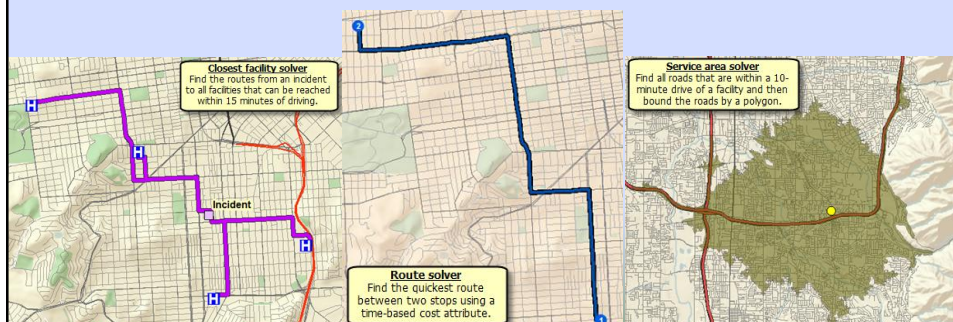


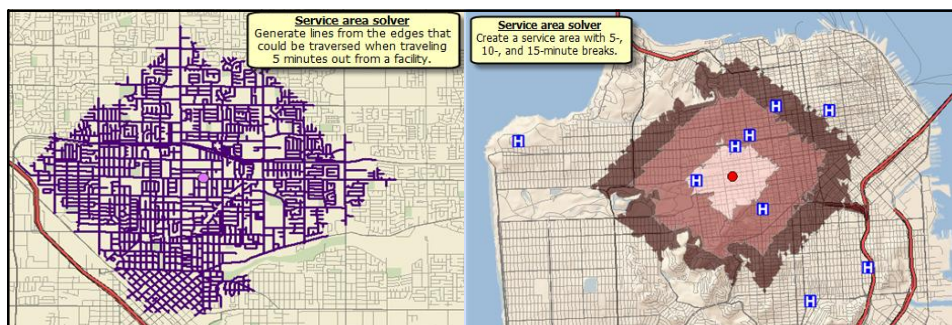
# Links/Edges in Network Analysis

Mark Cooney

**Network:** System of linear features that has the appropriate attributes for the flow of objects.

- Typically topology-based. Lines meet at intersections (junctions); lines cannot have gaps; lines have directions.
- Primary applications are utilities and transportation.



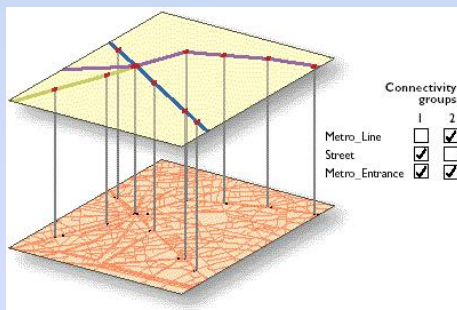


**Link/Edge:** Refers to a segment defined by two end points.

- Edge seems to be the preferred term by ESRI

## Connectivity

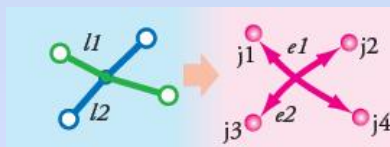
- Based on geometric coincidences of line endpoints, line vertices, and points.
- Edges are assigned to exactly one connectivity group (i.e. transportation network: buses on streets, subways on rail).
- Edges of different connectivity groups can connect through junctions assigned to two or more connectivity groups.



To connect a bus edge and subway edge, a junction assigned to each connectivity group must be present. In this case it is a common station (Metro\_Entrance).

Edges in the same connectivity group can connect in two ways:

1. **“Endpoint” connectivity:** Only join at coincident endpoints (nodes). Used for bridges, overpasses, etc.



2. **“Any Vertex” connectivity:** Join edges at coincident vertices.



•Network datasets must be cleaned so that either vertices or nodes are present at all intended junctions.

-To remedy, use Integrate (geoprocessing) tool to split crossing lines; or establish topology.

**Edge Attributes:** Properties that control the flow between junctions.

- Cost: Impedance (distance, time, demand)
- Descriptors: Characteristics (number of lanes, speed limits, etc.).
- Restrictions: Prohibitive attributes (one-way streets, small roads, etc.).
- Hierarchy: Road network preferences (interstates/highways, arterials, residential streets).

Network datasets are created in ArcCatalog. Right click an appropriate dataset (line shapefile or geodatabase with line features) and select New Network Dataset

## References:

- Introduction to GIS, Fifth Edition. Chang.
- ArcGIS Desktop Help 9.3.  
<http://webhelp.esri.com/arcgisdesktop/9.3>

**Questions?**