Network Analysis with ArcGIS Online

Deelesh Mandloi
Dmitry Kudinov
Introductions

• Who are we?
  - Network Analyst Product Engineers

• Who are you?
  - Network Analyst users?
  - ArcGIS Online users?
  - Trying to figure out what is ArcGIS Online?
Slides from this workshop

http://esriurl.com/uc16nawago
Topics

• What are ArcGIS Online network analysis services

• How to access the online services

• How to use the online services in out of the box apps

• Support and resources

• Questions
Online services

- Ready-to-use services published by Esri that are run in an Esri-administered cloud infrastructure
What you need to use online services

• ArcGIS Online subscription with service credits

• Your analysis inputs

• Mapping apps
  - ArcMap
  - ArcGIS Pro
  - ArcGIS.com Map Viewer
  - Business Analyst Online
What you do not need for online services

• ArcGIS Network Analyst extension license
• Your own street data modeled as a network dataset
• Your own ArcGIS Server software
• Hardware to host the server
• Staff to manage the IT infrastructure
Network Analysis Services
Solve transportation problems
Data coverage

• Work globally
• Use high quality street data
  - Predictive and real time traffic where available
  - Support for vehicle weight, width and height restrictions
  - Can use preferred truck routes or avoid toll roads
• Driving, Walking, Trucking, or your own travel modes

View web map
Accessing services

- All services are secured and require ArcGIS Online organization subscription with service credits

- Existing ArcGIS Desktop users get a free organization subscription

- Sign up for a 60 day free trial at www.arcgis.com
  - Comes with 200 service credits
Using services

• Two main out of the box clients
  - ArcGIS Desktop (ArcMap, ArcGIS Pro)
  - Get Directions button and Analysis tools in ArcGIS.com map viewer

• Some services are supported in other ArcGIS apps
  - GeoPlanner for ArcGIS
  - Business Analyst Online
  - Collector for ArcGIS

• ArcGIS web and runtime SDKs
  - http://developers.arcgis.com
Using services with ArcGIS Desktop (ArcMap)

- Ready-To-Use Services node in ArcMap 10.2 and later
- Need to create ArcGIS server connections with 10.1 SP1
Using services with ArcGIS Desktop (ArcGIS Pro)

1. Use from Network Analysis gallery in the Analysis tab if using ArcGIS Pro 1.2 or later
2. Use Ready-To-Use tools from the Feature Analysis gallery in ArcGIS Pro 1.3

- Add ArcGIS Server connection to your project if using Pro 1.1 or earlier
Using services in ArcGIS.com map viewer

- **Directions button**
- **Analysis tools**
  - Most tools in the Use Proximity toolset
  - Choose Best Facilities tool in Find Locations toolset
  - Enrich Layer tool in Data Enrichment toolset
  - Summarize Nearby tool in Summarize Data toolset
Using services with ArcGIS.com map viewer

- Need to add your inputs to ArcGIS Online
- Cannot use network dataset created from your own street data
- Layers and data you can analyze
  - Feature service
  - Map service
  - Comma-separated values (CSV) file (.csv)
  - Route layers
  - GPS exchange format file (.gpx)
  - Shapefile (.zip)
  - File Geodatabase (.zip)
  - Map notes
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

Add from the Living Atlas on the Project pane in ArcGIS Pro

Use the **World Traffic web map** or add Traffic layer from Living Atlas Layers to your own web map

Use Traffic map service from Ready-to-Use Services in ArcMap

Network Analysis with ArcGIS Online
Directions (Route) Service

• Simple Route – Point-to-point routing between stops in the given sequence

• Optimized route – Find the best route and sequence for visiting a series of stops

• Use live traffic conditions

• Driving directions in many languages
Using Directions service

Use Connect Origins to Destinations analysis tool in ArcGIS.com map viewer

Use Directions tool in ArcGIS.com map viewer

- Can save results as a route layer item for sharing or for further analysis
Using Directions service

Use Route analysis layer in ArcGIS Pro

Use FindRoutes geoprocessing tool from Ready-to-Use Services in ArcMap

Use Find Route button on the Tools toolbar in ArcMap

Network Analysis with ArcGIS Online
Directions with custom travel modes

Find best route for a truck that requires 5 meter clearance
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 Closest Facility analysis layer in ArcGIS Pro

Use Find Nearest analysis tool in ArcGIS.com map viewer

Use FindClosestFacilities geoprocessing tool from Ready-to-Use Services in ArcMap

Network Analysis with ArcGIS Online
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

Network Analysis with ArcGIS Online
Using Service Areas service

Use Service Area analysis layer in ArcGIS Pro

Create Drive-Time Areas
1. Choose point layer to calculate drive-time areas around
   San Francisco Stores
2. Measure
   Walking Time
   5 10 Minutes
3. Areas from different points
   Overlap
   Dissolve
   Split
4. Result layer name
   Travel from San Francisco Stores (5-10 Minutes)
   Save result in: demandlo

Use GenerateServiceAreas geoprocessing tool from Ready-to-Use Services in ArcMap

Use Create Drive Time Areas, Summarize Nearby or Enrich Layer analysis tools in ArcGIS.com map viewer

Network Analysis with ArcGIS Online
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 and use the free Route Planner developer sample

Network Analysis with ArcGIS Online
Using Vehicle Routing Problem service

Use Solve Vehicle Routing Problem Ready-To-Use tool in ArcGIS Pro

Use SolveVehicleRoutingProblem geoprocessing tool from Ready-to-Use Services in ArcMap
Origin Destination Cost Matrix service (Beta)

- Generates a table containing travel times and travel distances between all origins and all destinations.

- You can also...
  - Specify a cutoff
  - Limit the number of destinations to find
  - Analyze for different times of the day
Using Origin Destination Cost Matrix service

Use Origin-Destination Cost Matrix analysis layer in ArcGIS Pro (1.3).

Use GenerateOriginDestinationCostMatrix geoprocessing tool from Ready-to-Use Services in ArcMap.

No analysis tool currently available in ArcGIS.com map viewer.
Location-Allocation service

- 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

Use Location-Allocation analysis layer in ArcGIS Pro

Use Choose Best Facilities analysis tool in ArcGIS.com map viewer

Use SolveLocationAllocation geoprocessing tool from Ready-to-Use Services in ArcMap
Site Flu Clinics

Use Choose Best Facilities tool to site mobile health clinics for providing immunizations

Network Analysis with ArcGIS Online
### Service Credits

- Every successful request deducts credits from your organization
- How many service credits does network analysis services use?
- **Credits explained**

<table>
<thead>
<tr>
<th>Network Analysis</th>
<th>Credits Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple Routes</td>
<td>0.04 credits per route</td>
</tr>
<tr>
<td>Optimized Routes</td>
<td>0.5 credits per optimized route</td>
</tr>
<tr>
<td>Drive Time (Service Areas)</td>
<td>0.5 credits per drive time</td>
</tr>
<tr>
<td>Closest Facilities</td>
<td>0.5 credits per closest facility route</td>
</tr>
<tr>
<td>Multi-Vehicle Routes (VRP)</td>
<td>1 credits per route</td>
</tr>
<tr>
<td>Location-Allocation</td>
<td>0.1 credit per allocated demand point</td>
</tr>
<tr>
<td>Origin Destination Cost Matrix</td>
<td>0 credits (while in Beta)</td>
</tr>
<tr>
<td>Traffic</td>
<td>0 credits</td>
</tr>
</tbody>
</table>
Monitor service credits used by your organization

- Reports can be accessed by the administrators in your ArcGIS Online organization
- Monitor usage by individual users
Network Analysis privilege

- Control which users can run network analysis services using custom roles and the network analysis privilege.
Credit Budgeting and Allocation

- Control the amount of credits that can be used by a user
## Summary - Network Analysis Services

<table>
<thead>
<tr>
<th></th>
<th>Route</th>
<th>Closest Facility</th>
<th>Service Area</th>
<th>Vehicle Route</th>
<th>Location Allocation</th>
<th>OD Cost Matrix</th>
<th>Traffic</th>
</tr>
</thead>
<tbody>
<tr>
<td>ArcGIS Online Map Viewer</td>
<td><img src="image" alt="Directions" /> Connect Origins to Destinations</td>
<td><img src="image" alt="Find Nearest" /></td>
<td><img src="image" alt="Create Drive-Time Areas" /></td>
<td><img src="image" alt="Plan Routes" /></td>
<td><img src="image" alt="Choose Best Facilities" /></td>
<td>Not Available</td>
<td><img src="image" alt="Traffic" /></td>
</tr>
<tr>
<td>ArcGIS Pro 1.3</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td><img src="image" alt="Coming Soon" /></td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>ArcMap</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
</tbody>
</table>
Support and Resources

- http://logistics.arcgis.com
- http://route.arcgis.com
- http://traffic.arcgis.com
- Sample applications
- ArcGIS Online services in the Network Analyst help
Please take our Survey
Your feedback allows us to help maintain high standards and to help presenters

Find your event in the Esri Events App

Find the session you want to review

Scroll down to the bottom of the session

Answer survey questions and submit

Network Analysis using Python
Questions

Slides from this workshop

http://esriurl.com/uc16nawago