Managing A Fiber Optic Network with GIS

Experiences at Montana Dakota Utilities

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- Founded in 1924
  - The company expanded by acquiring small electric and gas companies, mostly in North Dakota and Montana
- Electric and Gas to 250 communities in 7 states (including OR & WA)
- Serves over 500,000 Energy Customers
- MDU Resources – Diversified Businesses
- Communications Dept. supports other businesses
History of Fiber Optics at MDU

- Began network in Bismarck in 1998
  - Internal use only initially
  - Supplied service to the ND State Government
  - Hybrid fiber (Multimode & Singlemode)
- Massive Network Expansion in 2000-2001
  - Provide only dark fiber to customers
- Expanded to Grand Forks and Mandan in 2006
- Expanded to Williston in 2007
- Other Customers – Hospitals, Telcos, Police, City Government
MDU Fiber Optic System

- Over 50 miles of fiber optic cable in 4 communities
In 1998 MDU began implementing an Enterprise GIS for Electric and Gas

- ESRI based platform
- Massive oversees data conversion effort
- Deployed with Telvent Miner & Miner technology

In 2006 we decided to maintain fiber optic system in their GIS

- Fiber optic system has:
  - less graphical data than electric or gas
  - very complex related data
Driving Factors for a GIS Solution

- Enterprise GIS with Landbase and Structure data
- Making data accessible company wide
- Support One Call Locating Maps/Data
- More efficient and timely system documentation
- Improve system analysis
  - Tracing tools
  - Reporting tools
- Quickly determine available paths for dark fiber
Solution Requirements

The New system must:

- Model the core features of the fiber optic network
- Model patch panels accurately
- Easily make connections between fibers and ports
- Trace singlemode and multimode availability
- Utilize the current enterprise GIS/ArcFM Solution
## Simplified Data Model

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<tr>
<th>Network Features</th>
<th>Non Network Features</th>
<th>Structures</th>
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<tr>
<td>Fiber Cable</td>
<td>Patch Point</td>
<td>Fiber Structure</td>
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<tr>
<td>Splice Point</td>
<td>Demarcation Point</td>
<td>Pole</td>
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<td>End Device Point</td>
<td>Proposed Fiber Cable</td>
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<tr>
<td>Fiber Slack Loop</td>
<td>Fiber Fault</td>
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*Network Features: Fiber Cable, Patch Point, Splice Point, End Device Point
*Non Network Features: Fiber Slack Loop, Demarcation Point, Proposed Fiber Cable, Fiber Fault
*Structures: Fiber Structure, Pole
Connection Manager
Data Capture

- Line work was entered by using “Favorites”
  - Created lines and related data at the same time
  - Decreased the editing effort

- Fiber connectivity was updated later using Connection Manager
Splice Point
Availability Tracing
Mobile Deployment

- Paper Map Books were common a year ago
- ArcReader allows data access to all employees
- Fiber optic data now in the One Call maps
Conclusions

Managing Fiber Optic Data in GIS:
- Leverages existing landbase and structures data
- Allows company wide access to the data
- Improve One Call process
- Improves system documentation
- Allows for system analysis
Thank You

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