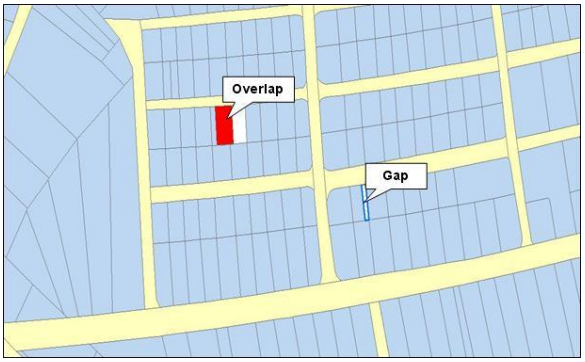
Topological Errors



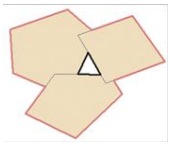
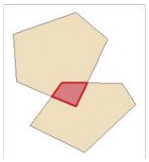
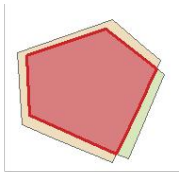
Topological errors violate relationships that are defined by the user or required by a GIS package.

- The coverage has these topological relationships:
  - Connectivity
  - Area definition
  - Contiguity
- The geodatabase has over 25 topological rules

- Common topological errors can be classified by the feature type:
  - Polygon
  - Line
  - Point

Polygon Errors

- Unclosed gaps
- Gaps between polygons
- Overlapping polygons

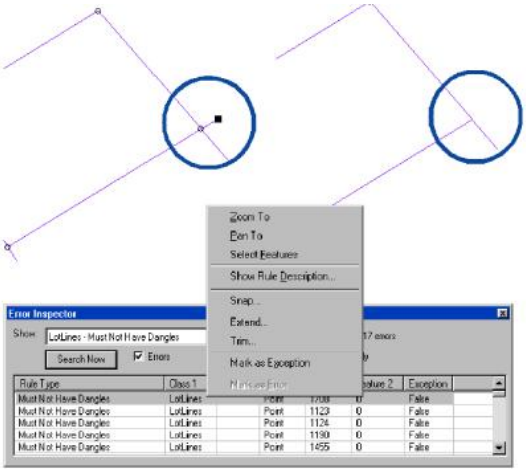
Line Errors

- Do not meet at node
  - Overshoot (overextended line)
  - Undershoot (gap exists between line)

  The result of these is a dangling node at the end of a dangle. This may be acceptable in the case of dead end streets, for example.
- Pseudo node
  - Appears along a continuous line and divides it unnecessarily

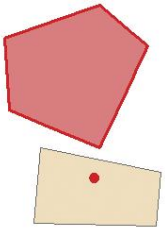
    This may be acceptable if attribute values change.
- Direction of line
  - Important in the case of one-way streets or rivers/streams

Dangles



Point Errors

- Not many point errors
- Label point in polygon
  - Each polygon should contain exactly one



Errors between Layers

- Don't have to be the same feature type
- Common error: boundaries are not coincident
- Common error: Lines don't connect
- Common error: Points don't fall along line feature

Topological Editing on Coverages

- Clean command
  - Builds topology
  - Applies dangle length and fuzzy tolerance
    - Dangle length: minimum length for dangling arcs
    - Fuzzy tolerance: minimum distance between vertices and arcs
  - Removes duplicate lines
  - Inserts a node at line intersection

Editing Using Map Topology

- Map topology: a temporary set of topological relationships between the parts of features that are supposed to be coincident
- Can be shapefiles or geodatabase feature classes, but not coverages
- Coincident features are defined by cluster tolerance
  - Snaps vertices and lines if they fall within a specified tolerance (similar to fuzzy tolerance for coverages)

Editing Using Topology Rules

1. Create topology:
   - ✓ Define participating feature classes
   - ✓ Topology rules
   - ✓ Cluster tolerance
2. Validation of topology
   - ✓ Creates errors which indicate where features have violated topology rules
   - ✓ Edges and vertices snap together if they fall within cluster tolerance
3. Fixing errors or accepting exceptions

Sources

- Chang, Kang-tsung. *Introduction to GIS.* McGraw-Hill, New York: 2008.
- ArcGIS 9.2 Desktop Help. <http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=Editing_a_topology> 2008.