

Operational Efficiency with GIS

Reliance Energy's experience in power distribution

Distributing power to over 5 million consumers in Delhi, Mumbai and Orissa, Reliance Energy Limited (REL) saw geographical information system (GIS) as a means to achieve its vision of building a world-class utility. Since Reliance Infocomm, its sister concern, was already using GIS, REL got a considerable headstart. Today, the company has an enterprise-wide integrated GIS. The supervisory control and data acquisition (SCADA) system is integrated to GIS, and network analysis and planning is done entirely on the GIS platform.

REL's technology partners are the Environmental system Research institute (ESRI) and Miner & Miner (M&M). The system architecture is based on Citrix, and the relational database management system (RDBMS) used is Oracle 9i. The second level is ArcGIS, which includes the entire gamut of core GIS functions on which the work is done. The third level is the ArcFM solution which comprises models and tools for mapping and network data management. The fourth is the integration framework which works on XML to get into business support, customer care, outage management and interactive voice response (IVR).

A number of GIS modules have already been implemented. One such module is the Arc Schematic which automatically generates schematic drawings of the network. When REL inherited the Delhi distribution business, there were no drawings of the network. Today the company has almost 100 per cent accurate and up-to-date drawings.

Streetlight applications of inspection, replacement and maintenance have also been implemented. REL is using activity scheduling to a great extent in terms of fault visualization and history and lifecycle replacement. The company has also implemented a distribution transformer management system and energy auditing. REL is getting into an exhaustive switching programme that can give alternate paths which can reduce aggregate technical and commercial (AT&C) losses.

The GIS modules currently under implementation include custom tools (meter reading, bill distribution, new connections, energy and system loss analysis, pole codifications, fault studies and history, painting and network modeling), data models and geodatabase scheme, and feeder management (upstream/downstream tracing of a feeder). Case studies worldwide have shown that downtimes have reduced from three and a half to four hours to 20-25 minutes by use of SCADA and feeder management. The company hopes to improve this further.

REL has almost completed mapping of its consumer information system, where information on billing, metered usage and meter tempering is associated with GIS features. It will also display system loss measurements for the LT Network, the aggregate system, losses to specific geographic areas and customer status online. The entire electricity network of Delhi, from 220kv to 11kv, is complete and on the system. REL's distribution business will run on this GIS platform.

Further, REL has integrated SCADA and GIS on the ArcFM platform for monitoring and control. The new BCC control in Balaji Estate will control the entire electrical distribution of Delhi. Large screen displays here will allow the user to toggle between the geographical screens and the electrical screens to indicate the route lengths of cables and AT & losses in different feeders.

GIS is also being used for outage management. When a customer calls with a complaint, the trouble call system captures the fault. The system can then escalate the fault and provide information to the breakdown crew regarding the likely cause of the problem. While the SCADA system continuously captures this information at very high voltage levels (220 kv, 33 kv and 66 kv,) this would not be economically viable for levels of 11 kv and below.

That said, SCADA has a significant role in handling outage management. It communicates the exact status of each circuit breaker to the GIS, system. In case of a fault, the outage management responder module automatically captures the breaker status and diverts the crew to it.

REL has started realizing some of the benefits of GIS, and expects to sign off the exact cost-benefit figures on March 31, 2006. With the implementation of different modules of ArcFM, there will be efficient updating of assets and facilities in terms of assets management, shutdown management and network management. There will be more efficient retrieval of information, and efficient engineering design and construction planning.

There will be complete elimination of data redundancy and data inconsistency. There will be complete outage tracking and management that should result in reduced downtimes in Delhi very soon. There will be complete automated mapping of Delhi. It will also help the company in terms of right-of-way (RoW) and route management.

While exact cost-benefit figures for GIS are not yet available, from a preliminary analysis, the benefit seems to outweigh the costs involved. The management is convinced that once the system is entirely in place, REL will be a “world-class utility and a benchmark by itself”.

**Based on a presentation by Chandan Guha,
Head, GIS, Reliance Energy Limited,
at a recent Power Line conference on GIS**

Reference book:

Power Line
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