Seminar overview

Topics
- What is Network Analyst?
- What is Network Analyst used for?
- What is the network dataset?

Format
- Topic discussions, software demonstrations, and Q & A sessions.
What is ArcGIS Network Analyst?
Goal: To model real-world networks
Network Analyst functionality

- ArcInfo Workstation
  ARC NETWORK module
- ArcView 3.x
  Network Analyst extension
- NetEngine
- ArcLogistics Route
- ArcIMS Route Server

ArcGIS 9.1
Network Analyst extension
What does it solve?

- Best route
What does it solve?

- Best route
- Closest facility
What does it solve?

- Best route
- Closest facility
- Service area
**What does it solve?**

- Best route
- Closest facility
- Service area
- Origin-destination cost matrix

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Where can it be used?

- ArcGIS Desktop (ArcView, ArcEditor, ArcInfo)
  - ArcMap
  - Geoprocessing

- Network Extension available for:
  - ArcGIS Server
  - ArcGIS Engine
Network Analyst in ArcMap

- Network Analysis Layers
Network Analyst in ArcMap

- Network Analysis Layers
- Network Analyst Toolbar
Network Analyst in ArcMap

- Network Analysis Layers
- Network Analyst Toolbar
- Network Analyst Window
Network Analyst with geoprocessing

- **Models**
- **Scripting**
- **Command Line**

```
# Local variables...
ServiceOrders = "C:/Demo/UC2004/NetworkAnalyst/Service Orders/Paris2.mdb/FOrders = "Orders"
Paris_Streets_Locator = "C:/Demo/UC2004/NetworkAnalyst/Service Orders/Paris
Drive_Time = "Drive_Time"
Route_2_ = "Drive_Time"
Route_3_ = "Drive_Time"
Paris_Net_2_ = "\drive/UC Demo/Service Orders/Paris2.mdb/FDS/

# Process: Create Route Layer...
gp.CreateRouteLayer_na(Paris_Net_2_, "Drive_Time", "Drive_Time", "USE_INF

# Process: Geocode Addresses...
gp.GeocodeAddresses_geocoding(Orders, Paris_Streets_Locator, "Street Addr

# Process: Add Locations...
gp.AddLocations_na(Drive_Time, "Steps", ServiceOrders, "CurbApproach # 0",.

# Process: Solve...
gp.Solve_na(Route_2_, )
```

![Diagram showing the workflow process](Diagram.png)
Network Analyst with geoprocessing

- Models
- Scripting
- Command Line
- Integrated with ArcGIS

![Network Analyst Diagram]

![Command Line]

MakeServiceAreaLayer Streets\StreetsND Service Areas Minutes
TRAVEL_FROM 5 SIMPLE_POLYS MERGE RINGS NO_LINES
Network Extension with ArcGIS Server

- Map Server Object
Network Extension with ArcGIS Server

- Map Server Object
- Web Services
- Web Applications
Network Extension with ArcGIS Engine

- Embedded in lightweight applications
- Supports major programming languages
Software Demonstration
Review and Q & A

ArcGIS Network Analyst extension
- Models real world networks
- For transportation network analysis

Use with other ArcGIS Desktop applications
- ArcMap
- Geoprocessing

Network Extension available for:
- ArcGIS Server
- ArcGIS Engine
What is ArcGIS Network Analyst used for?
Finding the best route

- Finds the route that minimizes travel cost through a series of stops

**Options**

- Cost Attribute (Miles, Minutes, RushHourTime, etc)
- Find best order
- Time windows
- Cost on stops
- Directions
Finding the closest facility

- Finds the routes that minimizes travel cost between incidents and multiple facilities

Options

- Cost Attribute (Miles, Minutes, RushHourTime, etc)
- Number of facilities to find
- Cutoff value
- Direction of travel
- Costs on incidents and facilities
- Directions
Driving directions

- Generates a series of directions
  - Based on route created by Route or Closest Facility solver

- Options
  - Expandable inset maps
  - Unit reporting options
  - Print preview options
Finding service areas

- Find the lines or area that can be traversed within a specified cost
  - Create polygons around specified locations
  - Create service area lines

- Options
  - Cost Attribute (Miles, Minutes, RushHourTime, etc)
  - Multiple Break values
  - Direction of travel
  - Polygon generation options
  - Line generation options
Finding an origin-destination cost matrix

- Generates an “OD” matrix of the cost from each origin location to each destination location.

- Options
  - Cost Attribute (Miles, Minutes, RushHourTime, etc)
  - Cutoff value
  - Number of destinations to find
More network analysis options

- Other parameters include
  - Barriers
More network analysis options

- Other parameters include
  - Barriers
  - U-Turn policy
More network analysis options

- Other parameters include
  - Barriers
  - U-Turn policy
  - Curb approach
More network analysis options

- Other parameters include
  - Barriers
  - U-Turn policy
  - Curb approach
  - Restrictions
More network analysis options

- Other parameters include
  - Barriers
  - U-Turn policy
  - Curb approach
  - Restrictions
  - Exact route vs. Hierarchical route

![Exact route](image1)

![Hierarchical route](image2)

Exact route

Hierarchical route (major roads)
Review and Q & A

Ways that Network Analyst can be used
- Best route
- Closest facility
- Service area
- Origin-destination cost matrix

Network analysis options
Introduction to network datasets
What is a network dataset?

- **New type of dataset**
  - Contains a network
  - Built from simple features
  - Works with Network Analyst

- **Where is it located?**
  - Geodatabases (Personal and ArcSDE)
  - Shapefile
  - SDC (Smart Data Compression)

- **Supports transportation modeling**
  - Enhanced modeling capabilities

**Turns and maneuvers**

**Attributes**

**Connectivity groups**
What is in a network dataset?

- Composed of "network sources"
  - Line features
  - Point features
- Turn features
  - Specialized line feature class
  - Can model restrictions and cost
  - Import from turn tables
  - Default turns where not explicit
  - Supports multi-part maneuvers

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Network attributes

- What are attributes?
  - Values on network elements
  - Different types (cost, descriptor, restriction, hierarchy)
  - Derived from constants, fields, VBScripts, custom code
Network attributes

What are attributes?
- Values on network elements
- Different types (cost, descriptor, restriction, hierarchy)
- Derived from constants, fields, VBScripts, custom code

What are attributes used for?
- Control navigation during network analysis
- May be used to accumulate information
Connectivity model
- Defines how points and lines are connected
- Different connectivity options
  - Change end-point/any-vertex connectivity
Connectivity model

- Defines how are points and lines connected
- Different connectivity options
  - Change end-point/any-vertex connectivity
  - Use z-elevation (z-levs)
Connectivity model

- Defines how are points and lines connected
- Different connectivity options
  - Change endpoint/midspan connectivity
  - Use z-elevation (z-levs)
- Specify connectivity groups
  - Allow multi-modal networks
  - Point classes may span connectivity groups

**Streets**
(Connectivity group 1)

**Rails**
(Connectivity group 2)
Review and Q & A

- Network dataset
- Network sources
  - Turn features
- Network attributes
- Connectivity model
For more information

Online resources
www.esri.com/networkanalyst
Product information

Evaluate
Users with current maintenance
ArcView 9.1 Evaluation CD

Network_Analyst_Tutorial.pdf
ESRI Software Documentation Library

ArcGIS Desktop Help
Contents tab > Extensions > Network Analyst

Network Analyst Developer Samples
Program files > ArcGIS > DeveloperKit > Samples > Network Analyst