What is a geometric network?

- Geometric networks offer a way to model common networks and infrastructures found in the real world. Roads, Sewer Systems, Power Grids, Telephone Lines, Rivers & Streams can be represented in a geometric network.
What is a geometric network in ArcGIS?

- Geometric networks are created in ArcCatalog and stored as a *relationship class* within a geodatabase feature dataset.

Geometric Network and Logical Network

- A geometric network has a corresponding logical network.
- The logical network is the physical representation of the network connectivity.
- Can be visualized as a set of tables without geometry – associated with features in the network.
What are Geometric Networks made of?

• A geometric network uses feature classes
  ▫ The network is composed of connected Edges and Junctions – based on geometric coincidence of feature classes
  ▫ Connectivity Rules – define behavior of network features, used to represent and model the behavior of a common network infrastructure in the real world.

Edges and Junctions

• Edges are network features similar to simple line features.
  ▫ Line Feature Class: water mains, electrical transmission lines, gas pipelines, telephone lines, etc...

• Junctions - facilitates the transfer of flow between edges, similar to pt features
  ▫ Point Feature Class: fuses, switches, service taps, valves, etc...

• Topologically connected to each other:
  ▫ Edges must connect to other edges at junctions
**Edges and Junctions**

### Types of Edges

- **Simple Edges** - Edges end with junctions and junctions connect edges
- **Complex Edges** - Complex edge features are created by connecting features to an edge without splitting them at junctions

### Types of Junctions

- **User defined junctions** - Created based on point feature classes, correspond to a single junction element in the logical network.
- **Orphan junctions** - Will be inserted at the endpoint of any edge at which a junction does not already exist, maintains network integrity
Sources and Sinks

- Flow moves from Sources ➔ Sinks in the Geometric Network
  - Junction features: AncillaryRole Field is added to the feature class = source, sink, or neither a source nor a sink.
  - This can be used to map flow in ArcGIS

- Useful to map changes in flow when Junctions are altered (Disabled/Enabled)
Network Weights

A weight can be used to represent the cost of traversing an element in the logical network.

Example: Pressure lost along a network of pipes because of friction in the pipes.

Creating Geometric Networks

Creating a new, empty network
- In ArcCatalog you can create, design, and build a geometric network from scratch.

Building a geometric network from existing data
- ArcCatalog contains a wizard that creates a geometric network from existing data.

- When creating a geometric network feature classes may need to be snapped together to create connectivity.
  - Similar to the Cracking and Clustering in Topology.
Managing a geometric network

• More complicated than managing a single entity, such as a table, shapefile, or feature class

• A geometric network is an association among several feature classes and is represented by several tables in the database –
  ▪ Manipulating the network involves all of these components

• ArcCatalog can be used to Delete or Copy the Geometric Network

Questions!

1. What is a Geometric Network?
2. What is a Logical Network?
3. Where and how are Geometric Networks stored in a Geodatabase?
4. What is the purpose of setting sources and sinks in a Geometric Network?
References

ArcGIS Desktop Help 9.2: Geometric Networks

ESRI Building Geodatabases, Chapter 7: Geometric Networks
I:Students\Data\GIS\ArcGIS_Documentation\ArcGIS9.1_documentation\ESRI_Library\