Geocoding
&
Dynamic Segmentation

Basic GIS Feature Types

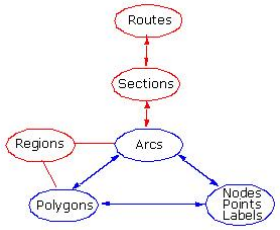
- Point
  - Cities, control points (BM), weather stations
  - Location, distance (buffer), point pattern, interpolation
- Polygon
  - States, land-use (zoning), land-cover, eco-region
  - Location (area coverage), distance, shape metrics, overlay
- Line
  - Roads, streams, utility lines, path
  - Location (linear referencing), distance, shape metrics (e.g., sinuosity), connectivity

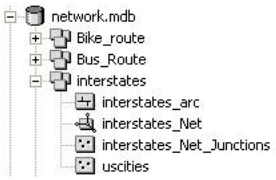
Linear Feature Analysis

- Linear referencing – location
  - Geocoding (e.g., address matching)
  - Dynamic segmentation
- Network connectivity - connectivity
  - Path analysis (e.g., shortest path)
  - Location allocation
  - Tracing (e.g., up stream area)

Geocoding & Dynamic Segmentation

- Dynamic segmentation
  - Sections and routes (for linear referencing)
  - Events
- Network
  - Line (coverage)
  - Edge + junctions (geodatabase)





Types of Geocoding

- Address matching
- Corner (intersection) matching
- ZIP code geocoding
- Reverse geocoding

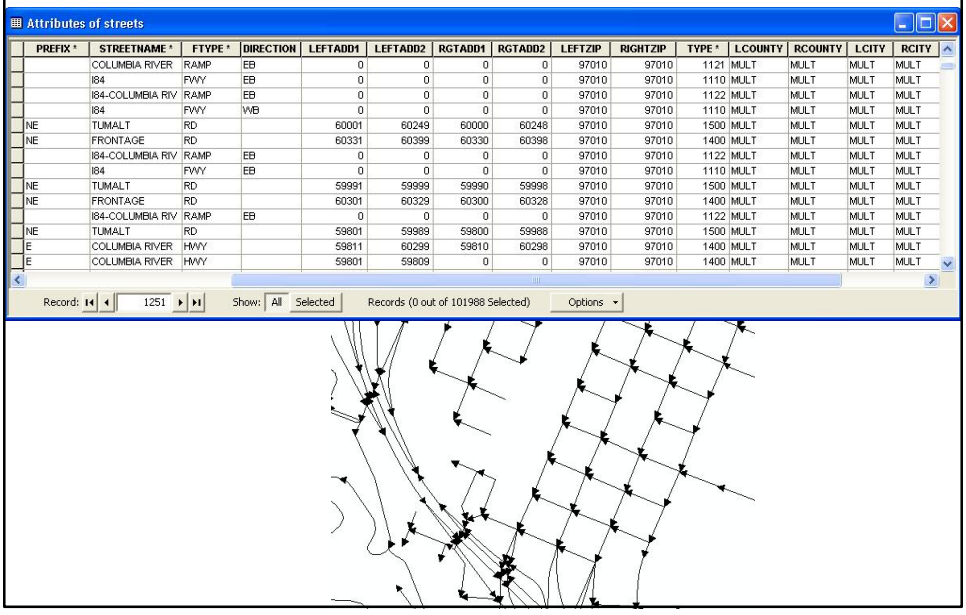
Geocoding Applications

- Location-based services (GPS, e911)
- Geodemographic analysis
- Public health
- Crime analysis

Geocoding

- Input: street addresses in text format
- Reference database: street map (e.g., TIGER)
  - Street name, prefix/suffix, and type
  - Beginning and end address numbers (left, right)
  - ZIP code (left, right)
- Process: Geocoding engine (linear interpolation)
  - Side offset, end offset
- Output: address points in GIS format

RLIS Streets



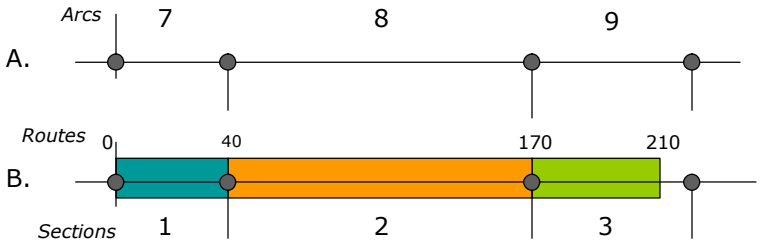
Causes of Geocodeing Errors

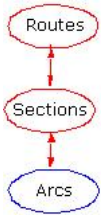
- Misspelling of address
- Incorrect address number
- Incorrect street prefix/suffix
- Incorrect street type
- Abbreviations
- Matching scoring system

Dynamic Segmentation

- DS is the process of computing the location of events along a route.
- Routes ((multipart) polylines – M-Aware)
- Sections (polylines)
- Events

Routes in Coverage Data Model





Section	Arc	F-Meas	T-Meas	F-Pos	T-Pos
1	7	0	40	0	100
2	8	40	170	0	100
3	9	170	210	0	80

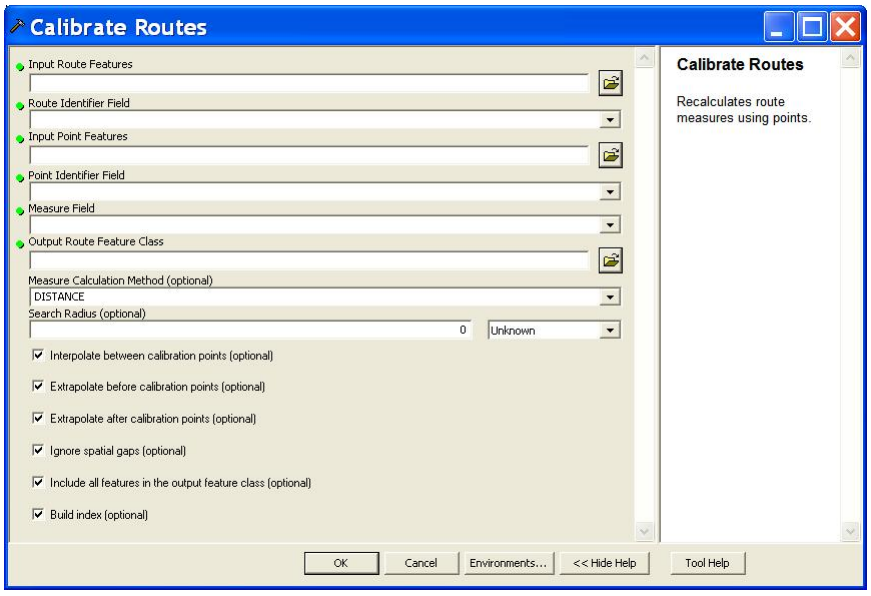
Section 3 To measure = 170 + (length of arc 9) x 0.8, or 210

Routes in Geodatabase Data Model

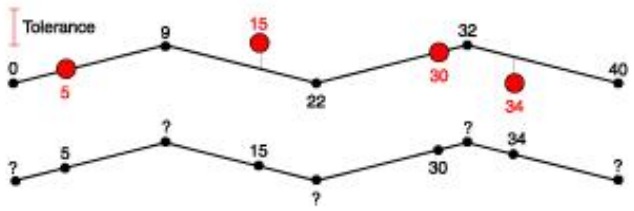
Point	X	Y	M
1	X1	Y1	1
2	X2	Y2	40
3	X3	Y3	170
4	X4	Y4	220

Creating Routes

- Create route geometric objects
  - Polylines or multipart polylines
- Linear Referencing Tools (ArcToolBox)
  - Create Routes: enable route measures on routes (i.e., create measured polylines)
  - Calibrate Routes: recalculate route measures using points.
- Types of routes
  - –Simple
  - Combined
  - Split route
  - Looping route
  - Hierarchical route

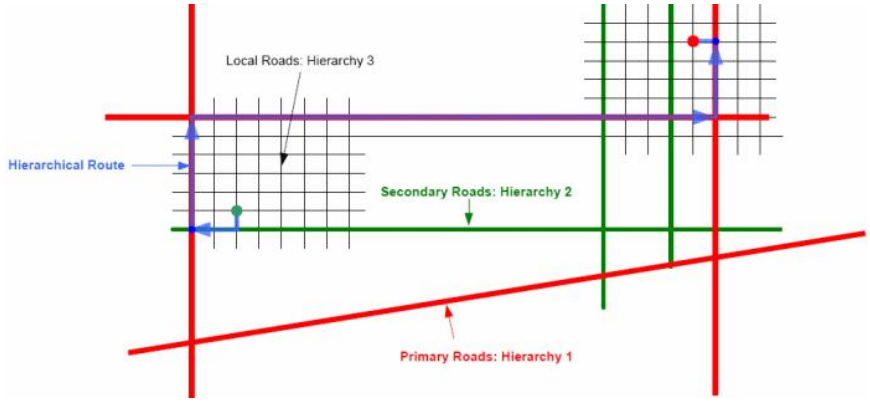


Calibrate Routes



- Interpolation / extrapolation
- Spatial gaps

Example of Hierarchical Route



Create Routes in ArcInfo

- Interactive
  - Arcedit: MAKEROUTE, REMEASURE
  - Network: PATH
- Bulk
  - Arc: ARCROUTE, MEASUREROUTE

Event Tables

- Types of events
  - Point events: mileposts, traffic accidents, dams
  - Linear events: speed limits, stream reaches
- Event tables creation and analysis (linear referencing tools in ArcToolBox)
  - Locate events along routes: create route event tables by intersection overlay
  - Overlay route events: union or intersect route event tables.
  - Transform route reference: transforms the measures of events from one route reference to another.

usstations#	bus#	measure
1	1	899.930
2	1	2359.145
3	1	2476.239
4	1	2849.655
5	1	3163.485
6	1	4173.557
7	1	5446.844
8	1	6451.580
9	1	9368.944
10	1	8509.497
11	1	10002.686
12	1	10412.696
13	1	11728.987

Table 16.5 A point event table showing bus stops along the bus route

inter-id	from	to	year
1	44700	90000	1995
1	123648	180000	1989
1	239375	270000	1992
2	74024	78000	1988
2	154873	180000	1993
2	356992	400000	1987
3	78065	90000	1988
4	40000	72033	1986

Table 16.7 A linear event table showing year of pavement re-surfacing on the interstate highway route system

Dynamic Segmentation

- Make route event layer tool
- Overlay/dissolve event layers