Federal GIS Conference

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Network Analysis with ArcGIS Online

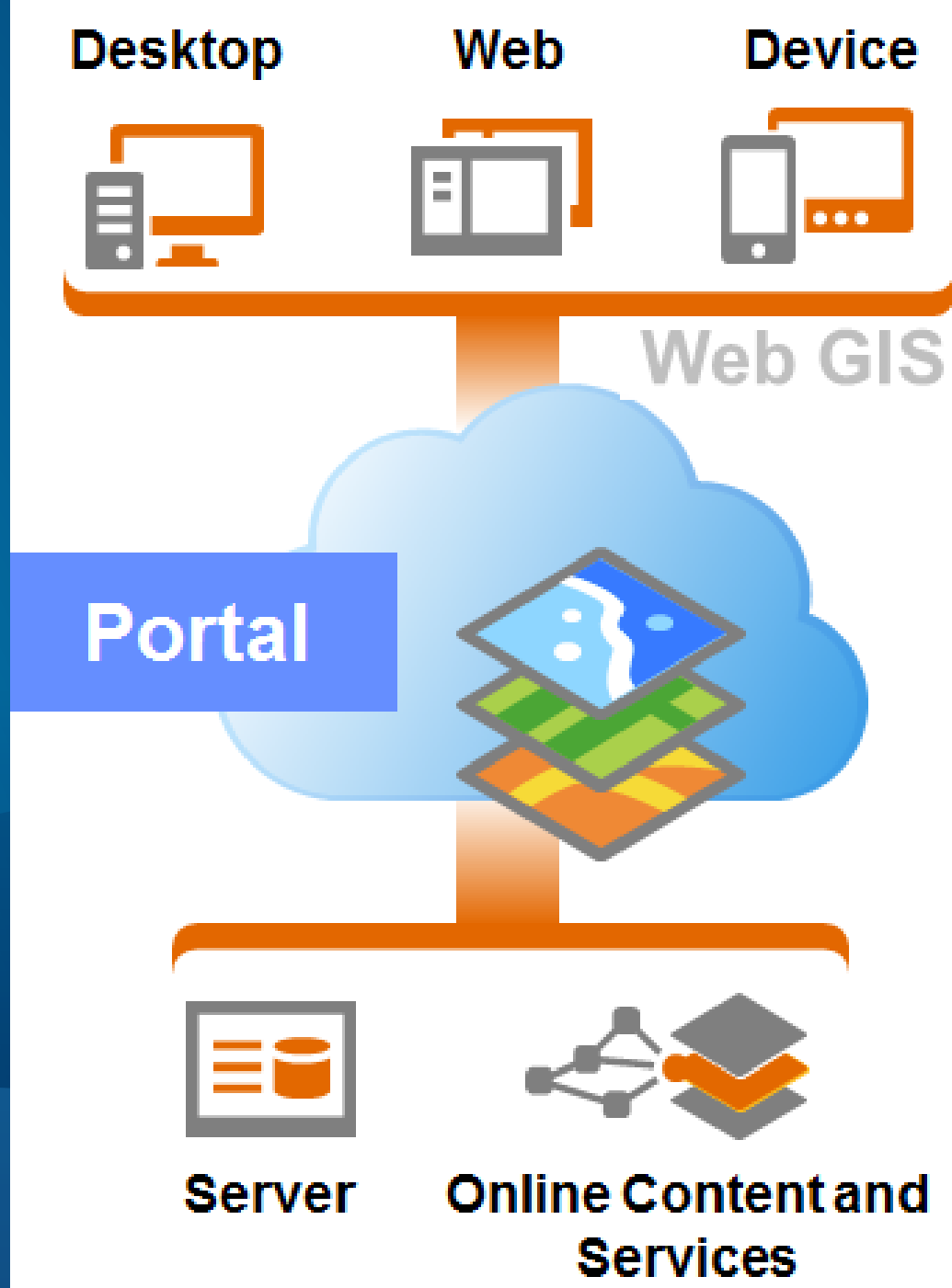
Matt Kennedy

Topics

- Online versus on-premise network analysis services
- How to access online services
- How to use online services
- On-premise services
- When to use online and on-premise services
- Support and resources

Types of Network Analysis Services

Online versus on-premise



Online services

- Ready to use
- Published by Esri
- Run on Esri-administered cloud infrastructure

On-premise services

- Create with ArcGIS software
- Published by you
- Run on your IT infrastructure

What you need for on-premise services

- ArcGIS software
- Hardware and IT infrastructure
- Staff
- Data modeled as a network dataset
- ~~ArcGIS Online subscription~~
- Analysis inputs
- Apps to consume services

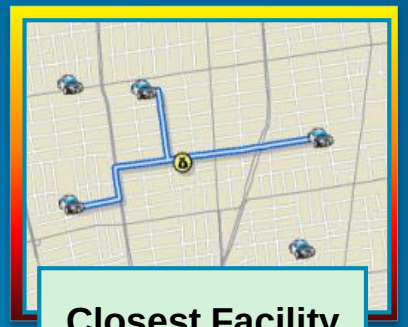
What you need for online services

- ~~ArcGIS software~~
- ~~Hardware and IT infrastructure~~
- ~~Staff~~
- ~~Data modeled as a network dataset~~
- ArcGIS Online subscription
- Analysis inputs
- Apps to consume services

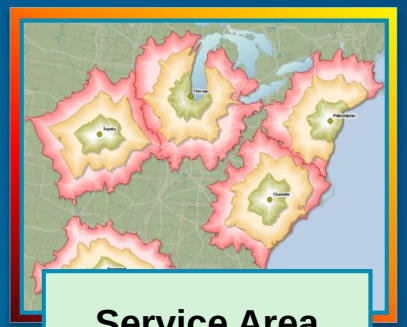
Network Analysis Services

Solve transportation problems

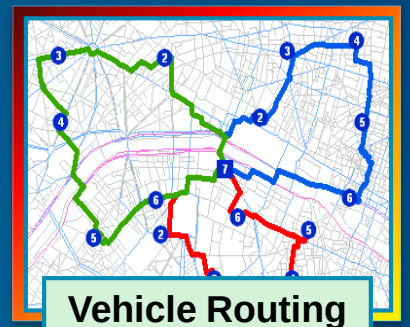
Route



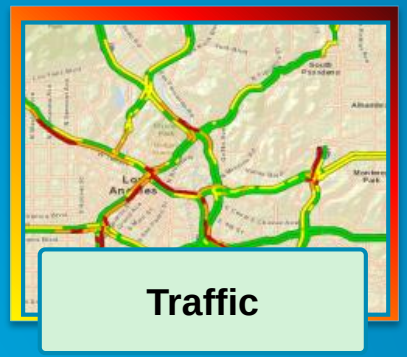
Closest Facility



Service Area

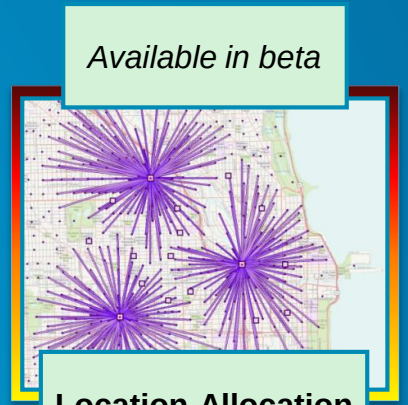


Vehicle Routing Problem

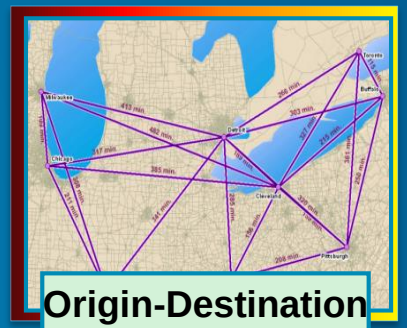


Traffic

Available in beta



Location-Allocation

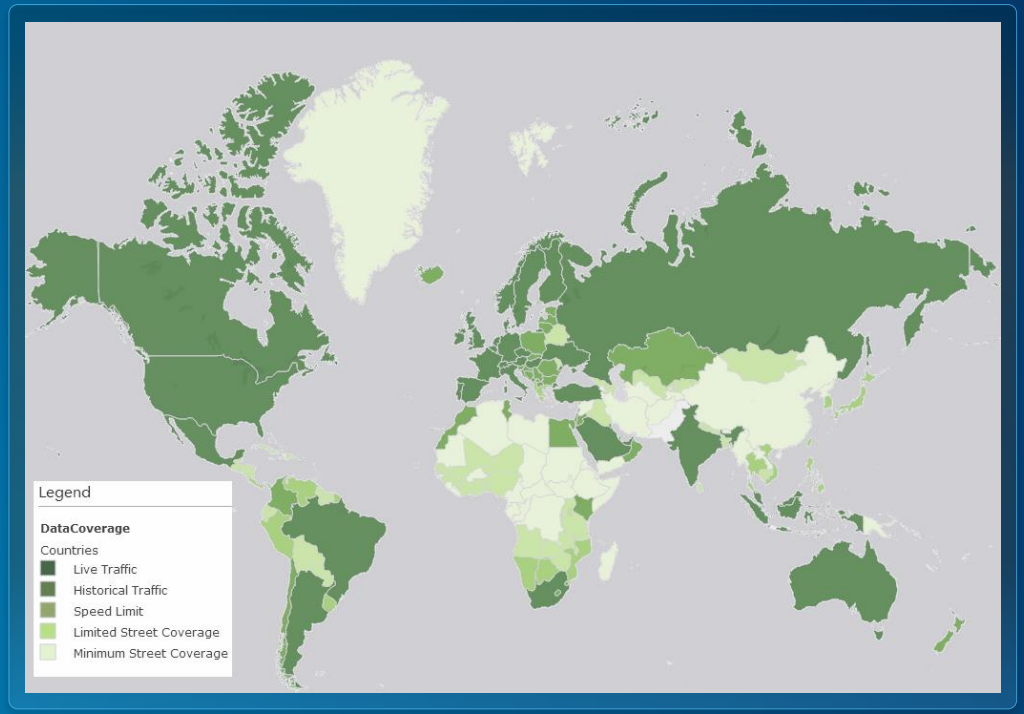


Origin-Destination Cost Matrix

Online services

Data coverage

- **Work globally**
  - Currently 238 countries
- **Use high quality street data**
  - Real time traffic where available
  - Weight, width, and height restrictions
  - Preferred truck routes
  - Avoid toll roads
- **Driving, Walking, and Trucking mode**



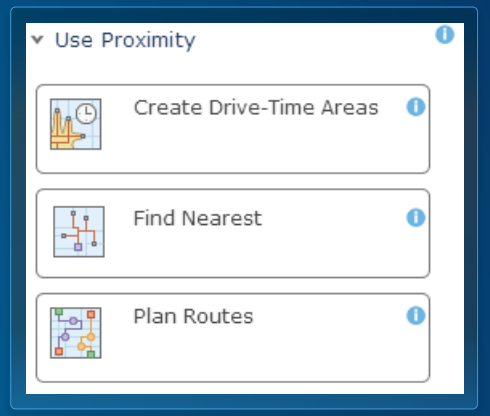
View web map

Accessing services

- All services are secured and require ArcGIS Online organization subscription
- Existing ArcGIS Desktop users get a free organization subscription
- Sign up for a 30 day free trial at www.arcgis.com

Using services

- Out of the box clients
  - ArcGIS for Desktop
  - ArcGIS.com map viewer

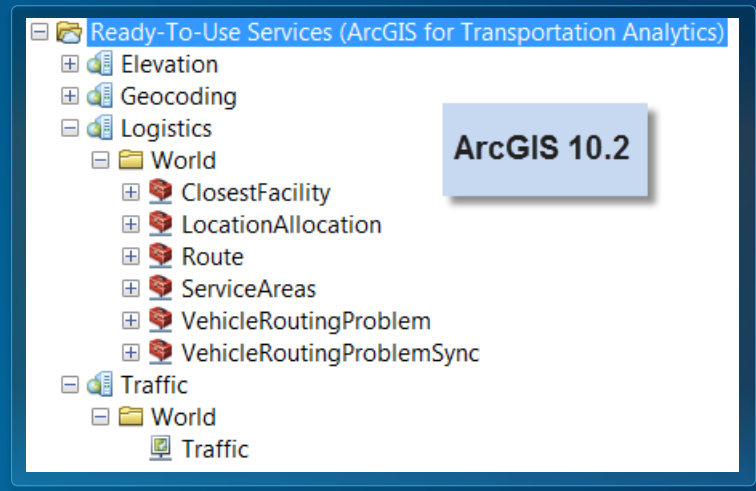


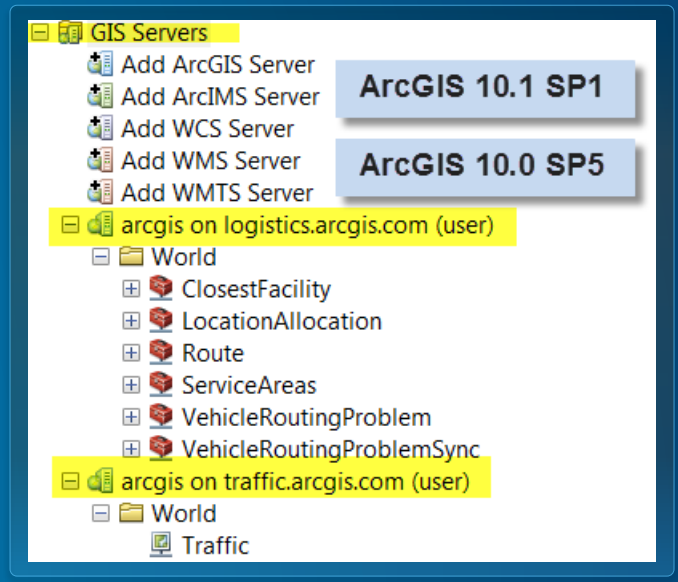
- Some services supported in other ArcGIS apps
  - Collector for ArcGIS
  - Operations Dashboard for ArcGIS
  - Route Planner

- ArcGIS web and runtime SDKs
  - http://developers.arcgis.com

Using services with ArcGIS for Desktop

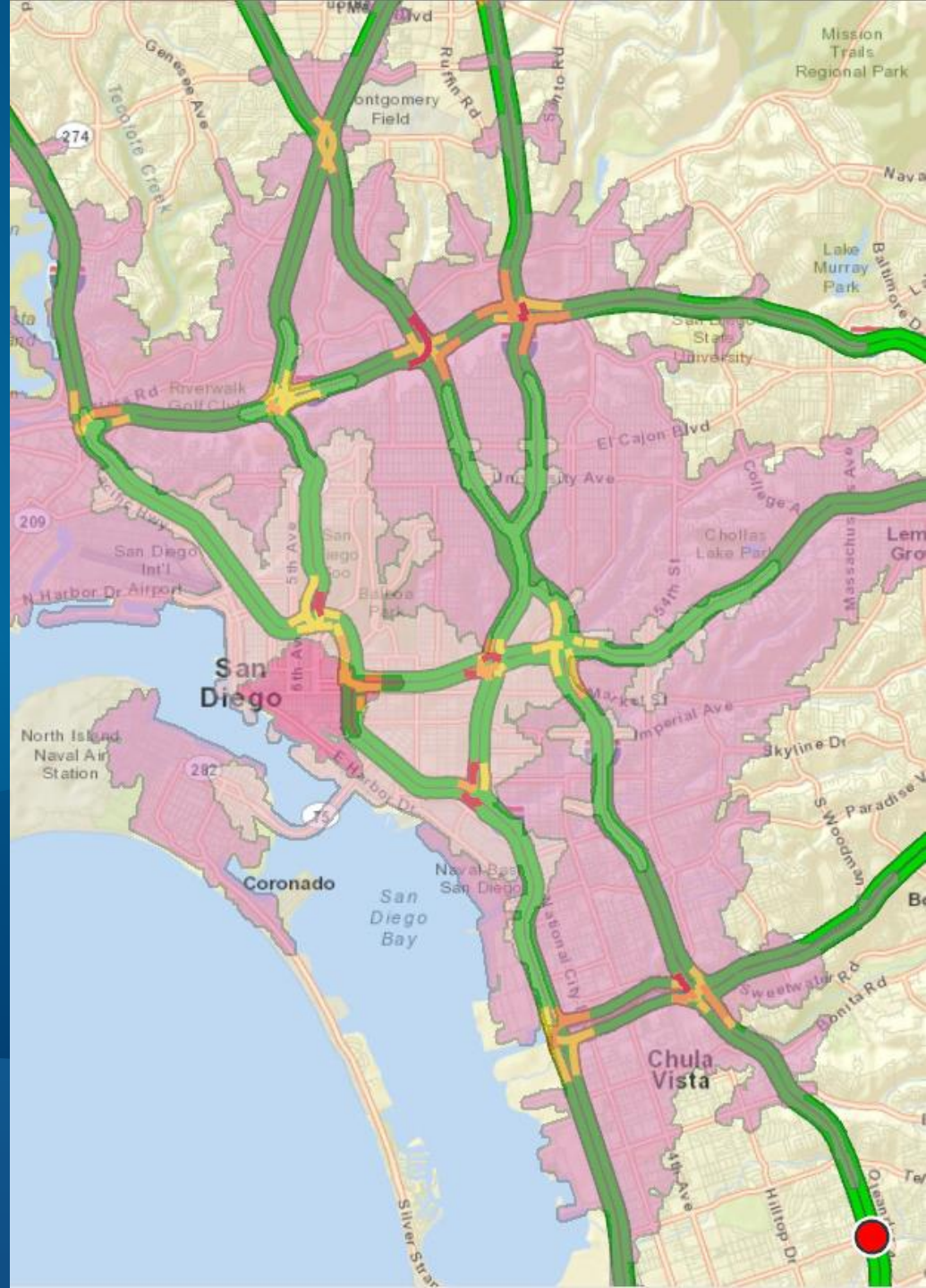
- Supported with ArcGIS for Desktop version
  - 10.0 SP5
  - 10.1 SP1 (10.1 final is not supported)
  - 10.2
- Single sign-on support with 10.2
- Need to create ArcGIS server connections with 10.1 SP1 and 10.0 SP5





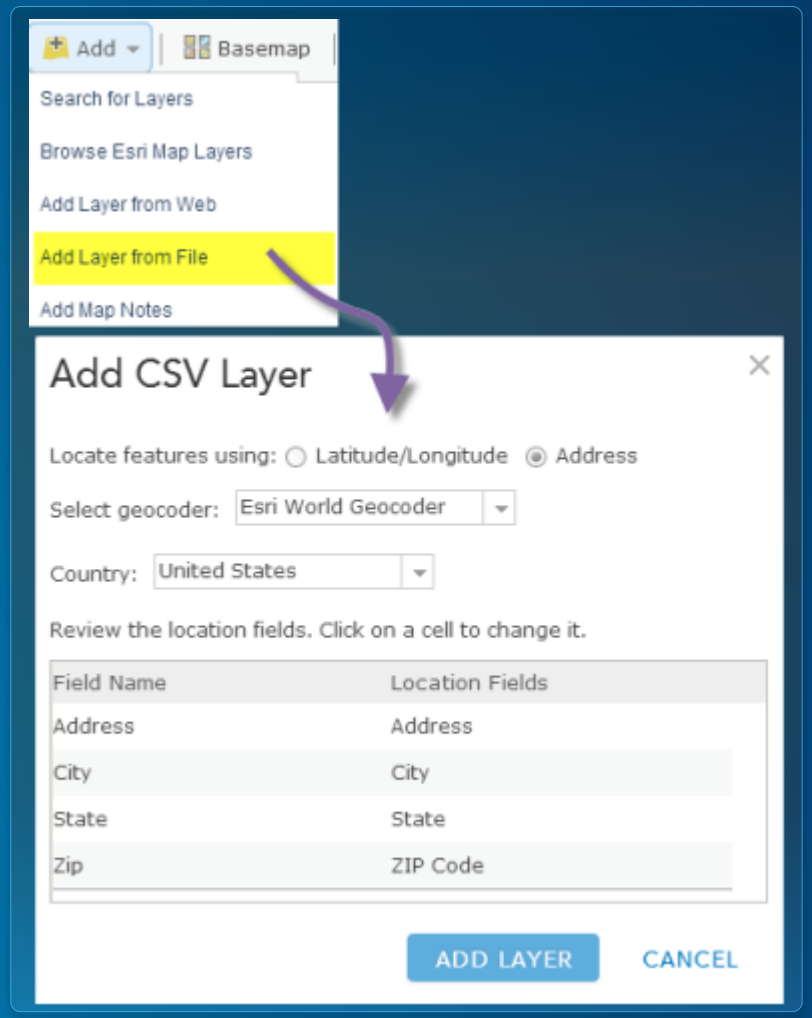
Demo

Connecting to online services in ArcGIS for Desktop



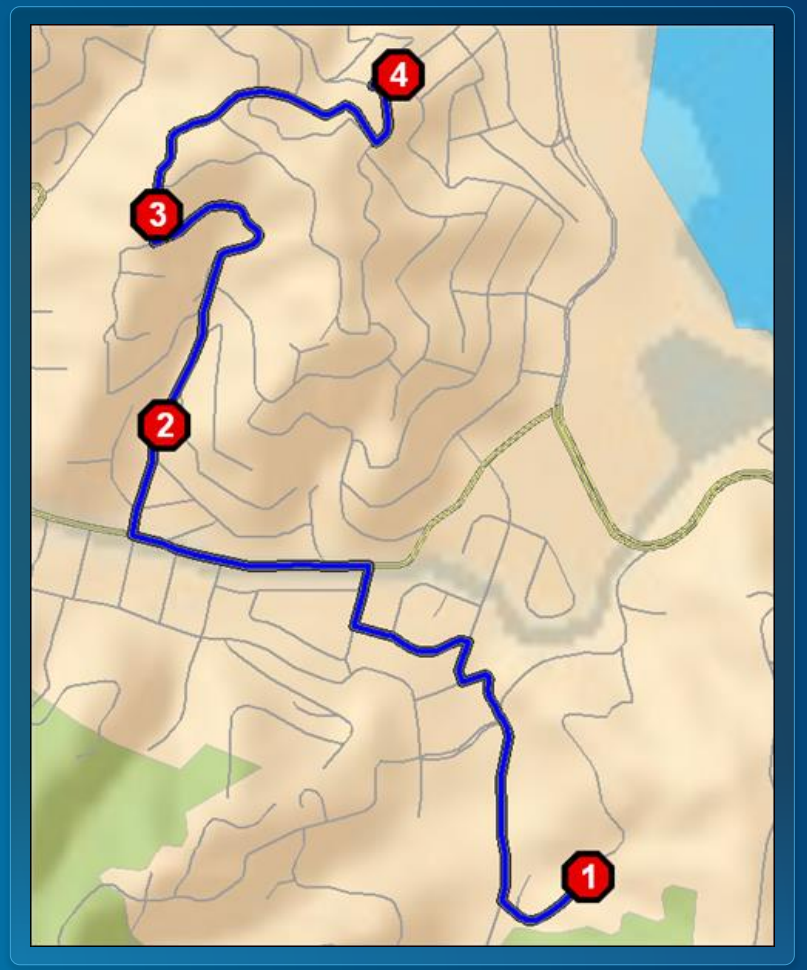
Using services with ArcGIS.com map viewer

- Need to add your inputs to ArcGIS Online
- Layers and data you can analyze
  - Feature service
  - Map service
  - Comma-seperated values (CSV) file (.csv)
  - GPS exchange format file (.gpx)
  - Shapefile (.zip)
  - File Geodatabase (.zip)
  - GeoRSS
  - KML
  - Map notes
  - Route layers



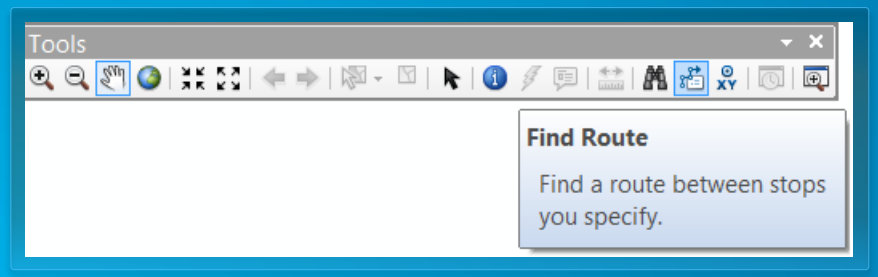
Directions (Route) Service

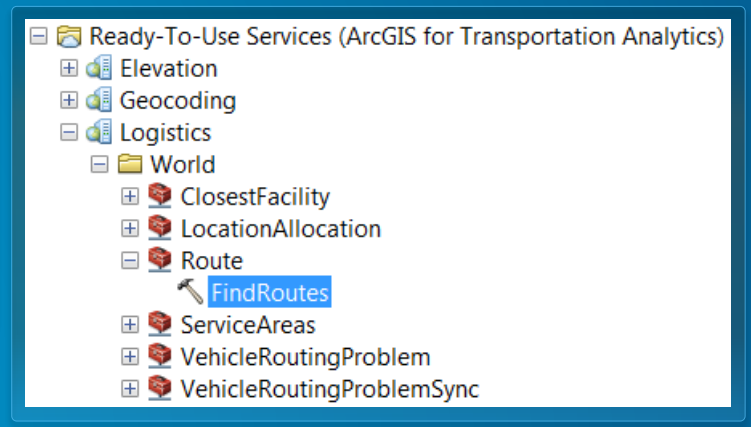
- Point-to-point routing – Simple Route
- Find the best route for visiting a series of stops that minimizes travel time or travel distance – Optimized route
- Use live traffic conditions
- Driving directions in many languages

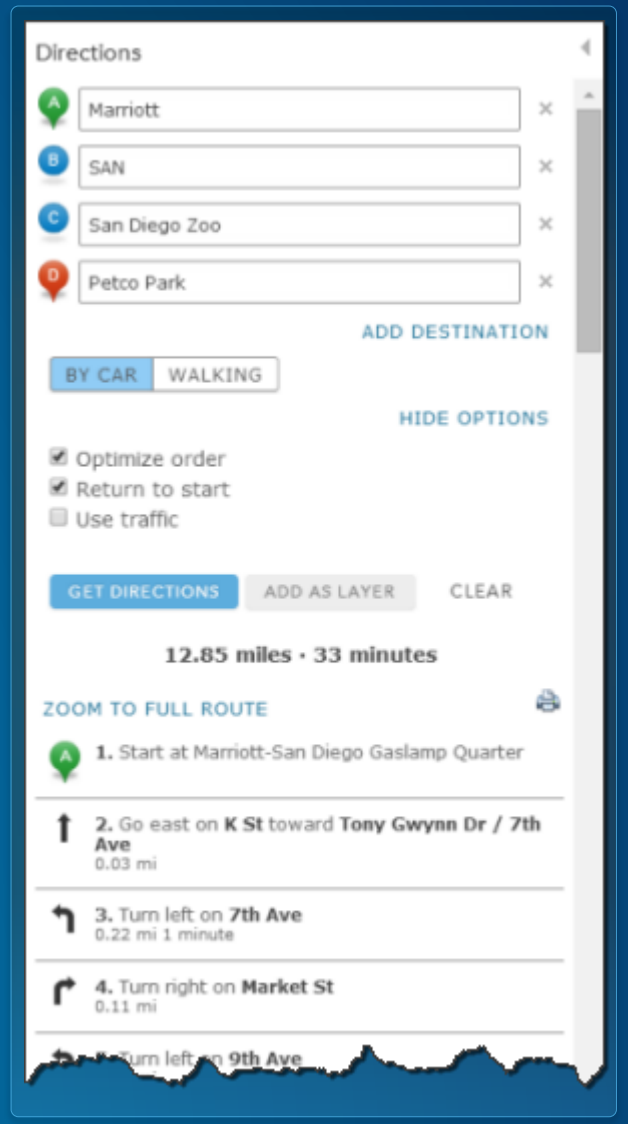


Using Directions service

- Use from Directions widget in ArcGIS.com map viewer
  - Can save results as a web map layer for further analysis
- Use FindRoutes geoprocessing tool from Ready-to-Use Services
- Use from Find Route button in ArcMap



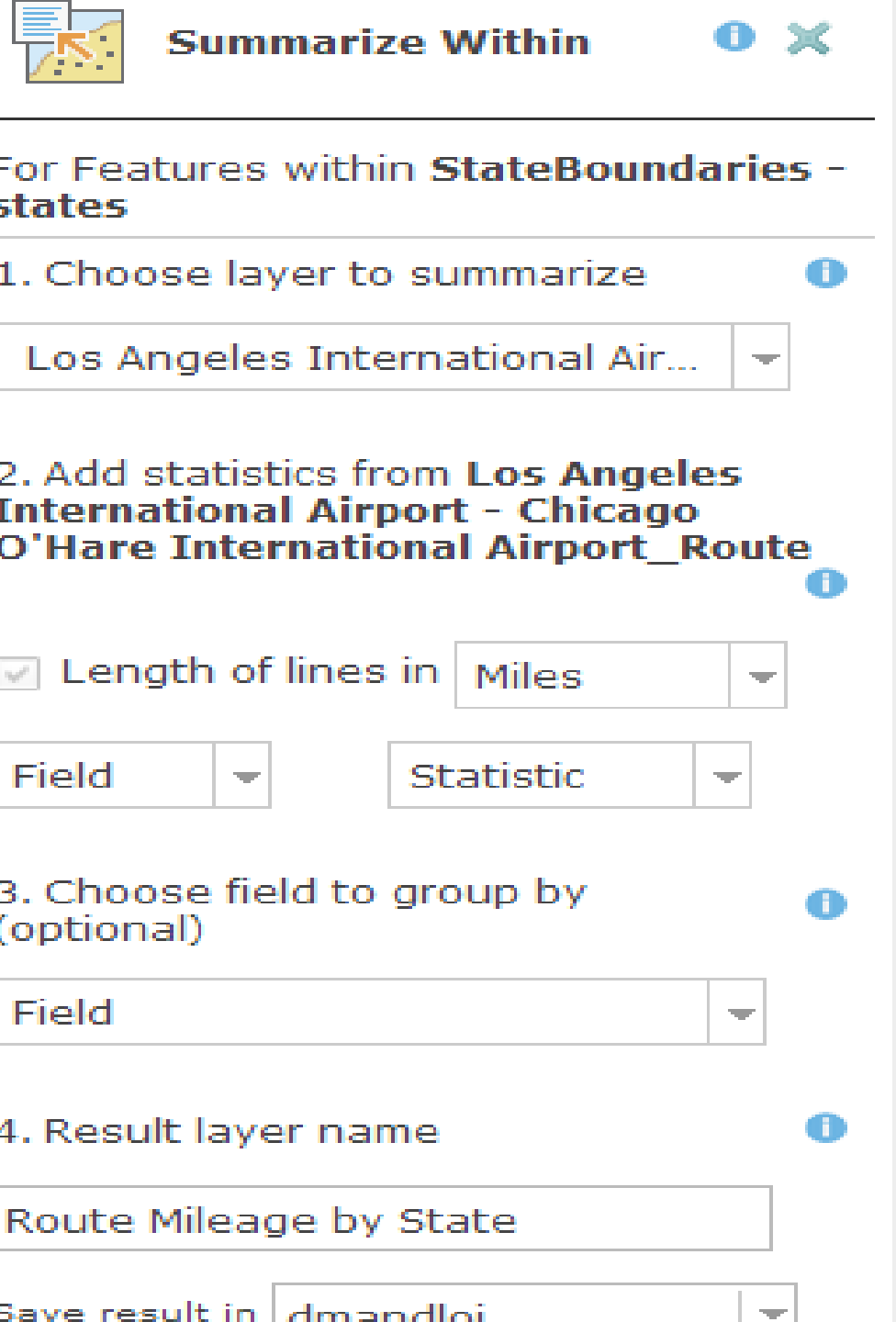




Demo

Mileage summary by state

Find best route and determine the miles covered by the route in each state

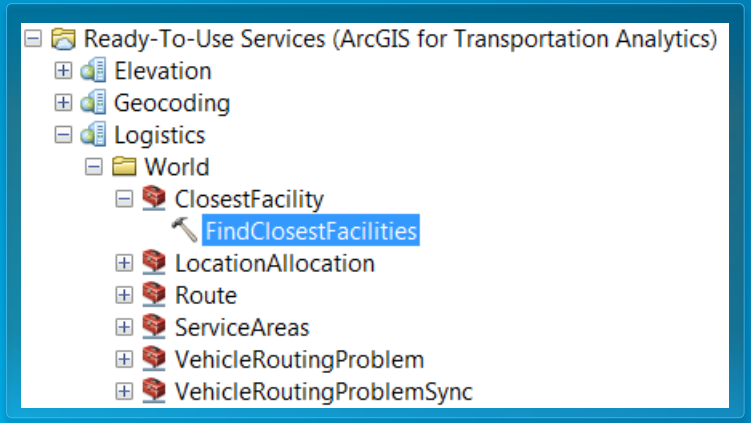


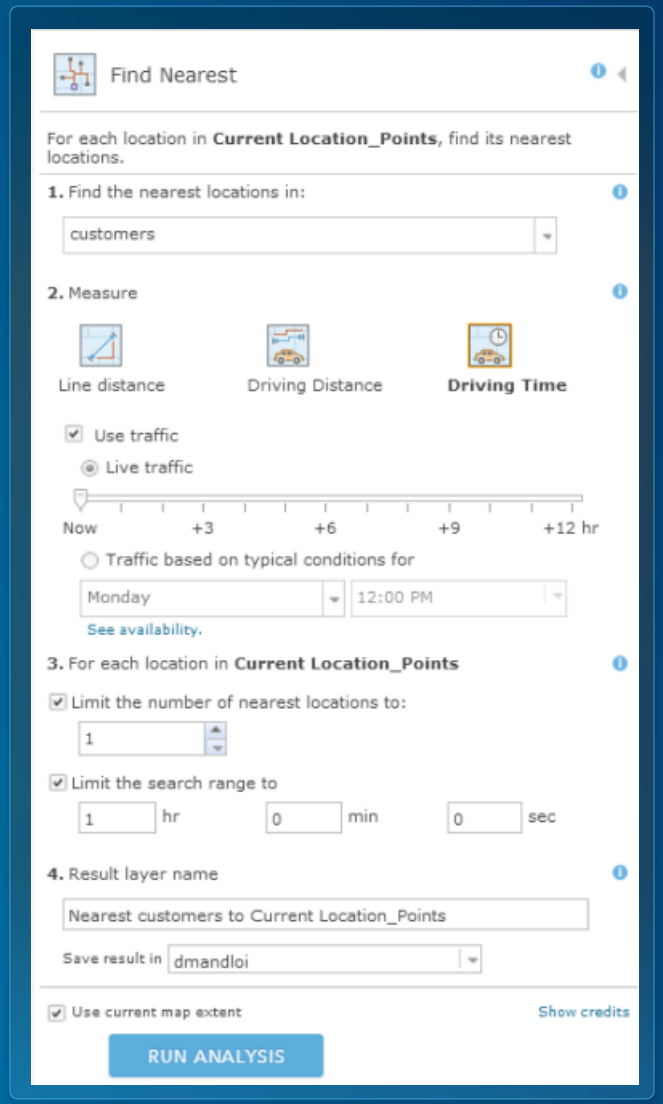
Closest Facility service

- Find the closest facilities from each incident
- Generate routes and driving directions
- You can also…
  - Use live traffic conditions
  - Limit the search distance
  - Limit the number of facilities to find
  - Travel from the facility to the incident

Using Closest Facility service

- **Use Find Nearest analysis tool in ArcGIS.com map viewer**
- **Use FindClosestFacilities geoprocessing tool from Ready-to-Use Services**

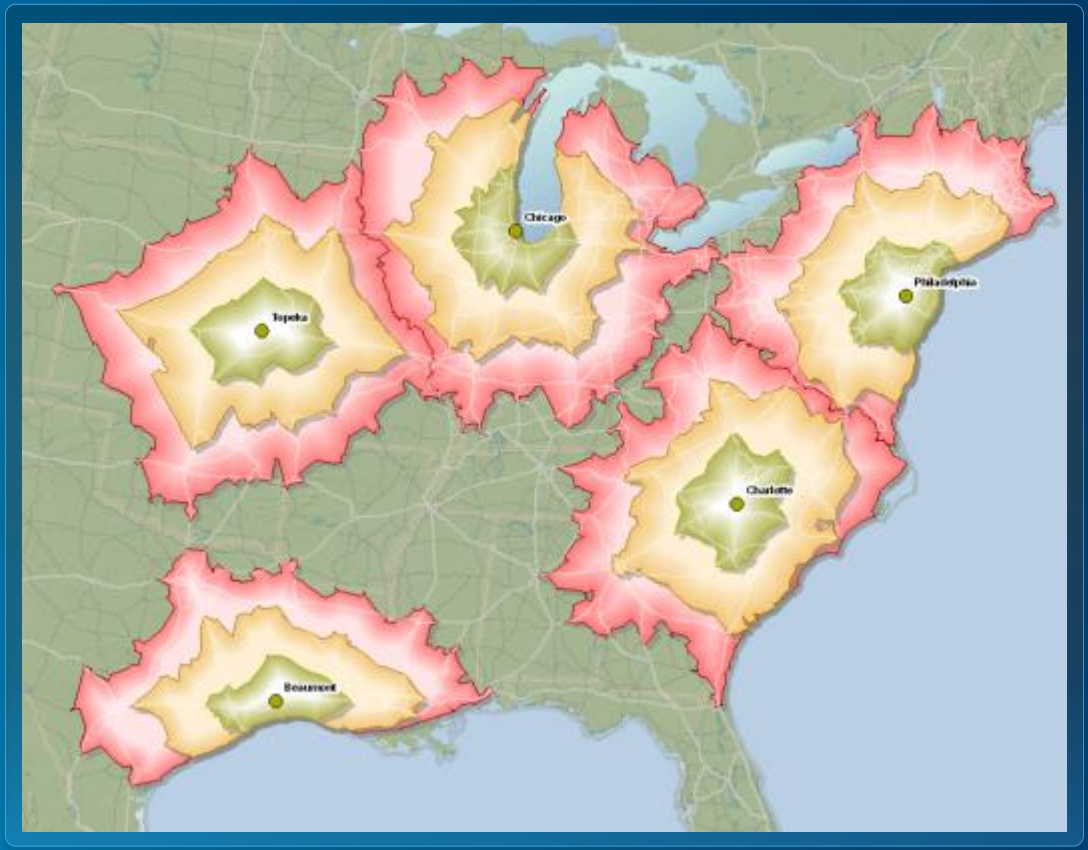




Service Areas (Drive Times) service

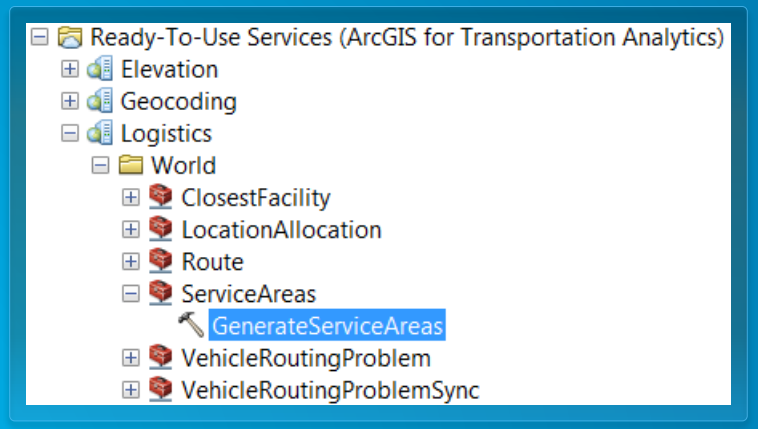
- Find the area you can reach from a location in a given time period

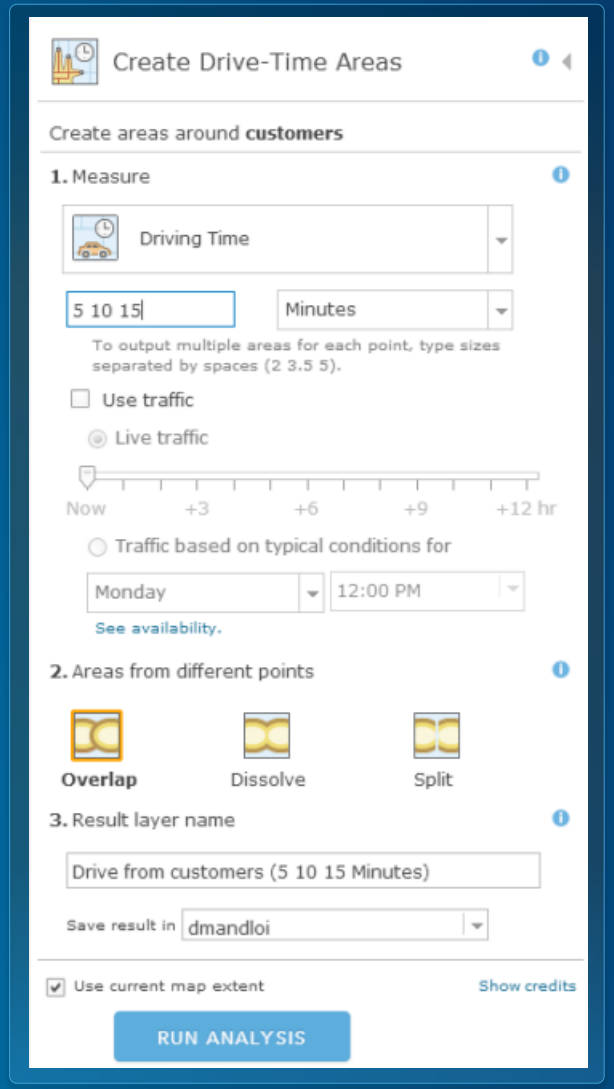
- You can also…
  - Solve for many locations
  - Use multiple drive time values
  - Analyze for different times of the day
  - Specify the direction of travel



Using Service Areas service

- Use Create Drive Time Areas, Summarize Nearby or Enrich Layer analysis tool in ArcGIS.com map viewer
- Use GenerateServiceAreas geoprocessing tool from Ready-to-Use Services

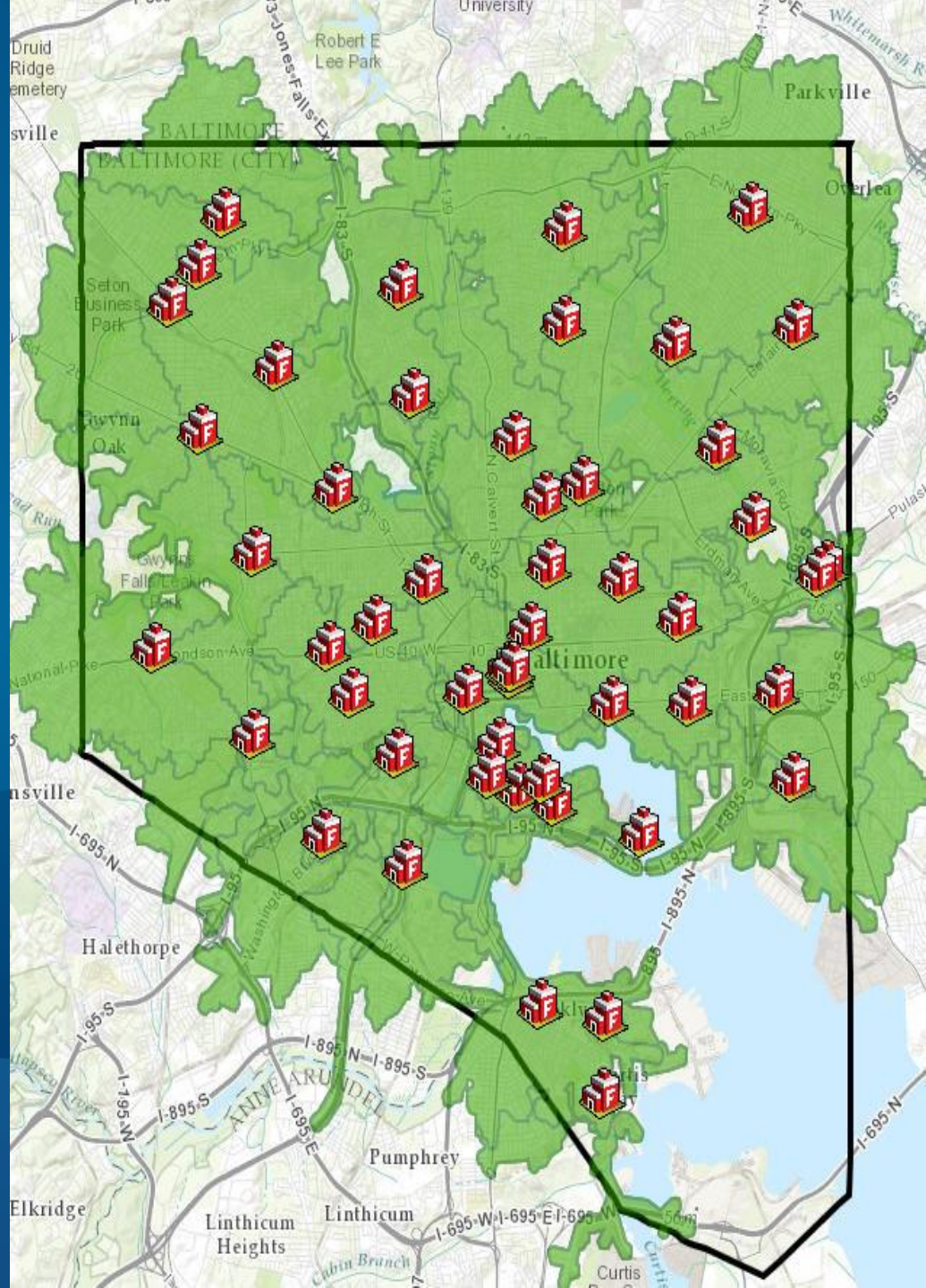




Demo

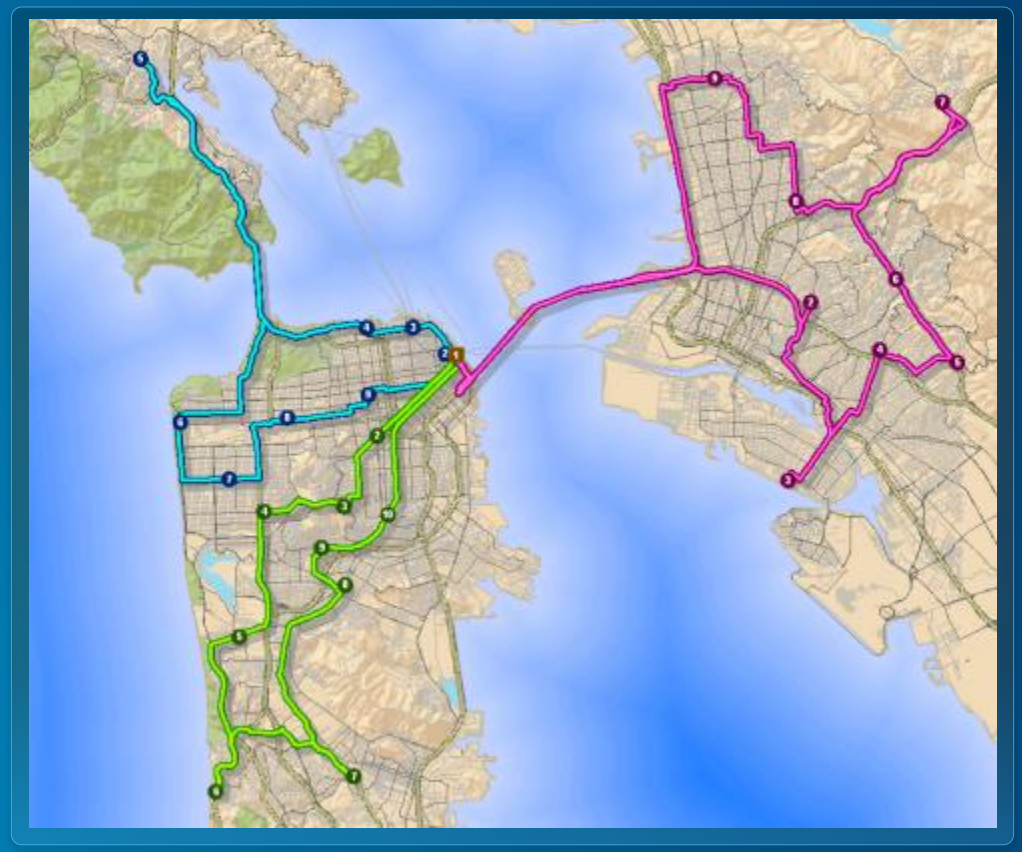
Service Area Analysis

Determine where emergency vehicles can reach in 4 minutes



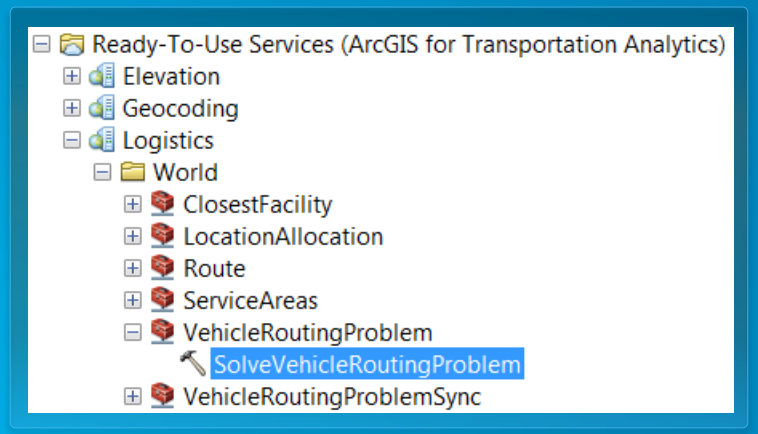
Vehicle Routing Problem (Fleet Routing) service

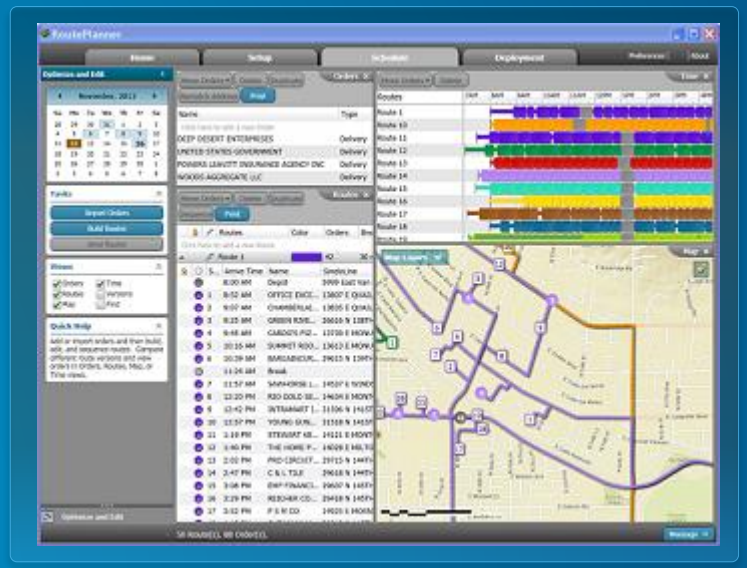
- Route a fleet of vehicles to service a set of orders
- You can also specify…
  - Vehicle capacities
  - Driver specialties
  - Work breaks
  - Time windows on orders

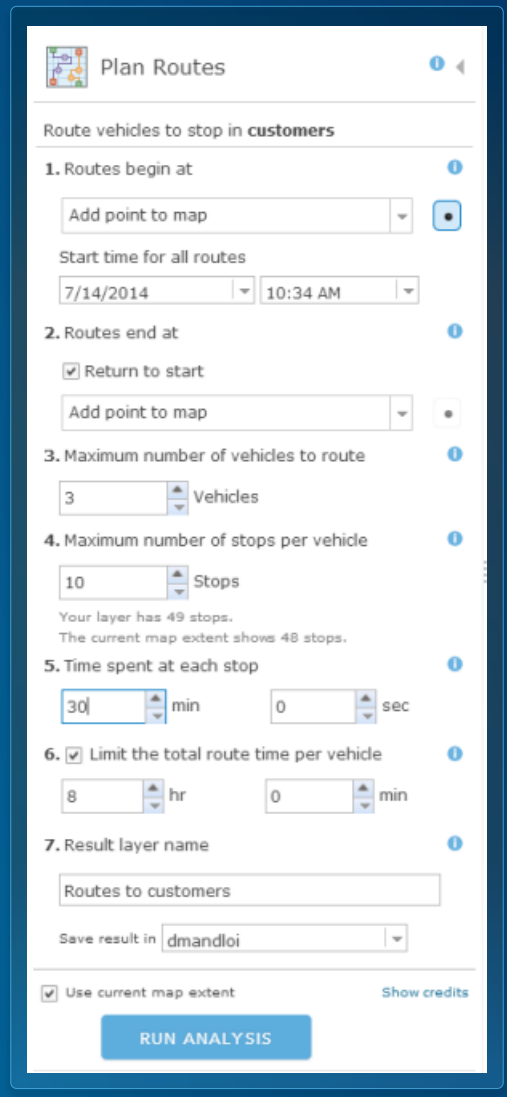


Using Vehicle Routing Problem service

- Use Plan Routes analysis tool in ArcGIS.com map viewer
- Download the free Route Planner application
- Use SolveVehicleRoutingProblem geoprocessing tool from Ready-to-Use Services



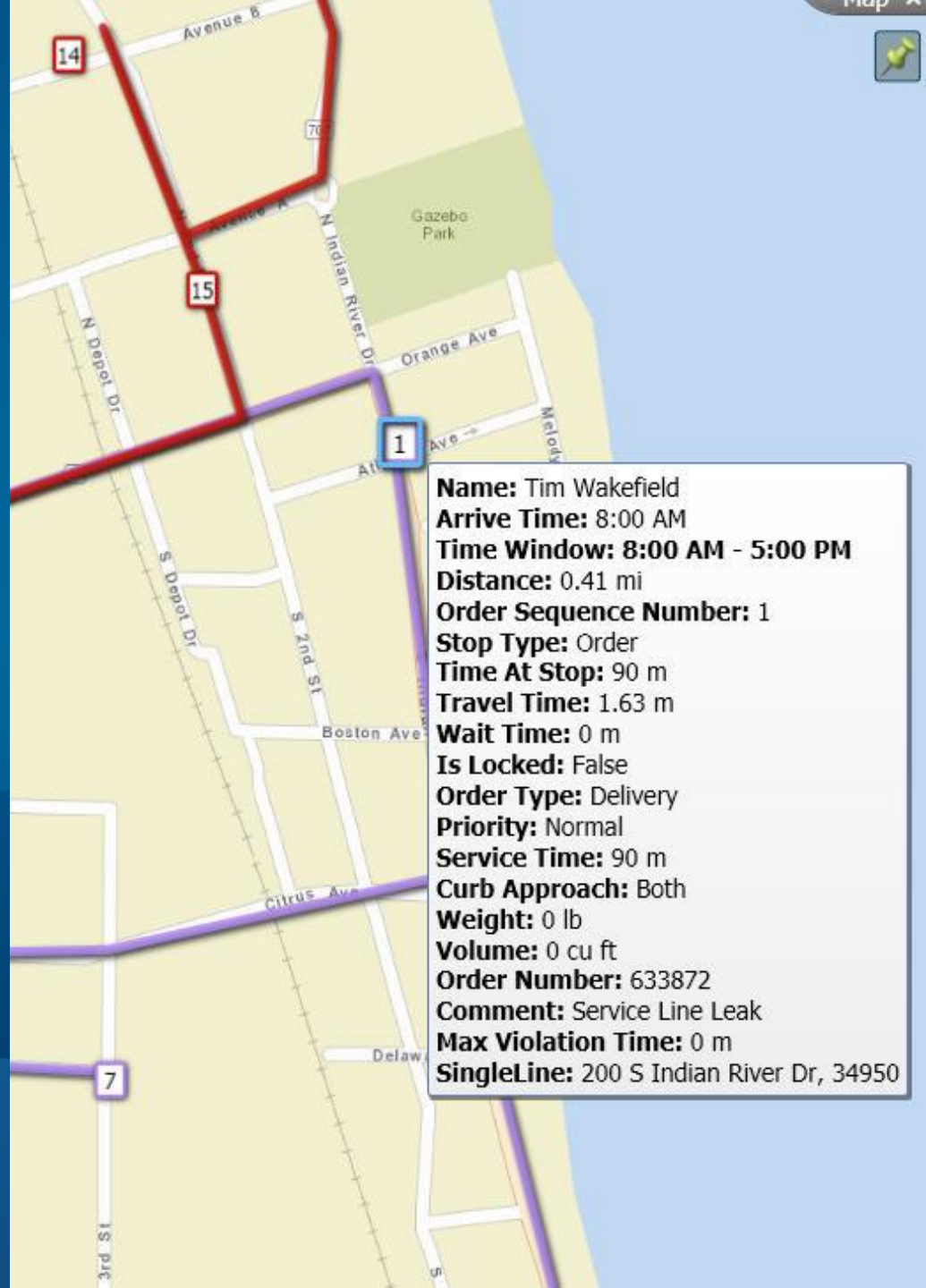




Demo

Schedule Field Work

Workorders using a fleet of vehicles

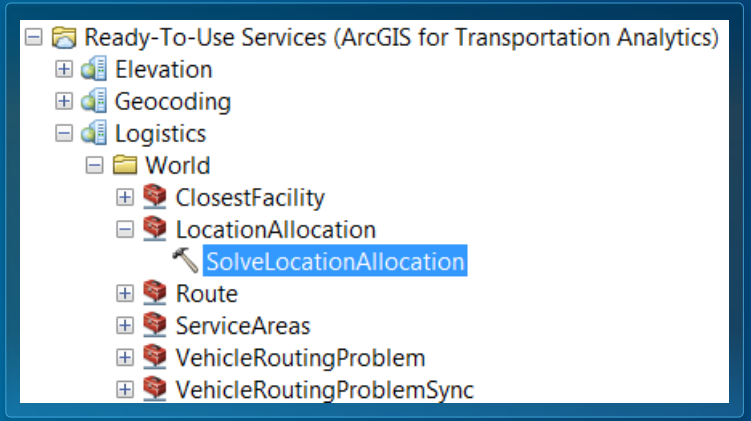


Location-Allocation service (beta)

- Determine the best location for a facility, based on demand conditions
  - Choose from many different analysis types
  - Limit the capacity of facilities
  - Analyze for different times of day

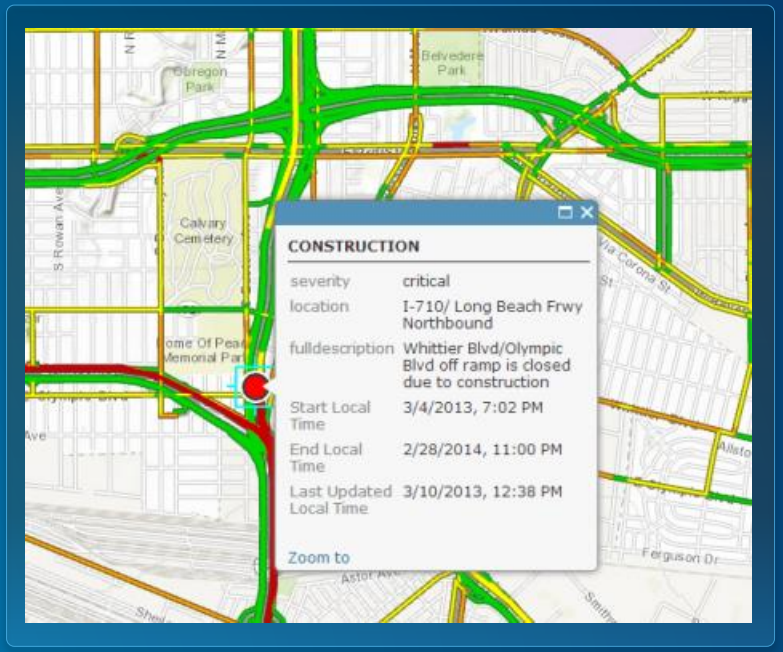
Using Location-Allocation service

- Currently not available as an analysis tool in ArcGIS.com map viewer
- Use SolveLocationAllocation geoprocessing tool from Ready-to-Use Services



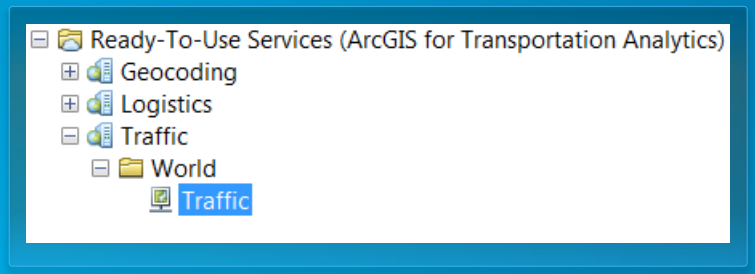
Traffic service

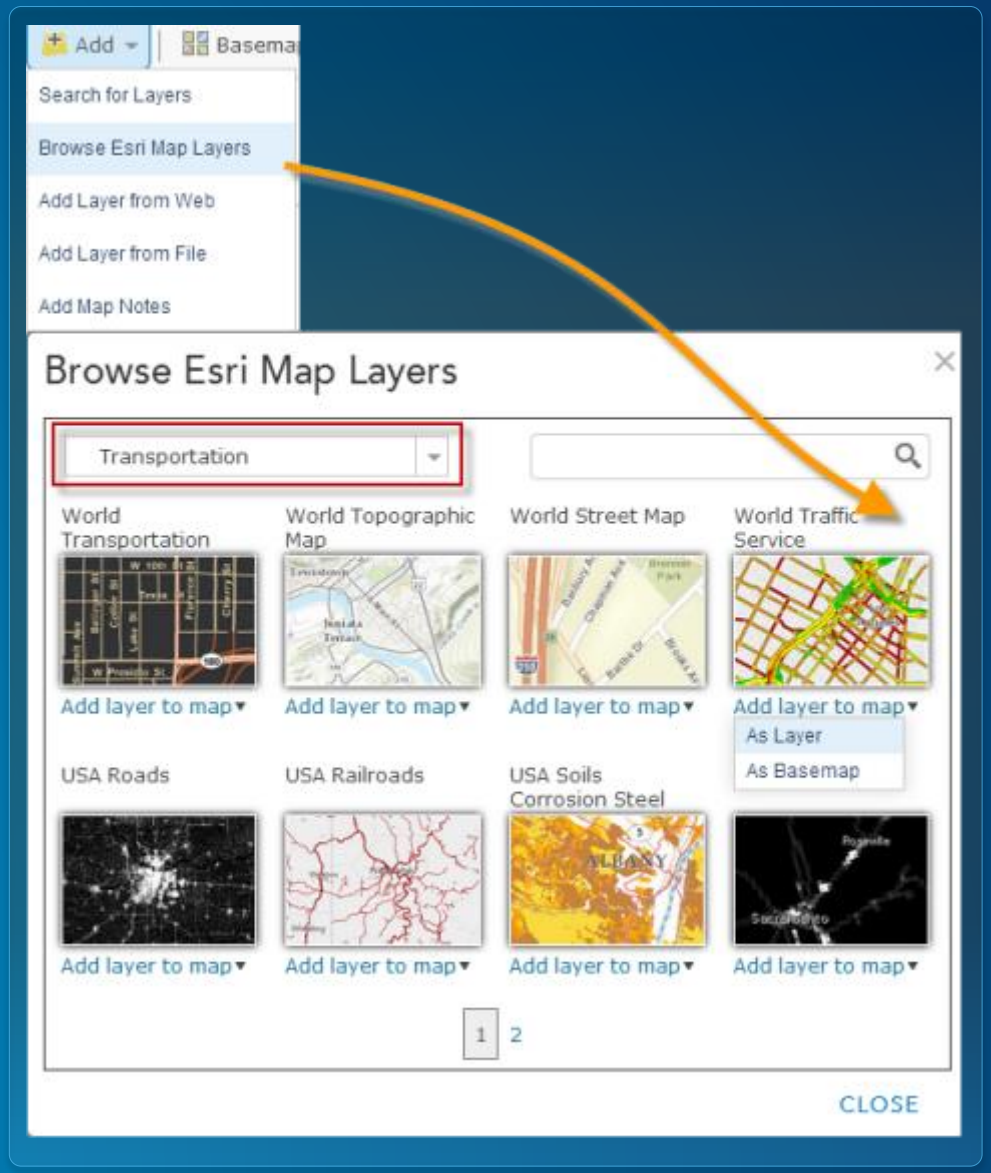
- Visualize traffic speeds
  - Support for live, historical and predictive traffic conditions
- Traffic Incidents
- Background layer to display results from network analysis services
- Data updated every five minutes



Using Traffic service

- Use the World Traffic web map or add Traffic layer to your own web map
- Use traffic map service in ArcGIS for Desktop





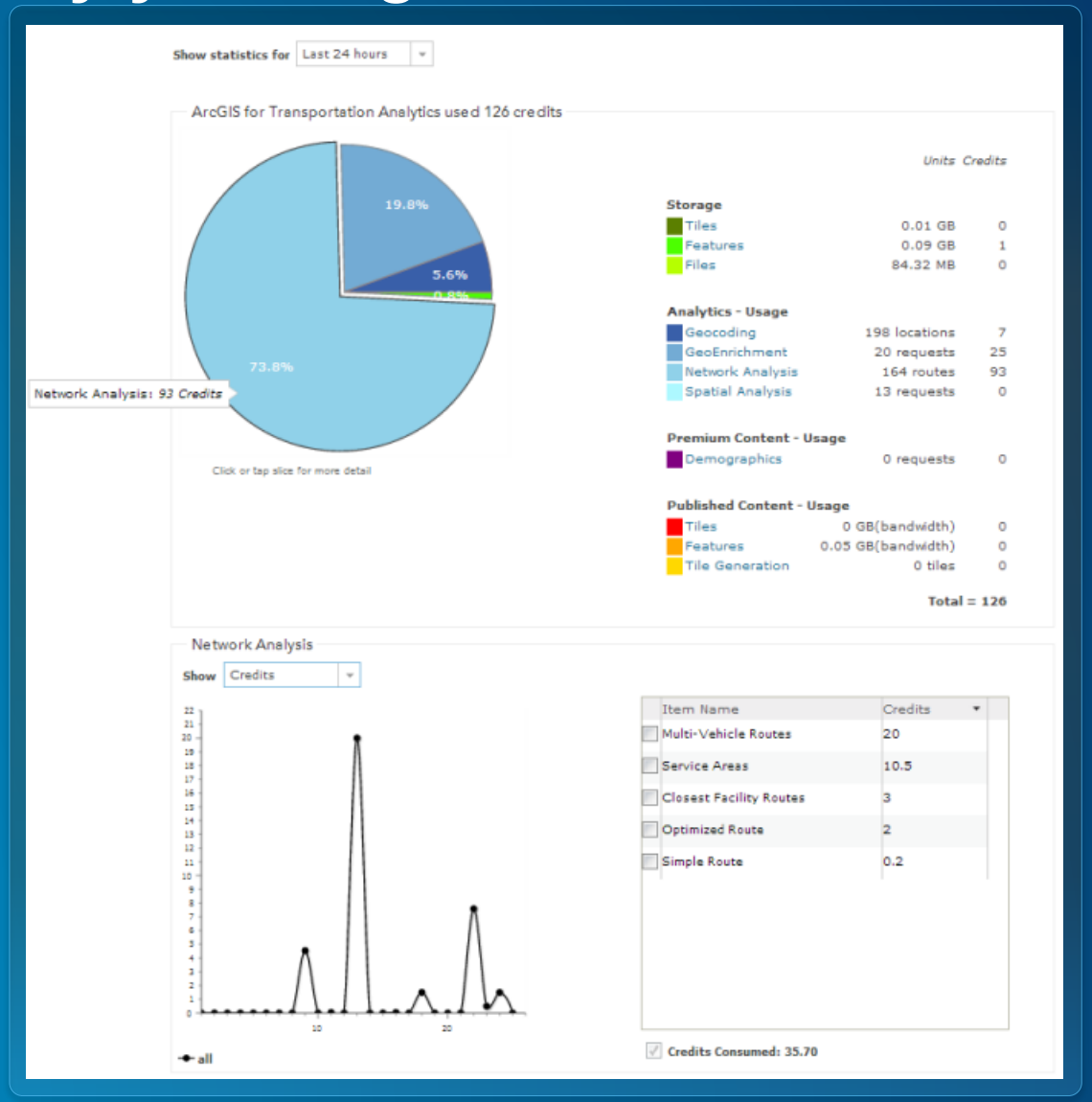
Understanding Your Bill – Service Credits

- **Every successful request deducts credits from your organization**
- **How many service credits does network analysis use?**
- **Credits Explained**
- **Service Credits Estimator**

Network Analysis	Credits Used
Simple Routes	0.04 credits per route
Optimized Routes	0.5 credits per optimized route
Drive Time (Service Areas)	0.5 credits per drive time
Closest Facilities	0.5 credits per closest facility route
Multi-Vehicle Routes(VRP)	1 credits per route
Location-Allocation (while in beta)	0 Credits
Traffic	0 credits

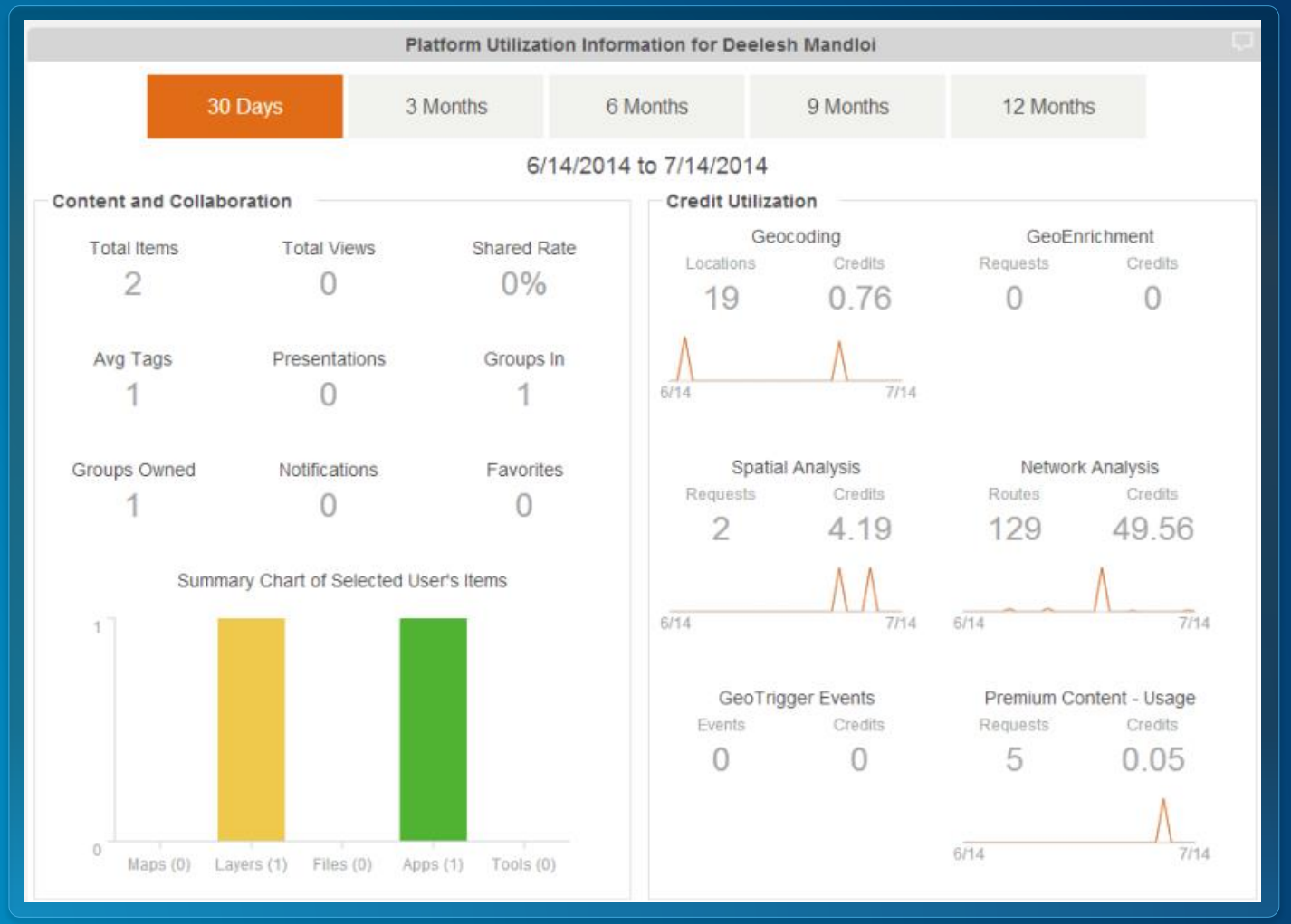
Monitor service credits used by your organization

- **Reports can be accessed by the adminstrators in your ArcGIS Online organization**



Monitor service credits used by named users in your organization

- Access user level credit usage reports using [Activity Dashboard for ArcGIS]



Online services in your own apps

Directions and Routing

The directions service allows you to generate routes between any numbe
of places. Generate optimal routes to the nearest one of several places.
Calculate areas accessible in a given amount of time.

Key Features

- Get directions from A to B
- Optimize routes to multiple locations
- Calculate how far you can drive in a given time period
- Determine the closest place from a set of places
- Optimize deliveries for vehicles and destinations

JavaScript

Using Directions
Sample Code
API Reference

iOS

Tutorial
Sample Code
API Reference

Android

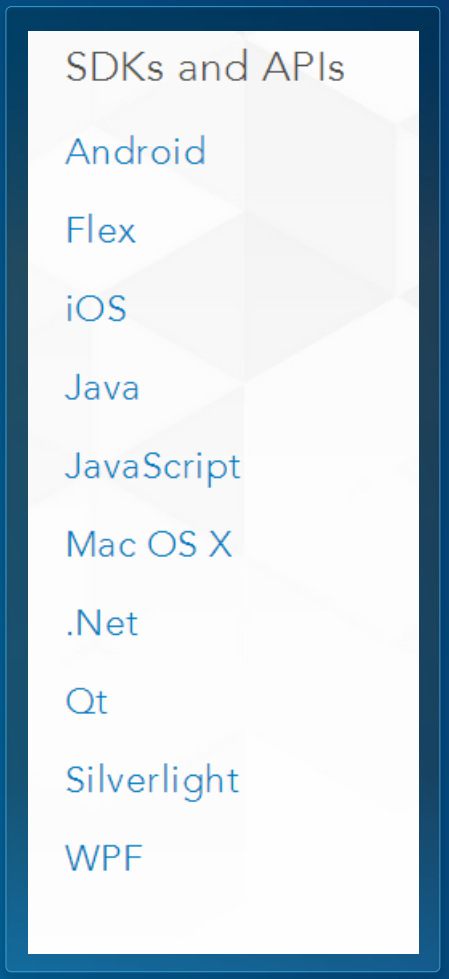
Tutorial
Sample Code
API Reference

REST

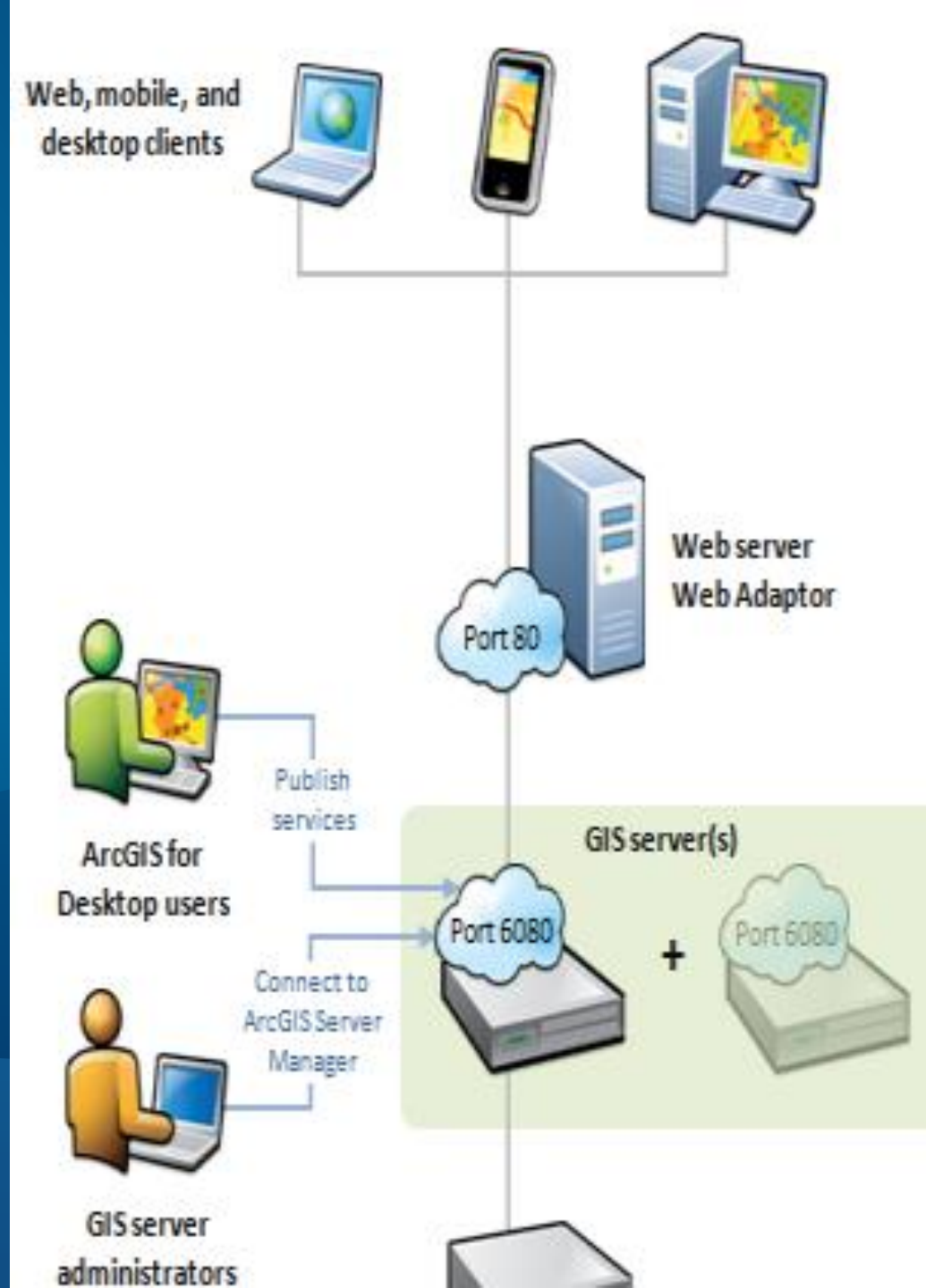
Directions
Service Areas
Nearest Facility
Fleet Routing
Traffic

Building apps using network analysis services

- Use ArcGIS web APIs and runtime SDKs
- If using the JavaScript API
  - Use the directions widget
  - Use the analysis widgets
- http://developers.arcgis.com
- Additional samples at
  - http://nadev.arcgis.com/arcgis/samples



On-premise services



On-premise service workflow

Network analysis using on-premise services

ArcGIS for Server

Geoprocessing Service

- A toolbox with geoprocessing tools
- Full use of the geoprocessing framework
- Synchronous and Asynchronous execution
- SOAP and REST endpoints for all solvers
- Out-of-the-box clients

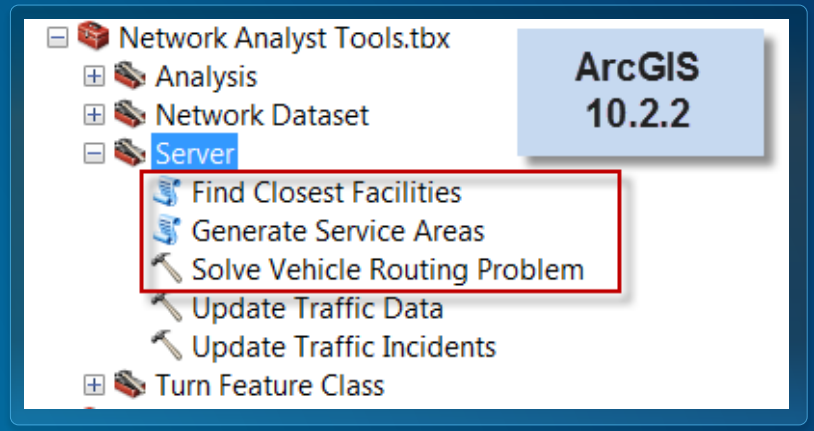
Network Analysis Service

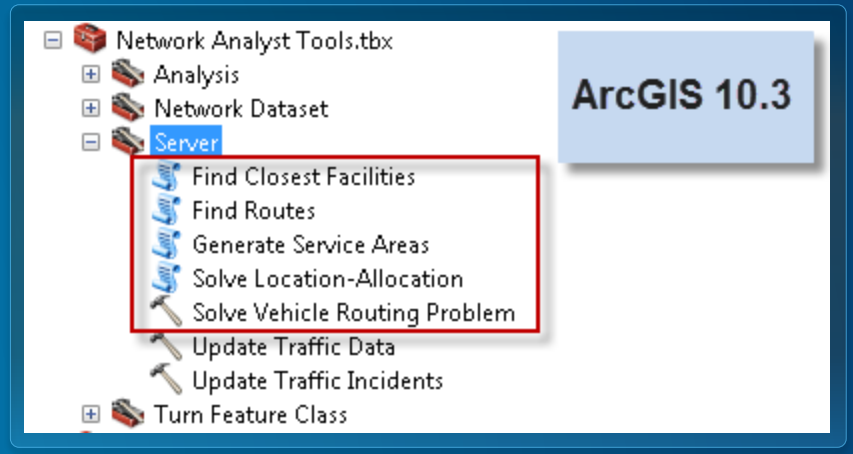
- Map document with network analysis layers
- Synchronous execution
- SOAP endpoints for all solvers
- REST endpoint for Route, Closest Facility, and Service Area solvers
- Few out-of-the-box clients

On-premise geoprocessing services

- Use the tools in the Server toolset within Network Analyst Tools toolbox to publish geoprocessing services that perform network analysis

- New tools to publish route and location-allocation geoprocessing services will be available in ArcGIS 10.3





On-premise services

- More details about authoring, publishing and using on-premise network analysis services are available in technical workshop titled Performing Network Analysis with ArcGIS for Server from 2012 user conference
  - Workshop presentation
  - Workshop video
- Applicable for ArcGIS for Server 10.1 and 10.2

Need to use on-premise services if

- Perform analysis on the network dataset managed by you
- Overcome the problem size limits enforced by the online services
- You cannot connect to the internet due to your organizational policies
- You need to use other transportation modes such as transit

Summary

Summary

- Online services
  - Ready-to-use services provided by Esri
  - Requires internet connection
  - Requires ArcGIS Online subscription
  - Cannot use your own street data

- On-premise services
  - Requires hardware and ArcGIS software
  - Have to use your own street data modeled as a network dataset

Resources

Support and Resources

- http://logistics.arcgis.com
- http://route.arcgis.com
- http://traffic.arcgis.com
- http://developers.arcgis.com
- Sample applications
- ArcGIS Online services in the Network Analyst help

Thank you…

- Please fill out the session survey:

Session: 75

Offering ID: 232

Thank you…

- Please fill out the session survey:

Session: 75

Offering ID: 233

Understanding our world.