Network Analyst: An Introduction

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Agenda

Routing this Session

- Fundamentals
- Pro Workflow
- Configuring A Solver
- Six Solvers
- Mobile Solutions
- Data Sources
Network Analyst Fundamentals

Getting to Know the Basics
ArcGIS Network Analyst

Generate Efficiencies

- Benefits
  - Less Gas
  - Less Maintenance
  - Less Driver Overtime/Overhead
  - More Customers Serviced

- Find the optimal locations for facilities or remove redundant facilities

- Improve Response Times
Accurately Model a Network

Network Datasets
ArcGIS Network Analyst

Spans the ArcGIS Platform

Network Analyst can be utilized in desktop, web, and mobile environments
ArcGIS Network Analyst
Spans the ArcGIS Platform

Network Analyst can be utilized in the desktop, web, and mobile environments

ArcGIS Online Network Services:
• Analysis in the Cloud, Managed by Esri
  - No user maintenance of servers, services, or data
  - Excellent uptime and reliability
• Requires no Network Analyst specific software/licenses/data
  - Perform Analysis from a browser

ArcGIS.com Map Viewer
Ready-to-Use Services

ArcGIS for Server
Geoprocessing

ArcGIS for Desktop

Credits
No license
No data

No credits
License
Data
Network Analyst can be utilized in desktop, web, and mobile environments.

ArcGIS Network Analyst
Spans the ArcGIS Platform

ArcGIS Online
Network Services

ArcGIS.com Map Viewer
Ready-to-Use Services

Network Analyst APIs:
• Python
• Android
• Flex
• iOS
• Java

ArcGIS for Server

ArcGIS for Desktop
Geoprocessing

ArcGIS.com Map Viewer
Ready-to-Use Services

Network Analyst can be utilized in desktop, web, and mobile environments
Finding the Nearest Response Center for each Rescue Mission
Network Analyst Workflows
A Deeper Dive into Routing Solutions
Network Analyst in ArcGIS Pro

2 Access Points

1. **Ready to Use Tools**

No Need for Your Network Dataset!
Network Analyst in ArcGIS Pro

2 Access Points

2. **Network Analysis in the Ribbon**

Requires a Network Dataset & License
Network Analyst Workflow

4 Basic Steps

1. Network Data Source
   - "Routing_ND" northamerica.geodatabase\Routing
   - Change network data source

2. Service Area
   - Generate drive-time polygons

3. Network Analysis Layer
   - Inputs
   - Outputs
   - Analysis Properties

4. Network Analysis Wizard
   - Routing
   - Geostatistical Wizard
   - Raster Functions
   - Function Editor
Creating a Route

Routing in ArcGIS Pro
Network Analyst Configurations
Configuring a Routing Solutions
Travel Modes

Configure to Your Vehicle’s Specifications

- **Modify Standard Travel Modes**
- **Create Custom Travel Modes**
  - Type: Truck, Car, Bike, Walk
  - Travel Costs
    - Impedance: Time vs Distance
Travel Modes - Continued

Configure to Your Vehicle Restrictions

- **Restrictions**
  - Vehicle Characteristics
    - Size, Weight, Height, Length, Axle Count
  - Road Characteristics
    - Avoid Private Roads, Gates, Unpaved Roads, Carpool Lanes
  - Prefer, Avoid, & Prohibit
Travel Modes - Continued

Configure to Your Vehicle Turns

- Turns
  - U-Turn Restrictions
- Create Turn Feature Classes
  - Model Turning Movements in a Network

Total Time: 26 Seconds

5 Seconds

15 Seconds

5 Seconds
Traffic

We all hate it, so let's avoid it!

• Use Historic or Predictive Traffic Patterns
• Consume a Live Traffic Services
  - Esri World Traffic Service
    - Historic & Near-Real Time
    - Based on HERE Data
  - Waze Live Alerts
    - Largest Crowd Sourced Navigation Applications
Barriers

Avoid Obstructions, Events, and Geographies

- **Temporary Restrictions**
  - Floods, Road Closures, Government Regulations

- **Slowdowns**
  - Snow, Road Work, Events
Side of the Road

Depart & Arrive on the Correct Side
Model Travel in 3D
Configure, Visualize, and Analyze in 3D

- Buildings
  - Indoor Wayfinding with ArcGIS Indoors
- Underground Subways
- Overpasses & Underpasses
- Ground Slope
Configuring a Route
Response Center Supply Run
Network Analyst Solvers
Solving Complex Routing Problems
Network Analyst Solvers

Solving Complex Routing Problems

Point-to-Point Routing
- Route
- Closest Facility
- Origin-Destination Cost Matrix

Coverage
- Service Area

Optimization
- Location-Allocation
- Vehicle Routing Problem
Route Solver

Network Analyst Solvers – Point-to-Point Analysis

• Find the best route for visiting a series of stops with minimum cost
  - Specify time windows on stops
  - Find best sequence of stops
  - Analyze for different times of the day
Closest Facility Solver

Network Analyst Solvers - Point-to-Point Analysis

- Find the nearest facilities from each incident
  - Limit the search distance
  - Limit the number of facilities to find
  - Travel from the facility to the incident
Origin-Destination Cost Matrix Solver

Network Analyst Solvers – Point-to-Point Analysis

- Generate a matrix of the travel costs from origins to destinations
  - Limit the search distance
  - Limit the number of destinations to find
  - Analyze different times of day

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Service Area Solver

Network Analyst Solvers - Coverage

- Find the area you can reach from a facility
  - Solve for many facilities
  - Use multiple break values
  - Specify the direction of travel
  - Output lines or polygons
  - Analyze for different times of the day
Location-Allocation Solver

Network Analyst Solvers - Optimization

- 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
Vehicle Routing Problem Solver

Network Analyst Solvers – Optimization

- Route a fleet of vehicles to service a set of orders
  - Vehicle capacities
  - Driver specialties
  - Work day rules
    - Breaks
    - Maximum hours
  - Time windows on orders
Preparing for Hurricane Maria

Network Analyst & Disaster Response

Preparing for Hurricane Maria
Network Analyst on a Mobile Device

Utilizing a Mobile Map Package (mmpk)
Mobile Capabilities

**Turn by Turn Directions**

- **Connected**
  - All network analysis services

- **Disconnected**
  - Routes
  - Directions
Mobile Map Package Workflow

Share or Side Load

*Requires Network Analyst extension

ArcGIS Pro

ArcGIS Online or ArcGIS Enterprise

Download

Share

Package*

Side Load

Navigator
Navigator for ArcGIS
Responding to the Call
Network Data Sources

Network Datasets
Where Can You Get Data?

Free Data!

- Use Your In-House Data
- TIGER (Census Data)
- OpenStreetMap
  - OSM to NDS tools
  - ArcGIS Editor for OpenStreetMap
Where Can You Get Data?

Premium Content

- **Vendor Street Data**
- **StreetMap Premium for ArcGIS**
  - HERE Data Network Dataset
  - Includes:
    - Ready to Use Basemap with Multi-scale Representations
    - Geocoding – Search, Reverse/Batch Geocode & Locators
    - Network Analyst Extension – Solvers, Historic Traffic, Travel Modes
    - *Custom Roads – Edit, Create, and Modify the StreetMap Premium Data

http://esriurl.com/SMPCoverageHERE

*Approval Process in Place
Pay for Analysis

On Your Portal

• ArcGIS Online Map Viewer

• ArcGIS Online Network Services
The Road Ahead

Pro 2.4

• Edit Network Dataset Properties
• Network Dataset Creation
• Enhance Network Analyst Python Module to Easily Perform Analysis
• Perform Network Analysis Using Web Services
• New Directions Engine for Pro!
• Runtime Solvers in Pro
• Create and Use Network Datasets with Transit

Pro 2.3
Print Your Certificate of Attendance
Print Stations Located at L Street Bridge

**Tuesday**
12:30 pm – 6:30 pm
GIS Solutions Expo
Hall D

5:15 pm – 6:30 pm
GIS Solutions Expo Social
Hall D

**Wednesday**
10:45 am – 5:15 pm
GIS Solutions Expo
Hall D

6:30 pm – 9:00 pm
Networking Reception
National Museum of Natural History
Please Take Our Survey on the App

Download the Esri Events app and find your event

Select the session you attended

Scroll down to find the feedback section

Complete answers and select “Submit”