WATER AND ENERGY INTERNATIONAL

VOLUME 64/RNI, NO. 8
November 2021

ISSN: 0974-4711
Pages : 84 Rs. 200/-

Special Focus on
Hydrogen Energy

Lighting the lamp by Shri Bhagwanth Khuba, Hon'ble Minister of State for New and Renewable Energy, Chemicals and Fertilizer; Govt. of India
(L–R) Shri A.K. Dinkar, Secretary, CBIP; Shri Gurdeep Singh, CMD, NTPC Ltd., Shri K.V.S. Baba, CMD, POSOCO,
and Dr. G P Patel, Director, CBIP, during Inaugural session

CENTRAL BOARD OF IRRIGATION & POWER
NEW DELHI
www.cbip.org

GeoUrja - An Innovative GIS Solutions for Power Sector

ROHIT PATEL[1]

PREAMBLE

The adoption of digital technologies allows devices across the grid to communicate and provide the information / data useful for customers as well as for grid management point of view and its complex operations. The development of smart electrical grid requires installation of digital grid devices capable of handling digital information. The location of connectivity of digital grid device is an important and mandatory aspects. Still, many power utilities in the Country do not have accurate access of data / information of the network assets. The asset details available are partially digitized information of the electrical network and the same lacks updating on regular basis making it redundant. The complete digitization of the electrical network requires specially designed GPS receivers (Rovers), a Base Station, and GIS software. These are proprietary products of the selected vendors. Additionally, due to its obvious vulnerability, these cannot be adopted to handle the large scale data requirements. Also, it is difficult to develop and manage wide spread electrical network of the Government Utilities, which involves multiple integrations, amendments, and changes.

LIMITATION OF PREVAILING PRACTICE & TECHNOLOGY NEEDS

Geographic Information System (GIS) has emerged as a powerful tool for the development of geo-referenced consumer and network maps for power distribution utilities. GIS is often considered for planning function while asset management is considered for engineering and/or maintenance function. Many GIS Software and traditional asset management programs (primarily asset-class specific tools) have complex system architectures. Therefore, integration and interfaces between them can be very complicated. It has been reported that many DISCOMs created GIS networks for City / Town or Urban areas with the support of a Private Partner or outsourcing option under various schemes. The biggest problem that electricity utilities are facing is the storage of historical data and updation on account of the real-time addition, alteration, and changes in the network at field level. Besides, the Software is an intellectual property and its needs regular support from its vendor for its updation. There is also limitations with regard to integration of software with the existing ERP, Billing, and SCADA systems, etc. DISCOMs need highly skilled and specialized manpower and special devices for regular updation of the electrical network. It is also difficult to update the Base Map to run various applications. At present, the utility has limited area vise GIS Data and still, a major part of the network is not digitally mapped and no location-based information of the assets and the network components is available. This entails random analysis and improper, erroneous results. Further, inappropriate lay of the network leads to misleading calculations, Organizational alignment and understanding can make it difficult to coordinate.

In order to meet the prime requirement of digitization of electrical network specifically network of State Utilities, an Innovative 'GeoUrja' platform with a topology analysis method is developed as a power distribution network model. T-he connection between electrical equipment can be generated automatically according to the terminal position of the equipment primitives. It is a cross-platform and open-source desktop application framework and the topology data is organized and modelled. This will extend the range of asset information, data modeling, integration, and provide analytics for supporting better Management Decision System and better customer services.

ABOUT "GEOURJA"

GeoUrja is an user friendly software platform developed for GPS survey of the existing Electrical Network and Consumers' locations by using a Smart Mobile device. The software based application enables to capture essential network

1. Execuvive Engineer (R&D), GPRD; GUVNL Gandhinagar

elements such as the geographical position of Electrical Asstes namely Transformers, HT & LT Poles & Lines, Cable route & Switching devices etc. The application also allows dynamic updatation, addition, modification in the Power Distribution System. The GeoUrja is developed through an open-source platform and uses GIS Cloud technology which will help the utilities to manage relevant information about Customers, Distribution, and Transmission Network with a perfect overview of the entire system & visualizing on a map. The digital view of the Electrical asset and consumers over the land base map is helpful for managing & planning large areas covered by Utilities.

DELIVERING TOWARDS THE SITUATION BY "GEOURJA"

Under the GeoUrja platform various applications and integration are independently developed by the team of Gujarat Power Research & Development cell; GUVNL, Gujarat. Key modules and development are highlighted as under:

EASY SURVEY MOBILE APPLICATION:

The Easy Survey Android Mobile Application is designed for electrical Network line drawing methods with Geo Tagging to achieve maximum efficiency in time and accuracy by using a Smart Android Mobile device. The GPS data will be plotted on geo-referencing of area for designing and preparation of the overhead and underground network system. Every feature (locations, attributes, etc.) has to be incorporated accurately with the respective object of the Network.

The position of Electrical Poles, Transformers, Switching devices, Cable route points, etc. shall be marked on the drawing as shown in Fig 1. According to the characteristics of electrical equipment in a Transmission / Distribution Network, the equipment primitive is designed to meet the requirements of Power utilities in the aspects of relevant symbols. These symbols use different colours, line types, line widths, and so on which are used to represent different segments of the running states and different component types.

Mobile Application has an additional functionality to utilize the point buffer analysis function of the GIS development platform, by traversing the bus objects and terminal objects as listed under:

- Network Information with HT and LT Network over the Satellite image.
- Consumer Basic Detail
- Quick search and navigation option for Consumer and Electrical assets.
- Current location base Overhead / Underground Network Information
- Asset QR tagging and information
- Live Location base network view

DISCOM DASHBOARD

Looking to the requirements and informational needs of Utilities, DISCOM Dashboard is designed in such a manner that the users can easily access complete network (Figure 2) Data related to their surveyed Feeders with facility of several view formats. It provides user's role wise Statistical Information, Feeder GPS surveyed Data with attribute information, rich Vector-based Maps & Geographical Map of the Feeders. Various reports and network maps can be generated & exported as per the user requirement. Key features of the dashboard are as follows.

- Electrical network statistical Information
- Network asset attribute view and edit functionality

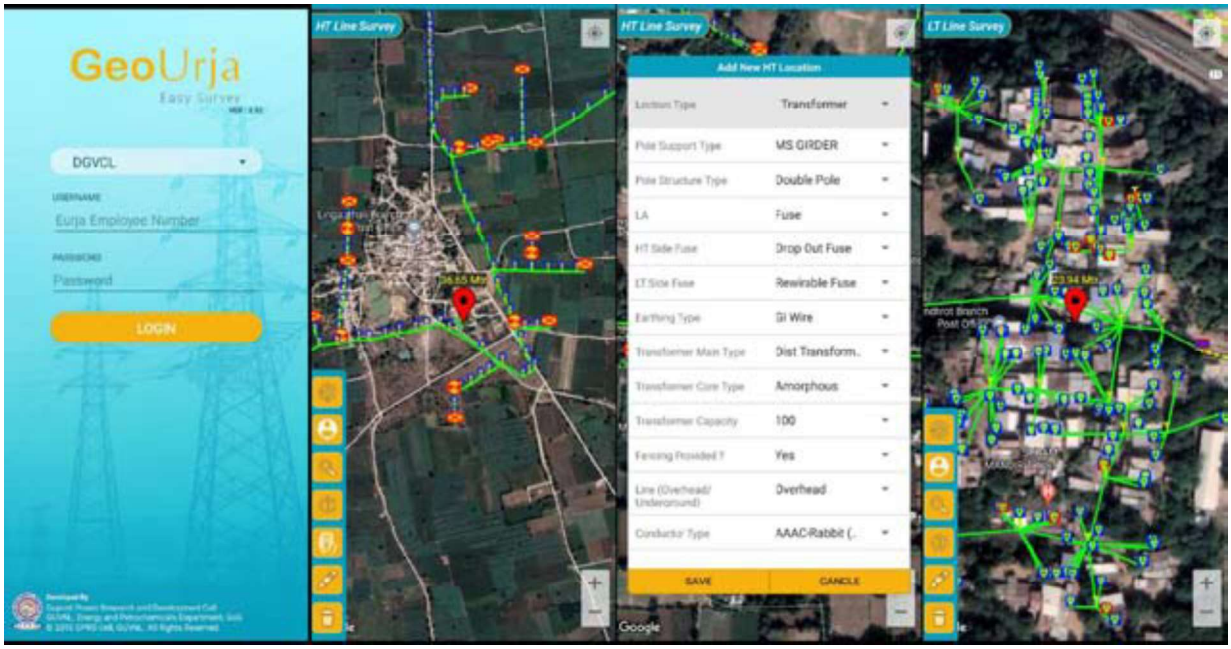

Fig.1 : Easy Survey Mobile Application

- Consumer details and coding
- Geographical and Vector-based map
- Electrical network analysis with power flow study like Voltage regulation, loss calculation, low voltage, reactive energy, etc.
- Network planning with multiple network view over geographical view
- Asset QR code tagging
- Integration with ERP and Billing system through API services

SAMPARK

GeoUrja Sampark module is designed for the customer care center. It is an integrated platform where place and location information is used from the API of geographical Map and GeoUrja provides details of the Consumer with Electrical Assets detail and network connectivity. There is a search facility to get the Information of Consumer's Name, Place, Consumer No. & Geo-Coordinates etc. Keeping the consumers informed about scheduled power outages (Figure 3)

GEOURJA LIVE

The Unique and Innovative Dashboard is designed to know the live power supply status of feeders and consumers. The various integration of existing systems elements such as information of feeder circuit breakers, RMUs, Meter Modem, Switches, etc are carried out and plotted on a single platform with GIS Power Network. The real-time Power supply status of the Consumers and ongoing network outage informations entails to access Power reliability and is also helpful for utility to manage the power flow of the network. (Figure 4)

STRATEGIC ABILITY

At the time of development and implementation of GeoUrja project, the GPRD Cell has received many useful responses, ideas and suggestions from users i.e. different authorities (engineers and employees) of DISCOMs, GETCO and GSECL. This has lead to making the GeoUrja platform very User-friendly and a low-cost application. Now, it can be said that the GeoUrja as a platform demonstrates as a tool to operate the enterprise functioning for the Power Sector utilities and it provides the real-time and historical information of the Energy Data.

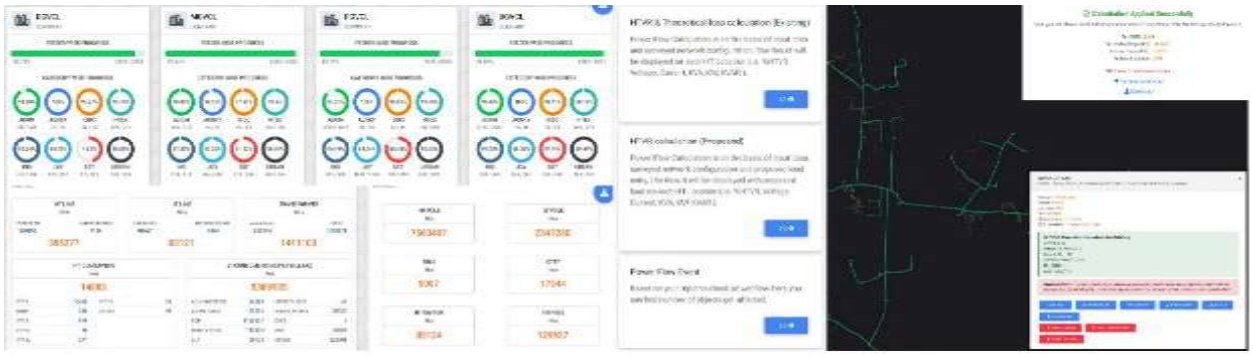

Fig. 2 : DISCOM Asset information and electrical Network study portal

Fig. 3 : GeoUrja Sampart portal for customer care

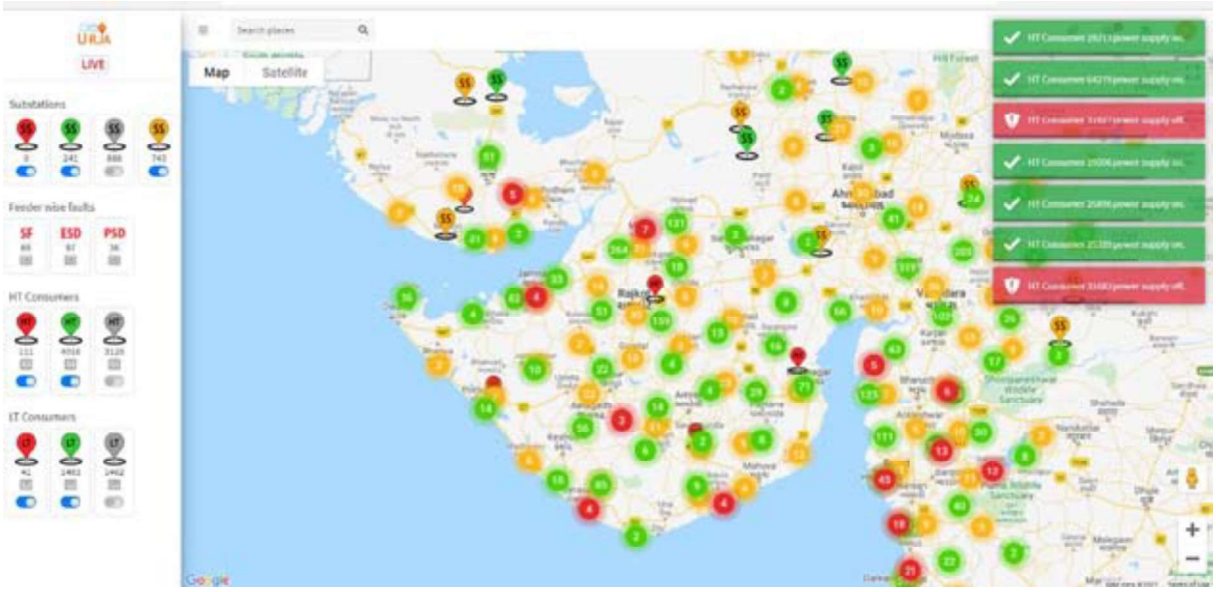

Fig. 4 : Network outages and live power status of consumers

Team GPRD is continuously working on further improving the GeoUrja platform by developing additional features based on enumerous suggestions received from the end users to make the application userfriendly, advantageous and reduces the toil of utilities'. The vigorous brainstormings has resulted in better services to the Stakeholders by use of accurate database.

FIELD STUDY REPORT UNDER GEO URJA PLATFORM

In a short span of two years, more than 2 crore locations are geo-tagged with the Easy Survey Mobile application. Presently, GeoUrja manages the data of 4,72,081 CKms electric lines with 14,16,210 Distribution transformers. There are more than 55.9 Lakh consumers who are mapped. With support of distribution utilities' at all level, on an average, more than 10,000 locations are being digitized on this GeoUrja platform every day. That is a record achievement and the best, positive and user-friendly atmosphere towards the implementation of GPRD Cell's GeoUrja project.

CONCLUSION

The Enterprise solution 'GeoUrja' platform is aimed to cover complete Asset Information, Data modeling, integration and analysis for providing supportive system for better Management Decision and improvised Consumer services. The basic idea of GeoUrja is to make it more benefitial for types of Databases in comparison to other available alternatives. GeoUrja is a user friendly and low-cost application in comparison to other options for gathering different databases and analytical tools. It enables to convert many functions of DISCOMs into default automation.

It is the pride of Gujarat Energy sector and a milestone which no other entity in power sector has been able to achieve.

For more details, please contact us without hesitation, we are ready to hear and serve you at :

Gujarat Power Research & Development Cell
(A Govt. of Gujarat Initiative)

Gujarat Urja Vikas Nigam Ltd, Research Park Academic Block 3, Room No. 214 IIT Gn, Palaj-382355 Gandhinagar, Gujarat, India.

www.gprd.in guvnlrnd@gprd.in @gprd_guvnl