ArcGIS Network Analyst: An Introduction

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ArcGIS Network Analyst Extension makes sophisticated analysis easy

- Transportation analysis across ArcGIS
- Model transportation networks
- IMPORTANT NOTE: Network Analyst is not used for utility networks
Topics to be covered

- ArcGIS Network Analyst extension high-level concepts
- Network services
- ArcGIS for Desktop: ArcMap and ArcGIS Pro
- Types of network analysis
- Modeling transportation networks
- Support and resources
Topics to be covered

• ArcGIS Network Analyst extension high-level concepts

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• ArcGIS for Desktop: ArcMap and ArcGIS Pro

• Types of network analysis

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• Support and resources
ArcGIS Network Analyst Extension does transportation analysis.

Coverage:
- Service Area

Optimization:
- Location-Allocation
- Vehicle Routing Problem

Point-to-point routing:
- Route
- Closest Facility
- Origin-Destination Cost Matrix

ArcGIS Network Analyst: An Introduction
ArcGIS Network Analyst Extension saves your organization money

- Benefit from efficient routes
  - Less gas
  - Less maintenance
  - Less driver overtime
  - More customers serviced

- Find the optimal locations for facilities or remove redundant facilities
ArcGIS Network Analyst Extension uses an accurate model of a transportation network.
ArcGIS Network Analyst Extension is used across ArcGIS

ArcGIS Online Network Services
- Credits
- No license
- No data

ArcGIS.com Map Viewer
- Ready-to-Use Services

ArcGIS for Server
- No credits
- License
- Data

ArcGIS for Desktop

Geoprocessing

ArcGIS Network Analyst: An Introduction
Network Analysis capabilities are available across Esri APIs and products

- ArcGIS for Desktop
- ArcGIS Online
- ArcGIS for Server
- Geoprocessing

- Python
- Android
- Flex
- iOS
- Java
- JavaScript
- Mac OS X
- .NET
- Qt
- Silverlight
- WPF
Network Services
Topics to be covered

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ArcGIS Online Network Services can perform 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
ArcGIS Online Network Services provide high quality, global coverage.
ArcGIS.com Map Viewer can perform analysis from a browser

- Generate directions
- Create drive-time areas
- Find nearest
- Plan routes
Ready-to-Use services do not require your network dataset

- Find Closest Facilities
- Solve Location-Allocation
- Find Routes
- Generate Service Areas
- Solve Vehicle Routing Problem
- View Traffic
Ready-to-Use Services
Network Analyst in ArcGIS for Desktop
Topics to be covered

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- **ArcGIS for Desktop: ArcMap and ArcGIS Pro**
- Types of network analysis
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Specialized layers

ArcGIS Network Analyst: An Introduction
Network Layer
holds a reference to a network dataset
Network Analysis Layer is configured for a specific solver.

- Composite layer
  - Inputs
  - Outputs
  - Analysis properties
Network Analyst controls in ArcMap

Network Analyst toolbar
Network Analyst controls in ArcMap

Network Analyst Window
Network Analyst controls in ArcGIS Pro

Network Analyst in the ribbon
Network Analyst controls in ArcGIS Pro

Network Analyst in the ribbon

- Service Area: Generate drive-time polygons.
- Route: Find the shortest path between stops.
Network Analyst controls in ArcGIS Pro

Network Analyst in the ribbon

![Network Analyst controls in ArcGIS Pro](image-url)
Network Analyst in ArcGIS for Desktop
Types of network analysis
Topics to be covered

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- Support and resources
- 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
Fire Coverage

Use the Service Area solver to find coverage for fire stations
• 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
Site selection

Use the Location-Allocation solver to find the best site for a new fire station
Vehicle Routing Problem solver is valuable across private and public sectors

- Inspection
- Repair
- Service
- Delivery
- Paratransit
Fleet routing
Create optimal routes for multiple vehicles to deliver appliances to many customers
Vehicle Routing Problem solver performs fleet routing

- 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
- 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
Commute Analysis

Route solver to solve many routes at once
Closest Facility solver finds the nearest location

- 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
Dispatching
Find the nearest emergency vehicle to an incident
http://nadev.arcgis.com/arcgis/samples
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
Modeling transportation networks
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- ArcGIS for Desktop: ArcMap and ArcGIS Pro
- Types of network analysis
- **Modeling transportation networks**
- Support and resources
Where can you get street data?

Free data

- Your own data
- Data and maps media (Prior to 10.3)
- TIGER (Census data)
- OpenStreetMap
  - OSM to NDS tools
  - ArcGIS Editor for OpenStreetMap
Where can you get street data? Pay for premium data

- HERE or TomTom
  - Vendor street data processing tools
- StreetMap Premium for ArcGIS
Where can you get street data?

Pay for analysis

- ArcGIS.com Map Viewer
- ArcGIS Online Network Services
Streets are connected
Analyze many types of travel

- Car
- Truck
- Pedestrian
- Rail
- Bicycle
- Transit
Restrictions can depend on street characteristics.
Restrictions can depend on vehicle characteristics.
Traffic
Turns can be restricted
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- Specific turns
- Generic turns

Turns can have added costs

Total Time: 20 Seconds
Barriers can be temporary restrictions.
Barriers can be slowdowns.
Arrive and depart from the correct side of the road
Model travel in 3D

- Buildings
- Subways
- Overpasses
- Slope

8%
Modeling transportation networks
In summary

- ArcGIS Network Analyst Extension...
  - Makes it easy to do sophisticated analysis
  - Offers many types of analysis
  - Works across products and skill levels
  - Models transportation networks accurately
Mobile devices can perform network analysis

- **Connected**
  - All network analysis services

- **Disconnected**
  - Routes
  - Directions
Common questions

- How do I analyze my utility or natural resource networks?
- Does Network Analyst support high-density routing?
- Can I get alternate shortest paths?
- Can Network Analyst work with transit schedules?
• ArcGIS Network Analyst extension high-level concepts
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Support and Resources

- Network Analyst tutorial
- Network Analyst in the ArcGIS Resources
- ArcGIS Network Analyst Extension Discussion Forum
- Creating network datasets video
<table>
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<tr>
<th>Time</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
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<tr>
<td>8:30 am</td>
<td>Network Analyst: An Introduction</td>
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<tr>
<td>9 am</td>
<td>Routing in Buildings with 3D Networks in ArcGIS Pro</td>
<td>Network Analyst: Automating Workflows with Geoprocessing</td>
<td>Network Analyst: An Introduction</td>
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<td>10 am</td>
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<td>Network Analysis with Python</td>
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<td>11 am</td>
<td>Using Navigator for ArcGIS</td>
<td>Using GTFS Public Transit Data in ArcGIS</td>
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<td>Network Analyst: Performing Network Analysis</td>
<td>Network Analyst: Creating Network Datasets</td>
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<td>Network Analyst in ArcGIS Pro</td>
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Room 15 A  Room 16 B  Demo Theater 10 Apps  Demo Theater 13 Spatial Analysis  Tech Theater 15 Exhibit Hall A  Tech Theater 17 Exhibit Hall A