ArcGIS Network Analyst: Network Analysis with ArcGIS Online and On-Premises Services

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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?
Topics

• Online and on-premise network analysis services
• How to access the online services
• How to use the online services
  - In out of the box apps
  - In your own apps
• On-premise services
• When to use online and on-premise services
• Support and resources
• Network Analyst at the User’s Conference
• Questions
Online and on-premise services
Online services

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

On-premise services

- Services published by you using ArcGIS software on your own IT infrastructure
What you need for on-premise services

• Your own ArcGIS Server software

• Hardware to host the server

• Staff to manage the IT infrastructure

• Your own street data modeled as a network dataset

• ArcGIS Online subscription

• Your analysis inputs

• May need your own apps to use the services
What you need for online services

- Your own ArcGIS Server software
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- Staff to manage the IT infrastructure
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- Your analysis inputs
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Network Analysis Services
Solve transportation problems

- Closest Facility
- Service Area
- Route
- Traffic
- Location-Allocation
- Origin-Destination Cost Matrix
- Vehicle Routing Problem

Available only with ArcGIS Online
Available in beta
Coming soon to ArcGIS Online
Online services
Data coverage

- **Work globally**
  - Currently 238 countries

- **Use high quality street data**
  - Real time traffic where available
  - Support for vehicle weight, width and height restrictions
  - Can use preferred truck routes or avoid toll roads

- **Driving, Walking, and Trucking mode**
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

- Two main out of the box clients
  - ArcGIS for Desktop (ArcMap)
  - Analysis tools in 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
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-separated 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
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
Demographic summary

Find demographic information within certain walk times from store locations
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
Schedule Deliveries

Schedule deliveries for orders using a fleet of vehicles

1. Routes begin at
   - Add point to map
   - Start time for all routes:
     - 7/14/2014
     - 10:34 AM

2. Routes end at
   - Return to start
   - Add point to map

3. Maximum number of vehicles to route
   - 3 Vehicles

4. Maximum number of stops per vehicle
   - 10 Stops

5. Time spent at each stop
   - 30 min 0 sec

6. Limit the total route time per vehicle
   - 8 hr 0 min

Plan Routes

Route vehicles to stop in customers

Current map extent shows 48 stops.
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

<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 (while in beta)</td>
<td>0 Credits</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 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 number 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
Find best routes for three trucks to make deliveries to the stores

- Use the vehicle routing problem service
- View live sample

Works best with Google Chrome browser
Find best locations to expand the child care business

- Use the location allocation service
- View live sample

Works best with Google Chrome browser
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
Network Analyst at the Esri User Conference
Tuesday

- **1:30** - ArcGIS Network Analyst: Automating Workflows with Geoprocessing
  - 17 B

- **4:30** – Configuring the **Location-Allocation** Solver for Optimizing a Dealer Franchise
  - Analysis and Geoprocessing Exhibit Hall B
Wednesday Morning

• 8:30 – ArcGIS Network Analyst: Automating Workflows with Geoprocessing
  - 17 A

• 10:00 – Multivehicle Routing with the Vehicle Routing Problem Solver
  - General Theater 2 Exhibit Hall A

• 12:30 – Using Streetmap Premium
  - Online GIS Exhibit Hall C
Wednesday Afternoon

• 1:30 – ArcGIS Network Analyst: An Introduction
  - 17 B

• 1:30 – Building Routing and Logistics Apps with ArcGIS Online
  - Web & Server GIS Exhibit Hall C

• 2:30 – Cool New Tools in Network Analysis
  - Analysis and Geoprocessing Exhibit Hall B

• 3:00 – Offline Routing and Geocoding in ArcGIS Runtime SDK
  - General Theater 2 Exhibit Hall A

• 3:15 – ArcGIS Network Analyst: Network Analysis with ArcGIS Online and On-Premises Services
  - 17 B
Thursday

• 10:00 – Offline Routing and Geocoding in ArcGIS Runtime SDK
  - General Theater 2 Exhibit Hall A

• 11:30 – Offline Routing using Network Analysis in Runtime
  - Analysis and Geoprocessing Exhibit Hall B

• 12:00 – Multivehicle Routing with the Vehicle Routing Problem Solver
  - General Theater 2 Exhibit Hall A
Thank you…

• Please fill out the session survey:

First Offering ID:  1180
Second Offering ID:  1333

Online – www.esri.com/ucsessionsurveys
Paper – pick up and put in drop box