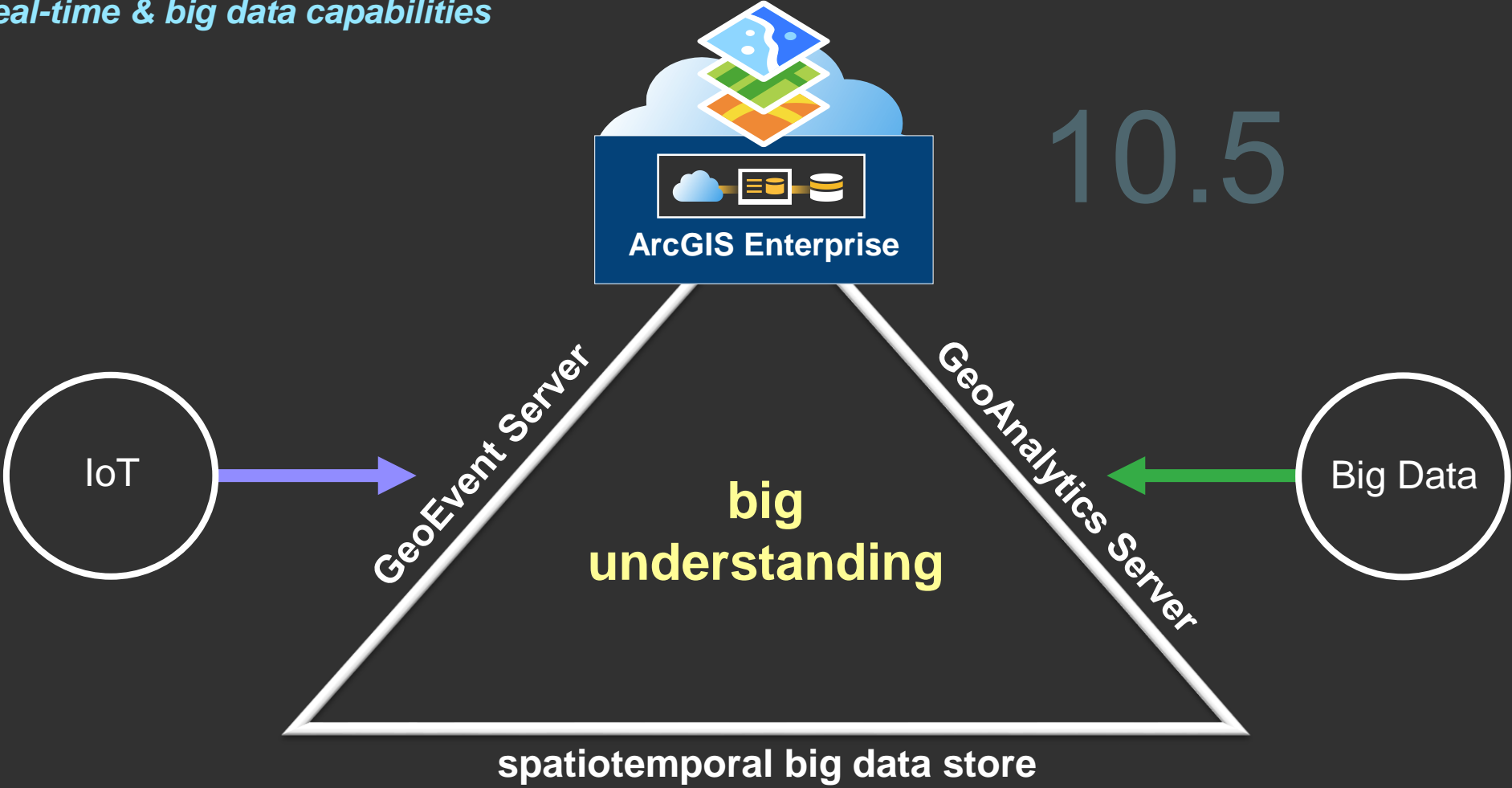
with real-time & big data capabilities

10.5



ArcGIS Enterprise

with real-time & big data capabilities

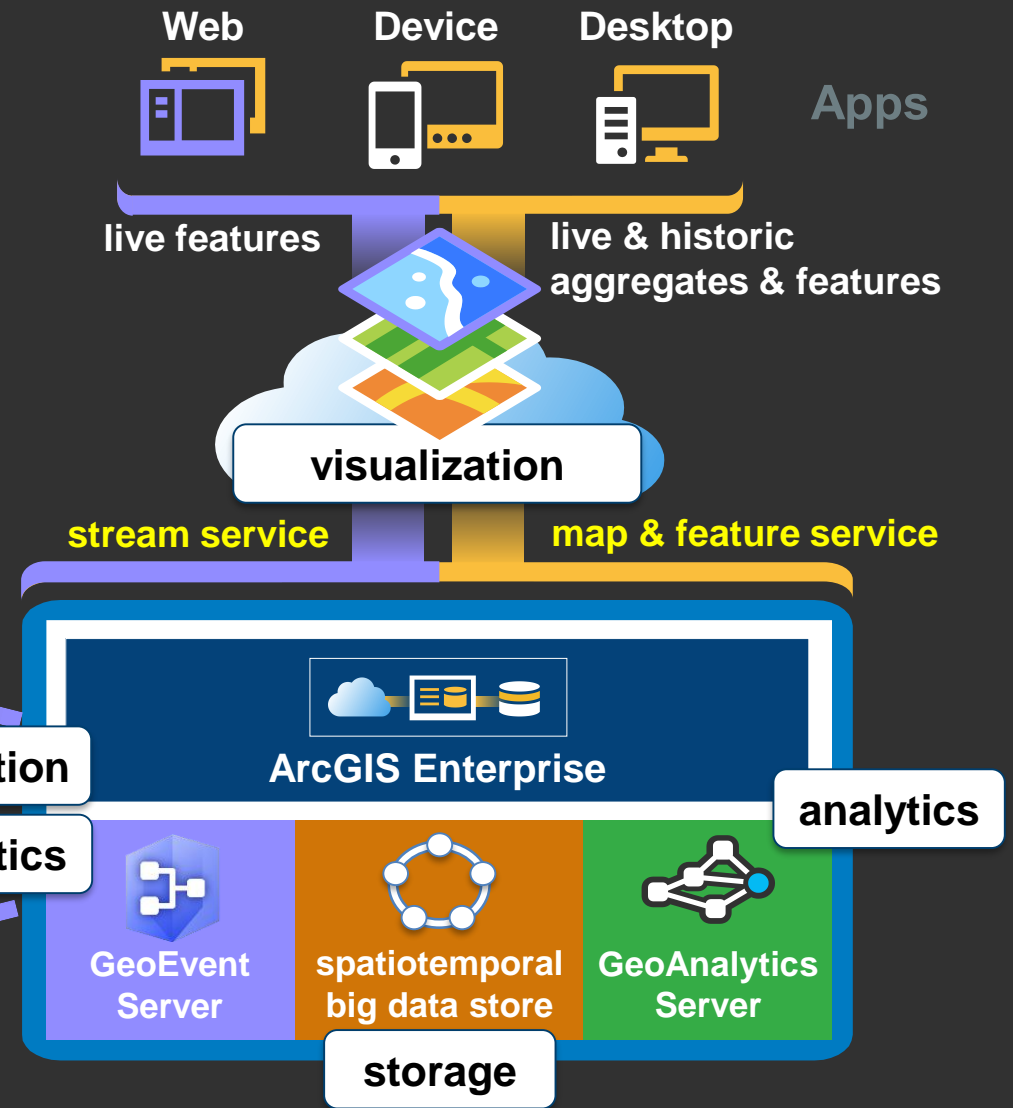


ArcGIS Enterprise

with real-time & big data 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
- Run analytics on stored observations
- Visualize high velocity & volume data:
 - as an aggregation
 - as discrete features
- Notify those who need to know about patterns of interest

10.5

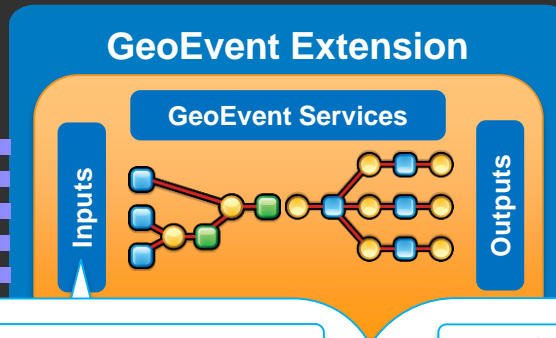




Working with Real-Time Data









Ingesting real-time data into ArcGIS

Input connectors
















You can create your own connectors.

Out of the Box


-  Poll an ArcGIS Server for Features
-  Poll an external website for GeoJSON, JSON, or XML
-  Receive Features, GeoJSON, JSON, or XML on a REST endpoint
-  Receive GeoJSON or JSON on a WebSocket
-  Receive RSS
-  Receive Text from a TCP or UDP Socket
-  Subscribe to an external WebSocket for GeoJSON or JSON
-  Watch a Folder for new CSV, GeoJSON, or JSON Files

Esri Gallery



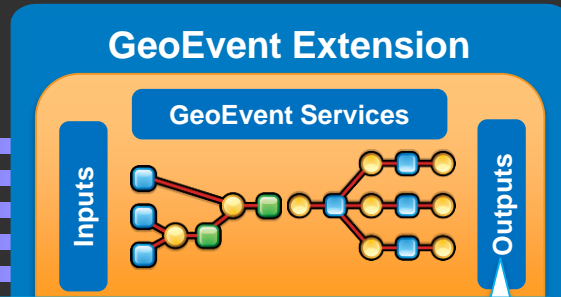
-  ActiveMQ
-  CAP
-  CoT
-  esd
-  Instagram
-  KML
-  Kafka *
-  MQTT
-  NMEA 0183
-  RabbitMQ
-  Sierra Wireless (RAP)
-  Trimble (TAIP)
-  Twitter

Partner Gallery

-  CompassCom
-  enviroCar
-  exactEarth
-  FAA (ASDI) *
-  GNIP *
-  Networkfleet *
-  OSIsoft *
-  Valarm
-  Zonar *













Storing real-time data in ArcGIS and alerting

Output connectors











You can create your own connectors.

Out of the Box

-  Add or Update a feature
-  Publish Text to a UDP Socket
-  Push GeoJSON or JSON to an external Website
-  Push GeoJSON or JSON to an external WebSocket
-  Push Text to an external TCP Socket
-  Send a Text Message
-  Send an Email
-  Send an Instant Message
-  Send Features to a Stream Service
-  Write to a CSV, GeoJSON, or JSON File
-  Add a Feature to a Spatiotemporal Big Data Store
-  Update a feature in a Spatiotemporal Big Data Store

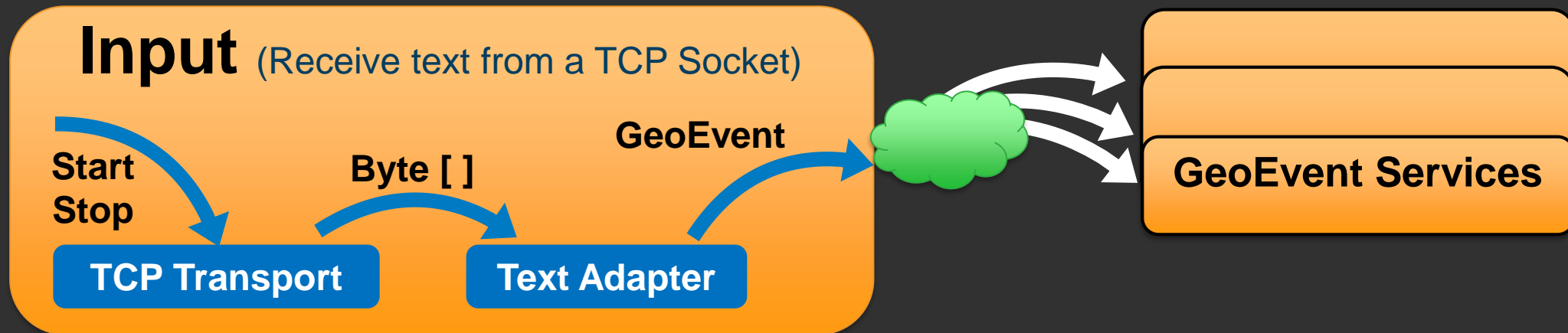
Esri Gallery

-  ActiveMQ
-  Cursor-on-Target
-  Hadoop (HDFS)
-  Kafka *
-  MongoDB
-  MQTT
-  RabbitMQ
-  Twitter

Input Connector

- Transport: HOW to move data
- Adapter: WHAT the data looks like

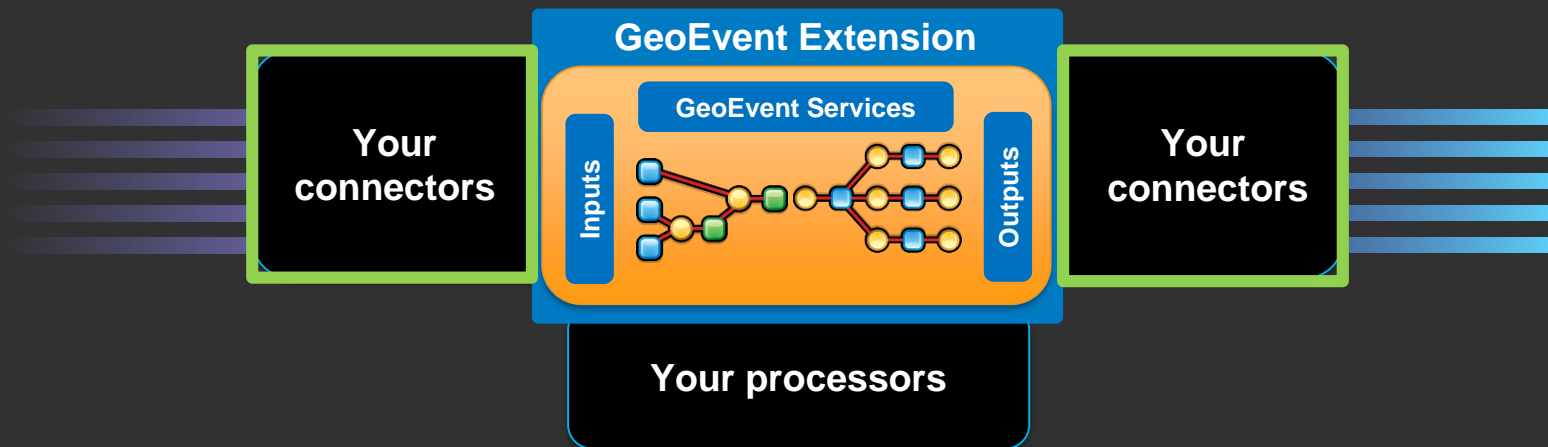
Example Input



Extending GeoEvent

Software Development Kit (SDK)

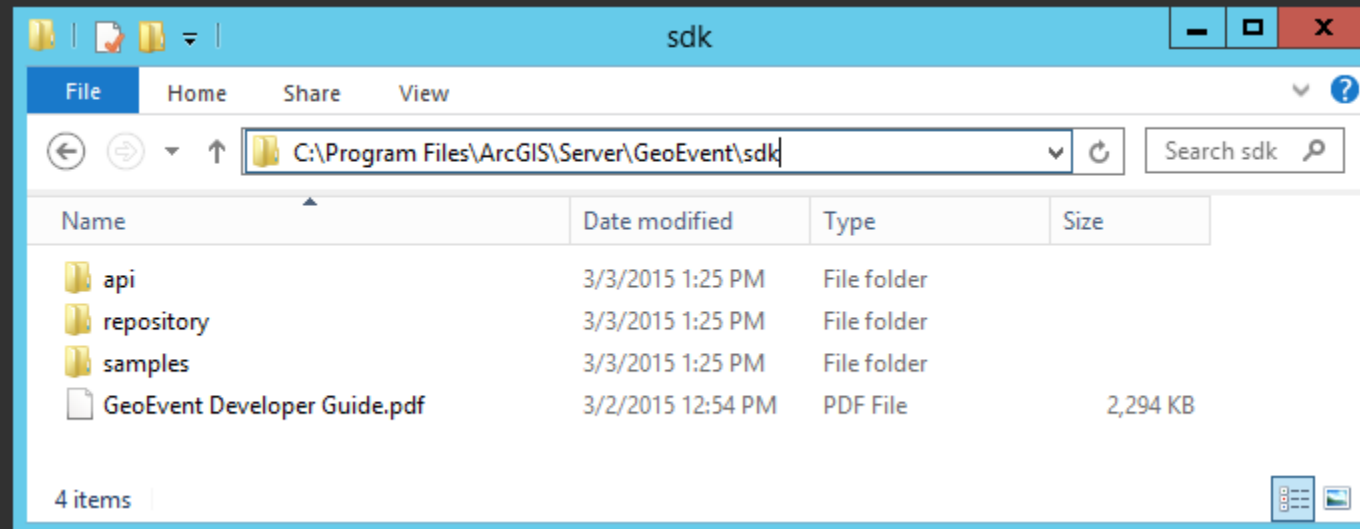
You can create your own custom connectors and processors using the GeoEvent **Software Development Kit (SDK)**.



Software Development Kit



- **api:** JavaDoc content associated with GeoEvent Extension SDK
- **repository:** Local maven repository
- **samples:** Sample connectors (and processors)
- **GeoEvent Developer Guide**



GeoEvent SDK

Custom Input Adapter

```
@Override  
protected GeoEvent adapt(ByteBuffer buffer, String string) {
```

```
    GeoEvent event = createGeoEvent(aisMessage);  
    if (event != null) {  
        geoEventListener.receive(event);  
    }  
}
```

```
<adapter name="aisInputAdapter" label="AIS Inbound Adapter" domain="esri.goevent.ais.adapter.inbound" type="inbound">  
  <description>This adapter can translate AIS messages</description>  
  <geoEventDefinitions>  
    <geoEventDefinition name="IGAisMessage" >  
      <fieldDefinitions>  
        <fieldDefinition name="CreationTime" type="Date" cardinality="One">  
          <fieldDefinitionTag>  
            <name>TIME_START</name>  
          </fieldDefinitionTag>  
          <fieldDefinitions/>  
        </fieldDefinition>  
        <fieldDefinition name="Goevent" type="String" cardinality="One">  
          <fieldDefinitions/>  
        </fieldDefinition>  
        <fieldDefinition name="Vesselname" type="String" cardinality="One">  
          <fieldDefinitions/>  
        </fieldDefinition>  
        <fieldDefinition name="AISMessageType" type="Short" cardinality="One">  
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        </fieldDefinition>  
      </fieldDefinitions>  
    </geoEventDefinition>  
  </geoEventDefinitions>  
</adapter>
```

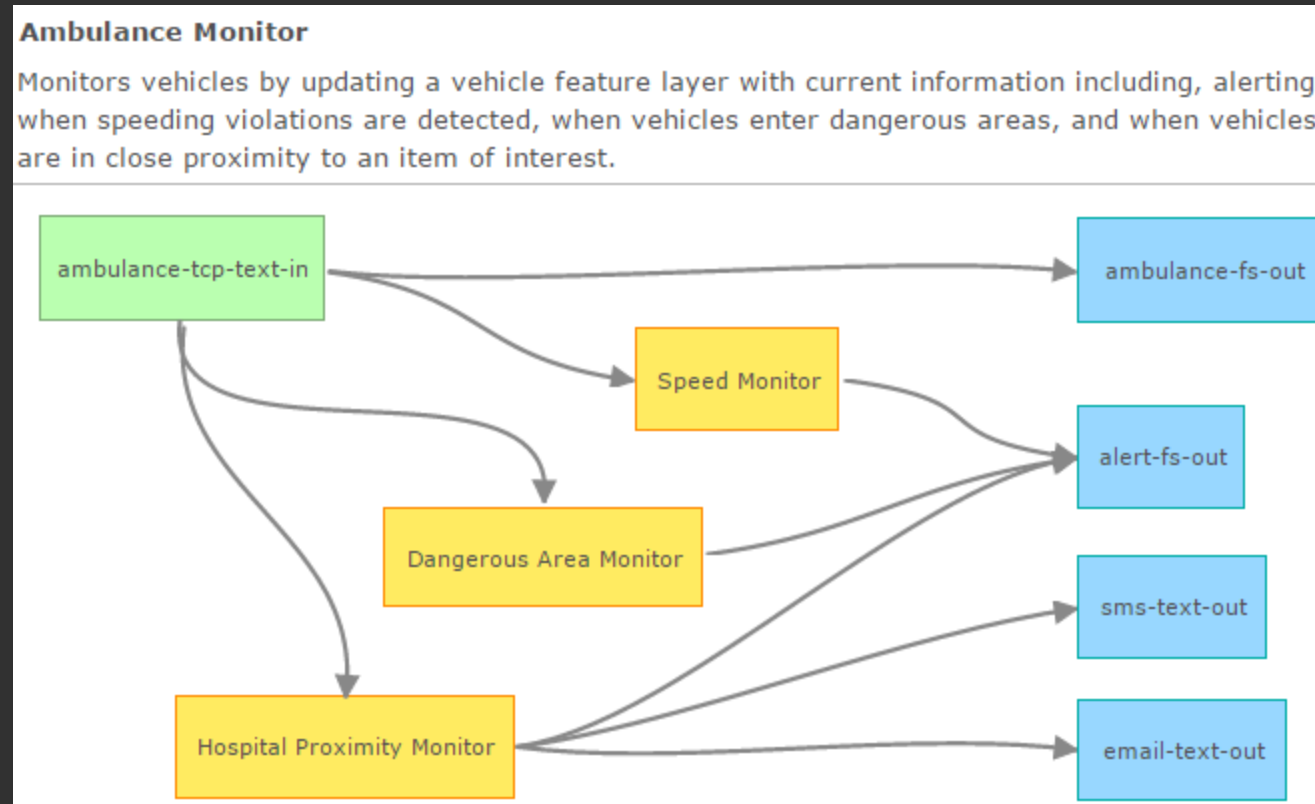


Applying Real-Time Analytics

Applying Real-Time Analytics

GeoEvent Services

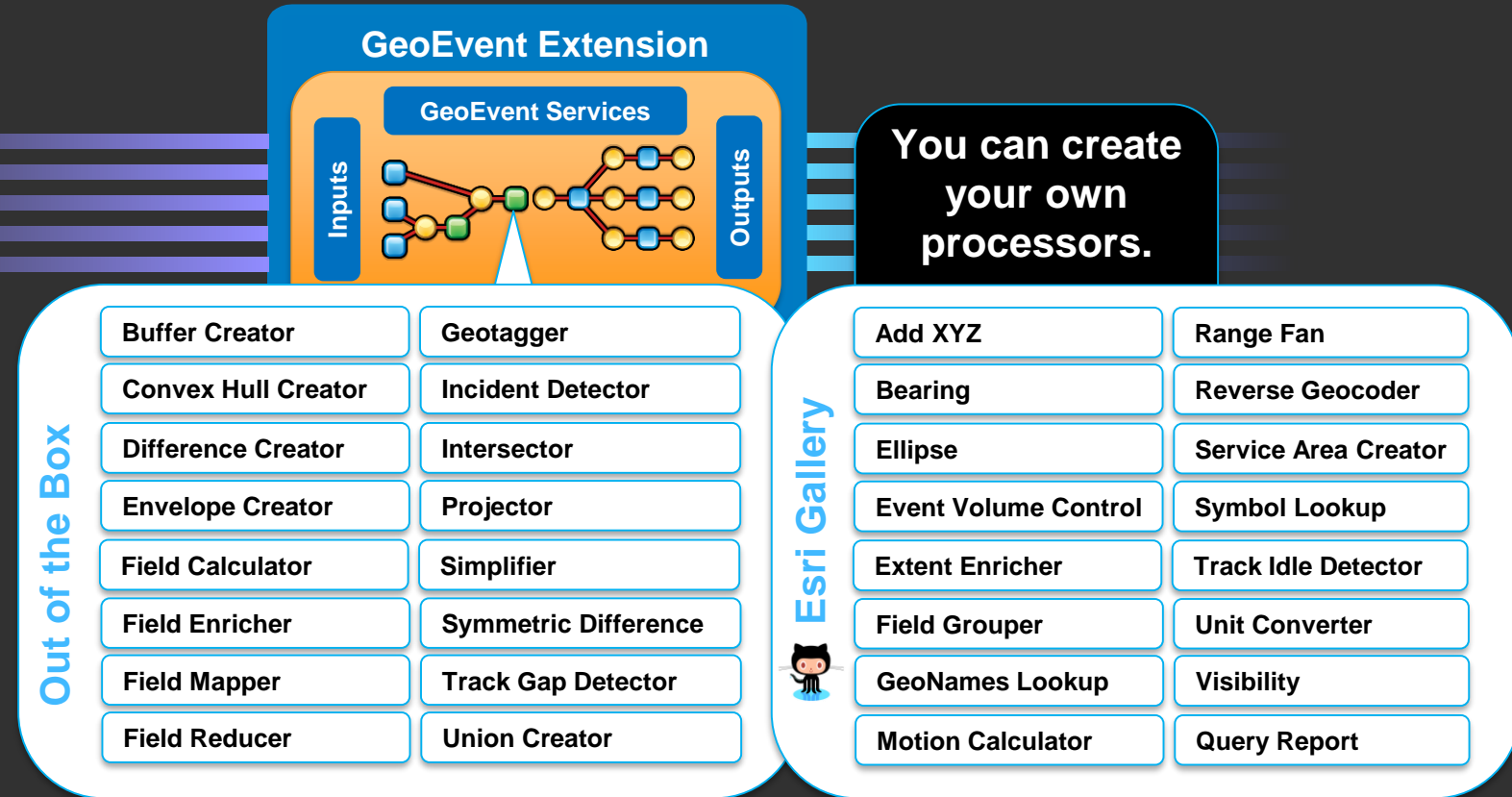
- A **GeoEvent Service** defines the flow of GeoEvents
 - The **Filtering** and **Processing** steps to perform
 - what input(s) to apply them to
 - and what output(s) to send the results to



Performing continuous analytics in ArcGIS

Processors

- You can perform continuous analytics on events as they are received using a **processor**.

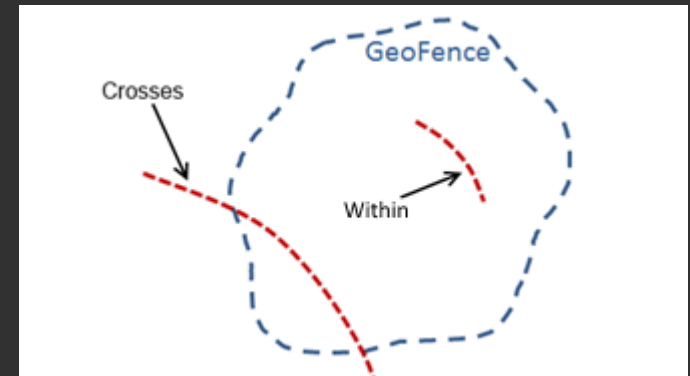
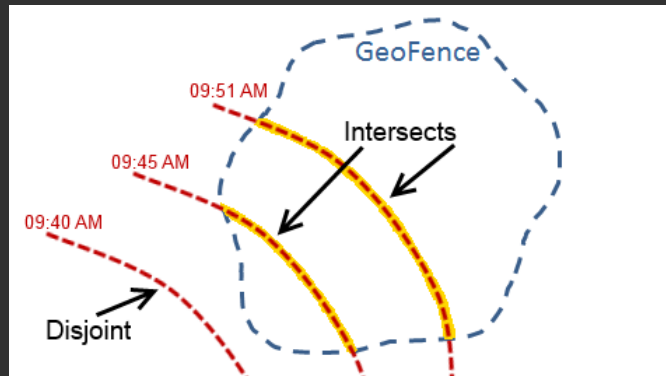
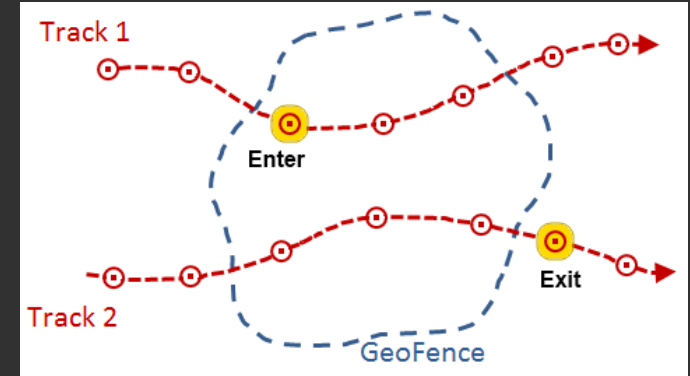
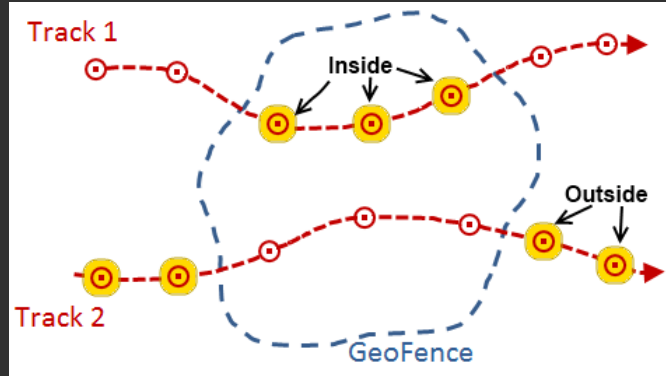


Additional Real-Time Spatial Analytics

Spatial filtering

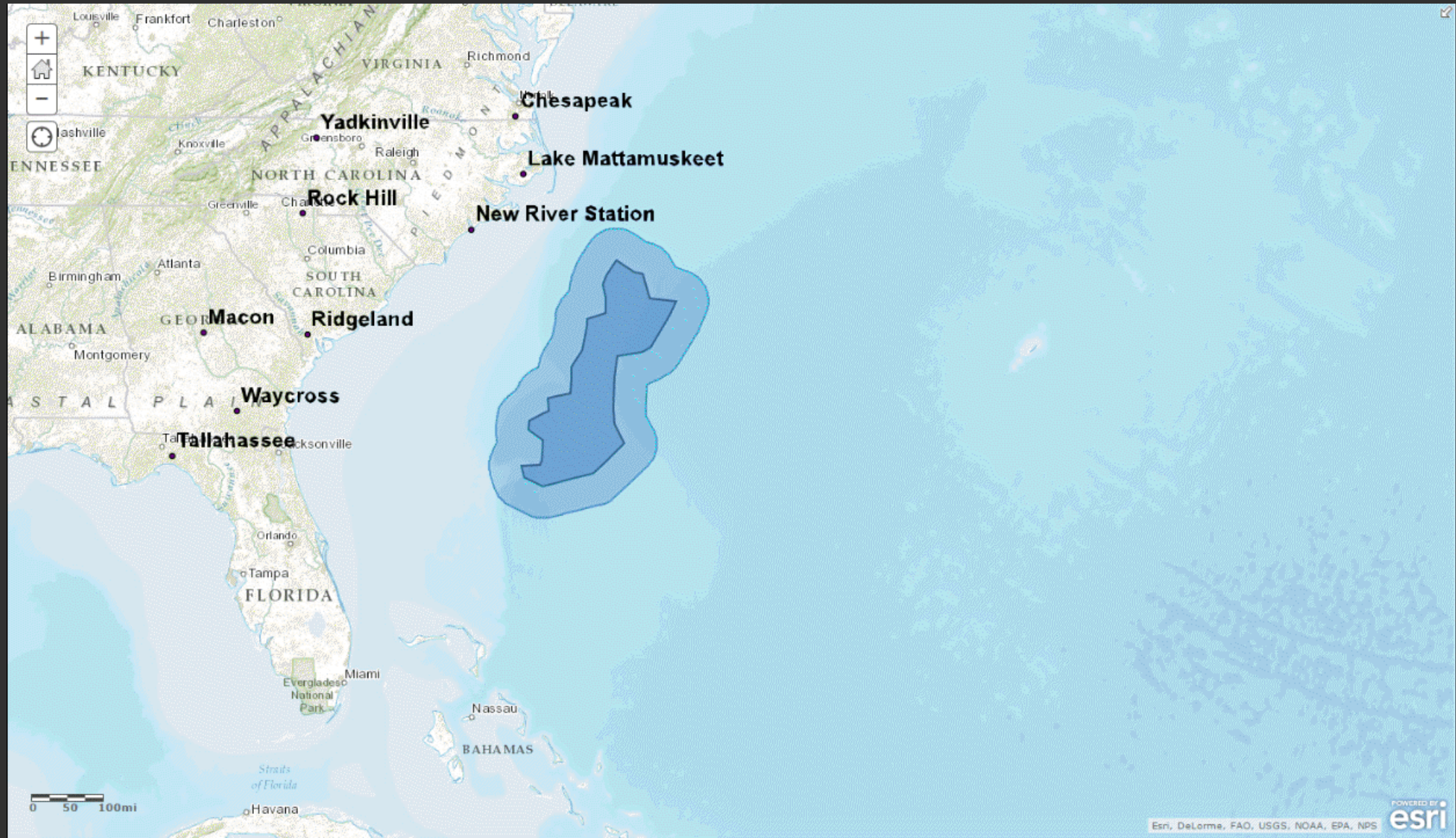
- Spatial operators:

inside	outside
enter	exit
intersects	disjoint
touches	contains
crosses	equals
overlaps	within



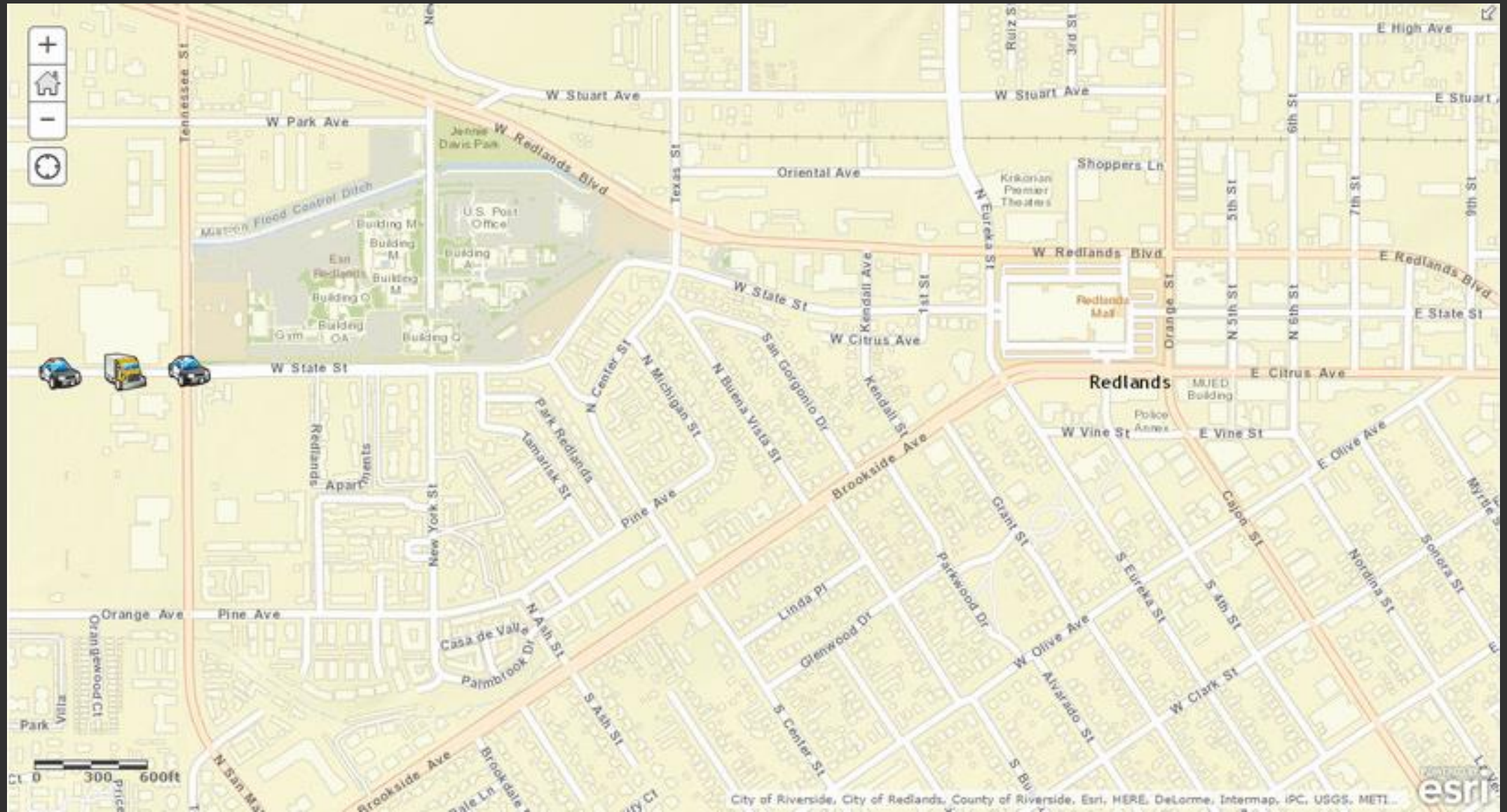
Additional Real-Time Spatial Analytics

Example – Impending weather notifications



Additional Real-Time Spatial Analytics

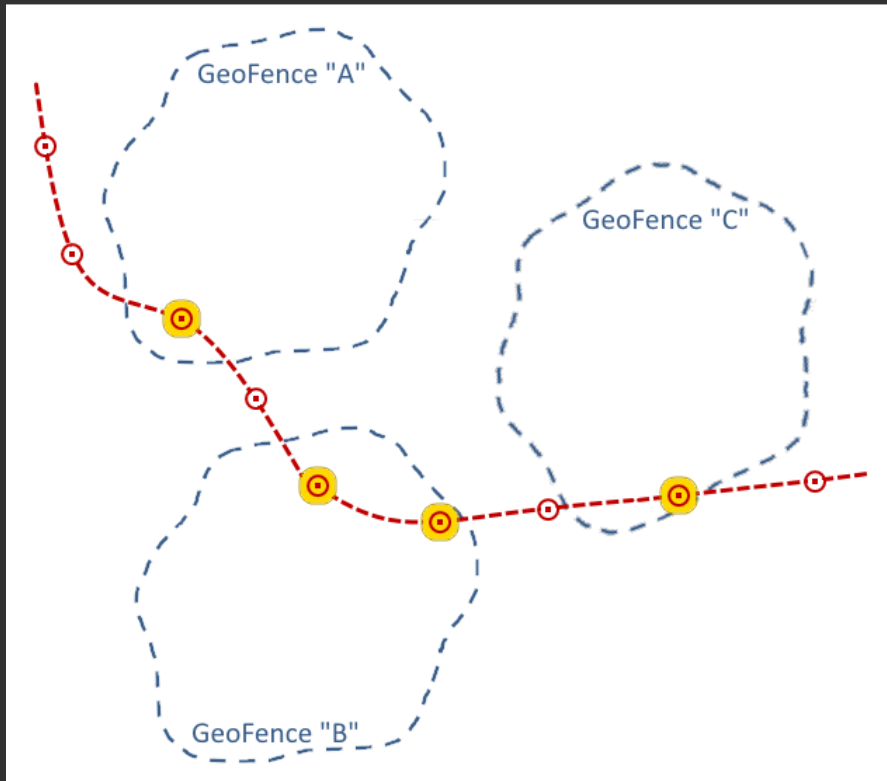
Example – Convoy separation alerting



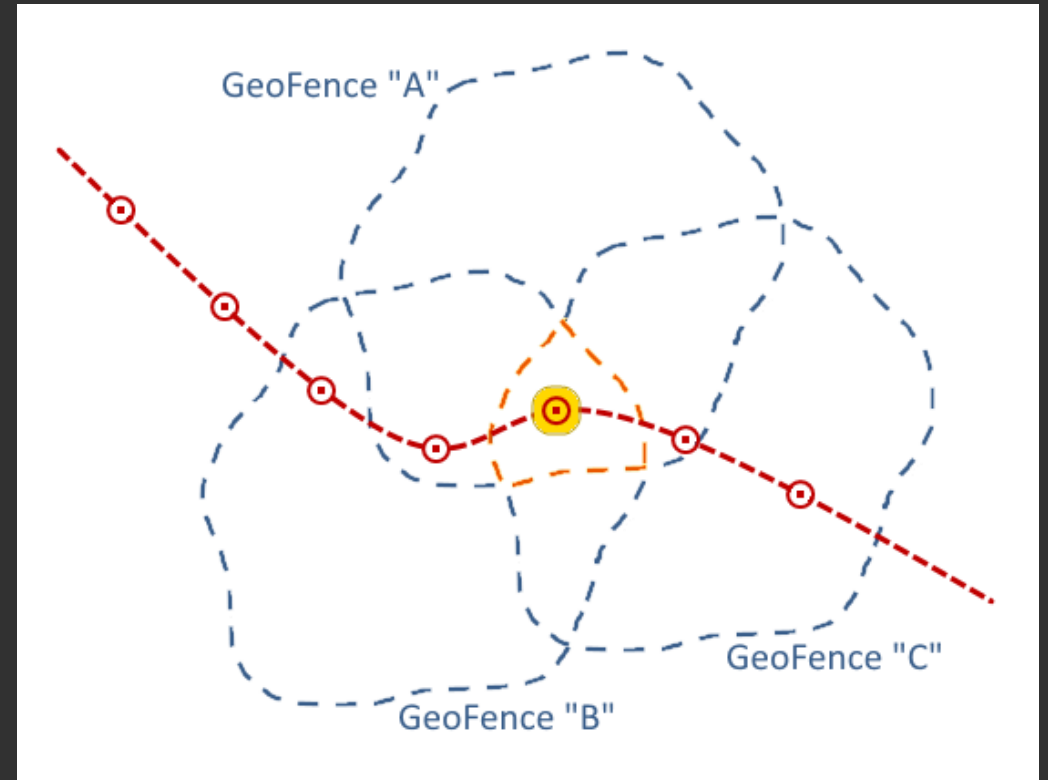
Additional Real-Time Spatial Analytics

GeoFence scope

- Specify a GeoFence scope: Any or All
- **Any** GeoFence



- **All** GeoFences



Additional Real-Time Spatial Analytics

Example – Territory adherence alerting



GeoEvent SDK

Custom Processor

```
@Override
public String getName()
{
    return "GeocoderProcessor";
}

@Override
public String getDomain()
{
    return "geocoder.processor";
}

@Override
public String getVersion()
{
    return "10.5.0";
}

@Override
public String getLabel()
{
    return "${com.esri.geoevent.processor.geocoder-processor.PROCESSOR_LABEL}";
}

@Override
public String getDescription()
{
    return "${com.esri.geoevent.processor.geocoder-processor.PROCESSOR_DESC}";
}
```

Applying Real-Time Analytics

Berlin S-Bahn



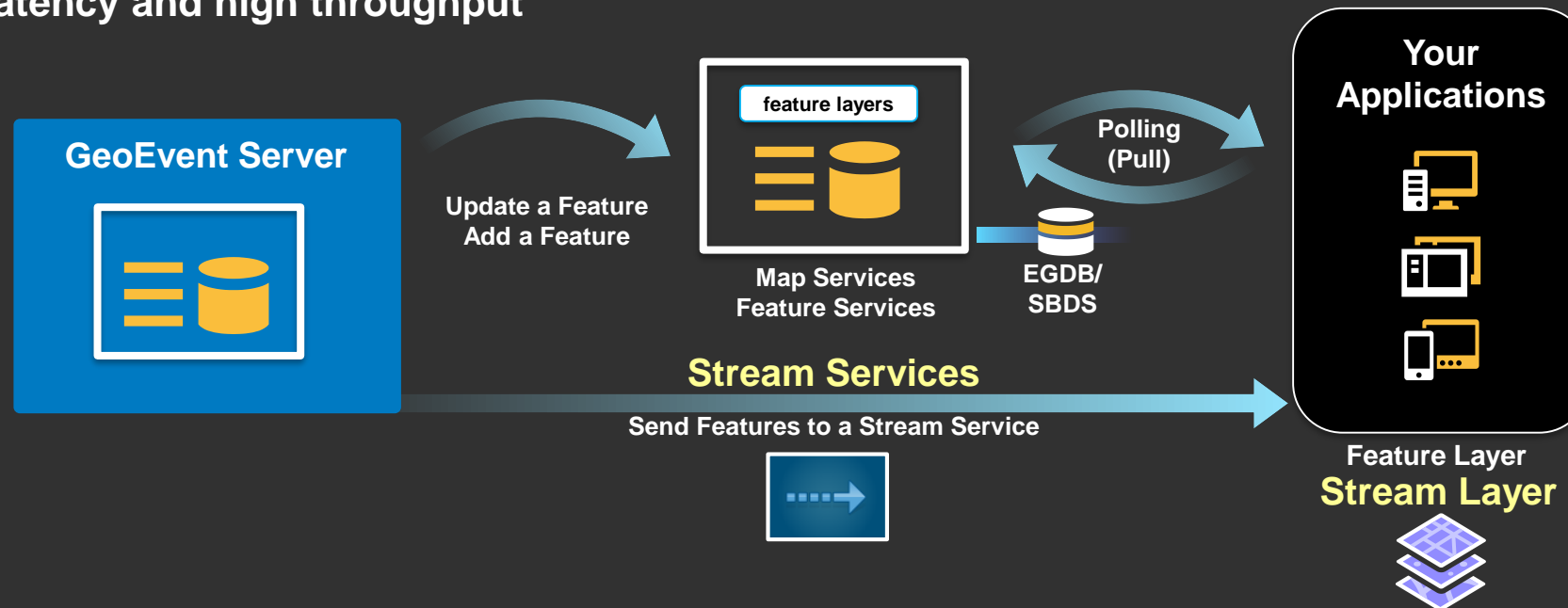


Visualizing Real-Time Data

Getting Real-Time Data into Web Apps

Two patterns

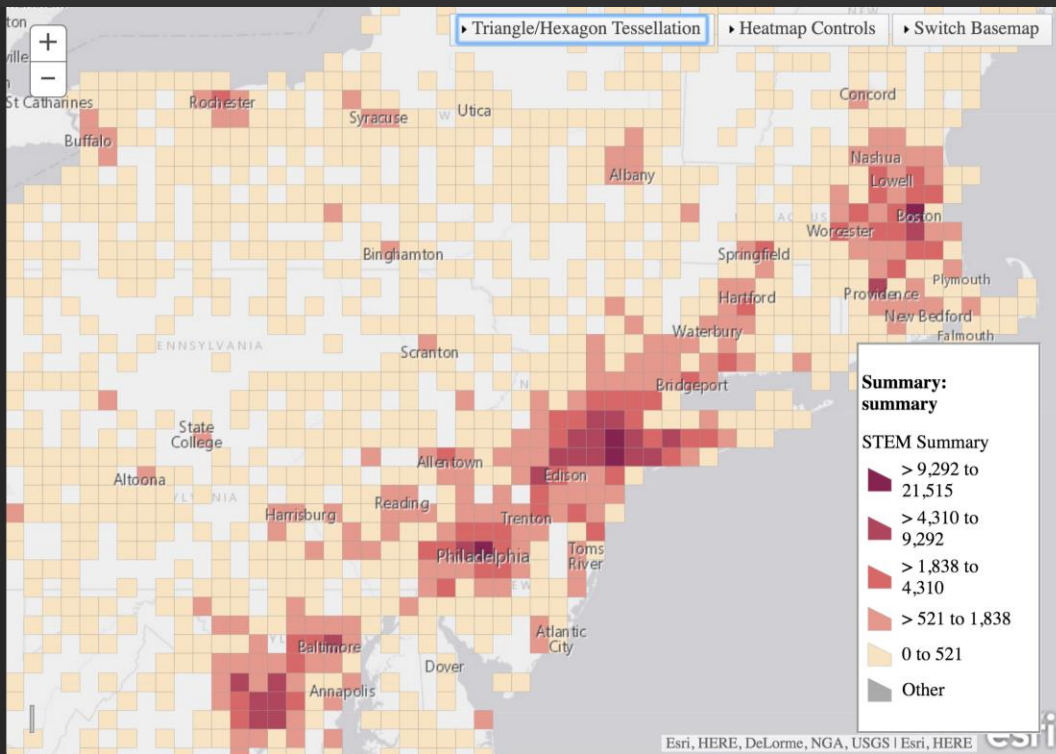
- Feature layers **pull** from feature services
 - Web apps poll to get periodic updates
 - Must be backed by an enterprise geodatabase (EGDB) or spatiotemporal big data store (SBDS)
- Stream layers **subscribe** to stream services
 - Web apps subscribe to immediately receive data
 - Low latency and high throughput



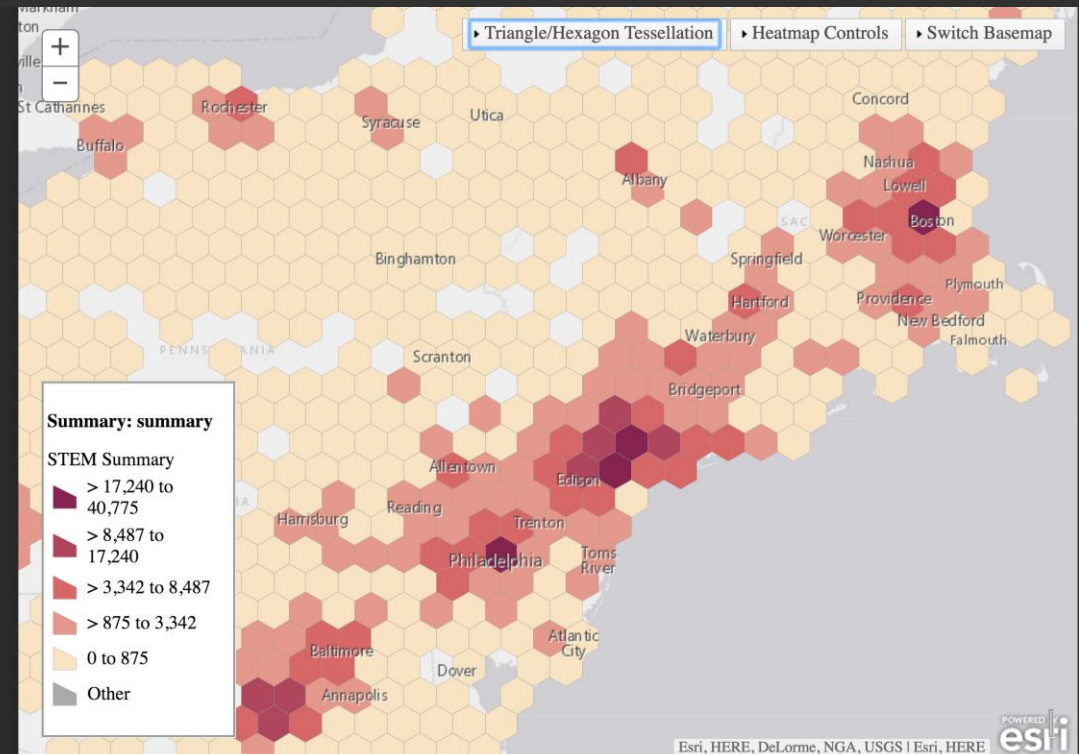
spatiotemporal big data store

10.5 enhancements

- spatiotemporal big data store & map service enhancements:
 - enhanced aggregation capability to support on-the-fly square & hexagon aggregation



square aggregation



hexagon aggregation

Thank you very much!



Understanding our world.