Electric Utility Network

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Introduction

Electrical Utility Network is the most generic term in the case of electrical transmission network, concerned in GIS environment. The network gets started from the source and ends with sink. The source is the generation point of electricity and the sink is the end point may be an industry / a small house where the energy is best utilized. This electric utility network is an energy process flow in which it begins with the source, distributed through grid and transmitted to the ends by using transformers and gets connected by cables for its energy transfer. The role of GIS is to spatially map the entities, to make the whole process in real time and share the data across all verticals using WEBGIS.

Objectives

The objective of this paper is to propose how best GIS can be effectively utlilized for electric utility networks. For Electric networks the major spatial features which gains immediate importance were

1. Electric Cable lines
2. Transformers
3. Switches
4. Grid
5. Transmission network
6. Power poles
7. Breakers
8. Feeders, etc

Mapping these features and spatially locating these feature in system and to make it readily available or keeping it shared across the networks is the immediate need of the hour.

Discussion

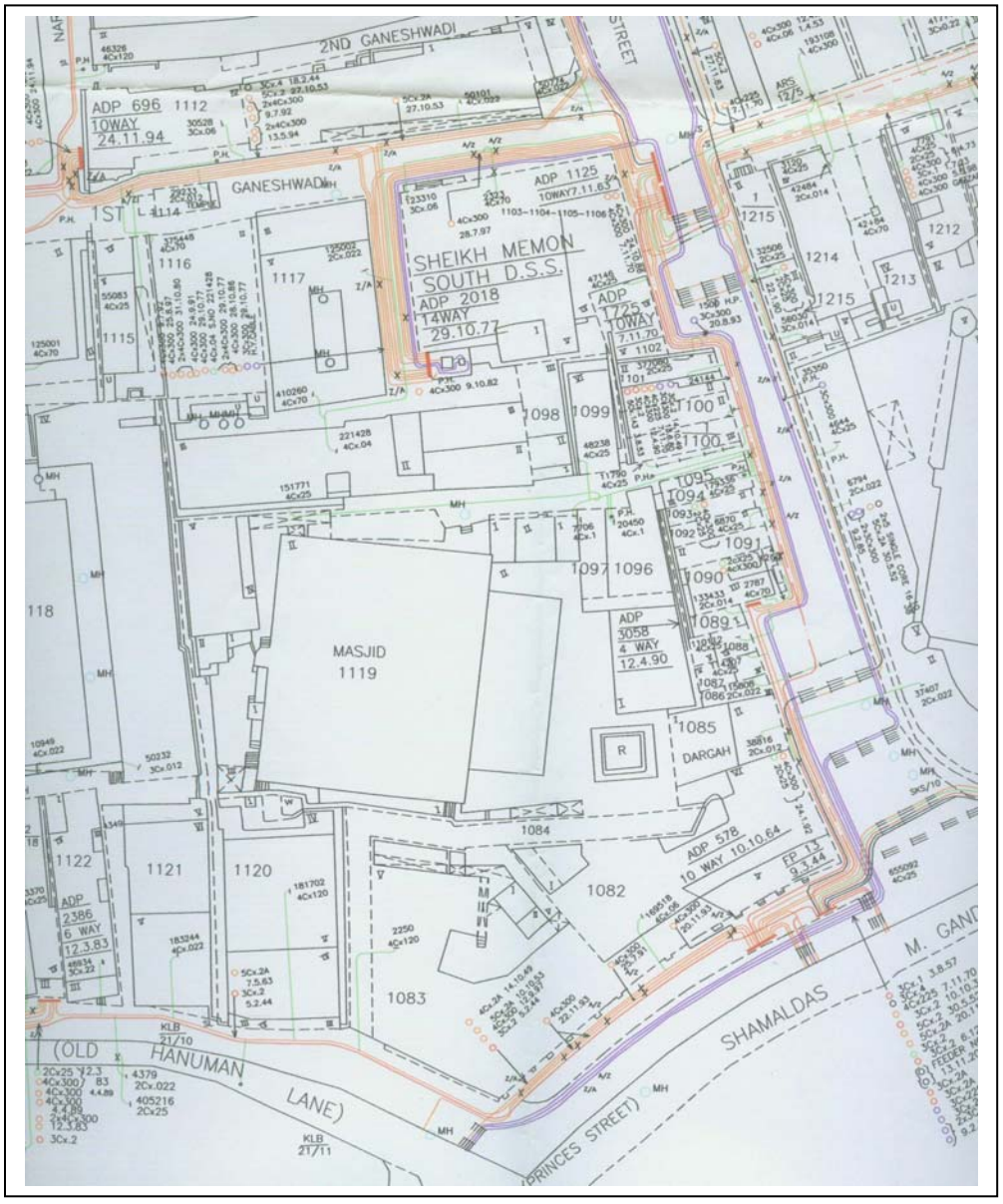
The importance of mapping things into GIS environment / setup is to provide spatial solutions in a real time manner. The major problems identified in this energy sector were

1. Frequent power failure due to natural disaster (excessive precipitation, lightning, etc)
2. Unequal transmission of load
3. Rupture on the equipments due to the improper maintenance.

All the equipments involved in electric transmission network has got some limited time period on its durability. Periodic change on these equipments is necessary to maintain the standards in electrical network. So spatially managing these with temporal dimension involved will pave way for the system to automatically denote / trigger / tell about the time limit for each and every equipment automatically within a threshold time limit and there by decreasing the frequent power failures involved in an electrical network.

To reach the equipment / to find the exact fault wherein it has occurred could be substantiated by hand held palmtops. The notified location on the spatial network wherein the fault has occurred could be easily identified and asked for the first responders to act / go to the exact area and rectify the problem immediately. One of the major advantage of GIS in Electrical networks is the location component.

For Electrical Utility networks, our process of data capture begins with capturing landmark details, dimensions and specific feature capture on point and line segments on features such as cables, feeders, switches etc. We adopt specific standards as given by the client and also following international specifications wherever it is applicable. After feature capture all the errors will be rectified using ArcGIS and the data is passed on for intensive QA / QC check. After the process of QA we submit it to the client and if at all any minor errors were there we thereby rectify and finally the entire process gets approved. A sample figure on the electrical utility network is provided below



As of now STESALIT is more interested to spatially map the electrical networks and manage the whole environment in server for a ready access about the information on its transmission. All the electrical standards will maintained and described / noticed / portrayed in mappable format. We have also done some couple of pilot projects for electrical utility network analysis for some parts of India.

STESALIT has extensive information on the concepts of Geodatabase Design, Parcel Mapping techniques, Utility Analysis, Landcover Inventory and Photogrammetry. STESALIT as a team has integrated into multidisciplinary aspects and has always aimed to provide better solutions by multidisciplinary approach, and thereby maintaining international standards.

We anticipate for a collaborative work with organizations who work in electrical domains and in GIS for the electric utility network sector we would like to value-add the service on basis of requirement.

Conclusion

Our future perspective is to integrate this Electric Network Utility of GIS with SCADA to really simulate the real time flow of the energy across the networks, and which is aimed to be kept in server environment for any time any where identification and demarcation of any effect in the system / energy flow at any junctions across the networks. On integration with SCADA we could also provide diversified solutions in this electrical utility network sector.