ISSN(Online) : 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 4, April 2016

A Review On: Underground Electricity and Communication Infrastructure

Sachin Rajendra Bajaj

M.Tech Student, Dept. of Computer Science and Information Technology, Dr. B. A. M. University Aurangabad, Maharashtra, India

ABSTRACT: Most of the electric cables and communication cables are strung overhead across the country. These cables include power lines, telephone lines, TV lines, fiber optic cables etc. As in India due to natural phenomena such as heavy rain, storm, fires, accidents causes inconsistency in power supply, communication faults, data loses, etc. It may also cause to fatal injuries. In India at most of the slum area there is theft of electricity. Concerns about reliability of overhead lines, maintenance cost and operating costs, and public safety and quality-of-life are leading more and more utilities and Realizing municipalities for converting overhead distribution lines to underground lines is the best way to provide good service to their customers. Comparing to overhead lines underground network is more secure and reliable.

KEYWORDS: Underground electric cables, GIS, Smart Transformer, Transition Stations, Fiber optics cables.

I. INTRODUCTION

Indian government has initiated a project of making 100 smart cities. Smart cities basic aspects are to provide smart transport, smart electricity, smart infrastructure, security, etc. Considering for underground infrastructure it includes water supply, power supply, fire optics cable, etc. As most of the Indian power supply infrastructure is overhead on ground surface, which is insecure, inappropriate, and inconsistent. Underground power supply grid is more secure, reliable than overhead network, so it is required to convert the overhead electric grid network infrastructure to underground infrastructure.

Electric power can be transported from generating stations to load areas either by overhead electric lines system or by underground cables system. The growing demand of electric power has led utilities to analyze both underground and overhead power distribution system considering their reliability, liability, maintenance and installation cost. Many countries like United States, Australia, and European Union are considering revising protocol for new power distribution installations and converting existing infrastructure to underground mode.[1]

Now a days Underground cable network has become an important element in the power delivery chain from sub-transmission to the door-step of consumer. Importance of underground cable network and its efficient management in electric utility is of prime importance. Underground cable network has some silent benefits of reliability and safety endowed with suitable technological developments. The underground cable network has several advantages like less liable to damage through storms or low maintenance cost, lightning, smaller voltage drop, less chances of faults and better general appearance. However, the major drawback in Underground cable network is that they have greater installation cost and also insulation problems at high voltages compared with the equivalent overhead system. For this reason, underground cables are employed where it is impracticable to use overhead lines.[2]

In addition in improving the landscape, undergrounding protects electrical equipment from vegetation and bad weather. It also helps create more open space in neighborhoods. Undergrounding any distribution system is comparatively more expensive than building overhead lines, and the decision is of the provincial and municipal authorities.

Underground cables have different technical requirements than overhead lines and have different environmental impacts. Due to their different physical, environmental, and construction needs, underground transmission generally costs more and may be more complicated to construct than overhead lines.

The design and construction of underground transmission lines differ from overhead lines because of two significant technical challenges that need to be overcome.

ISSN(Online) : 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 4, April 2016

1) Providing sufficient insulation so that cables can be away from grounded material;
2) Dissipating the heat produced during the operation of the electrical cables.

Overhead lines are separated from each other and are surrounded by air as coolant. Open air circulating between the conductors cools the wires and dissipates heat very effectively. Air also provides insulation that can recover if there is a flashover.

II. UNDERGROUND CABLES

An underground cable consists of one or more conductors covered with proper insulation and surrounded by a protecting cover.

Though there are several types of cables available, the cable to be used will depend upon the working voltage and service requirements. In general, a cable must fulfill the following requirements:

(i) The conductor used in cables should be of tinned stranded copper or aluminium of high conductivity. Stranding is done so that conductor should become more flexible and carry more current.

(ii) The conductor size should be such that the cable carries the Sufficient load current without overheating and causes voltage drop within permissible limits.

(iii) The cable must be thick in insulation in order to give high degree of safety and reliability at the voltage for which it is designed.

(iv) The cable must be provided with suitable mechanical protection so that it may withstand the rough use in laying it.

(v) The materials used in cables should be such that there is complete chemical and physical stability throughout.

2.1 Construction of cables:

(i) **Cores or Conductors:** A cable may have one or more core depending upon the type of service for which it is intended. For instance, the 3-conductor cable shown in Figure.2.1 is used for 3-phase service. The conductors are made of copper or aluminium and are usually stranded to provide flexibility to the cable.

(ii) **Insulation:** Each core should be provided with a proper and suitable thickness of insulation, the thickness of layer depending upon the voltage to be carried by the cable. The commonly used materials for insulation are varnished cambric, impregnated paper or rubber mineral compound.

(iii) **Metallic sheath:** To protect the cable from gases, moisture or other damaging liquids(acids) in the soil, Insulation is covered with lead or aluminium as shown in Figure.2.1

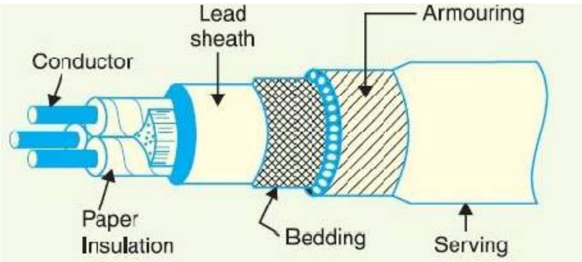

Figure.2.1 Construction of a cable.

(iv) **Bedding:** Metallic sheath is covered with a layer of bedding which consists of a fibrous material like hessian tape or jute. Bedding is used to protect the metallic sheath against corrosion and from mechanical injury due to armouring.

(v) **Armouring:** Armouring is provided over the bedding which consists of one or two layers of galvanised steel tape or steel wire. Its purpose is to protect the cable from mechanical injury while laying it and during the course of handling.

(vi) **Serving:** To protect armouring from Surrounding, a layer of fibrous material provided over the armouring.[3]

2.2 Types of Underground Electric Transmission Cables:

There are two main types of cables currently in use for underground transmission lines. One type is constructed in a pipe with fluid or gas pumped around the cable in order to manage heat and insulate the cables. The other type is a solid dielectric cable in which no fluids or gas is required and is a more recent technological advancement.

Some types of underground cable construction include:

ISSN(Online) : 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 4, April 2016

- High-pressure, fluid-filled pipe (HPFF)
- High-pressure, gas-filled pipe (HPGF)
- Self-contained fluid-filled (SCFF)
- Solid cable, cross-linked polyethylene (XLPE)

2.2.1 High-pressure, fluid-filled pipe (HPFF)

A high-pressure, fluid-filled: this type of underground transmission line, consists of a steel pipe that contains three high-voltage conductors. Figure 2.2 illustrates a typical HPFF pipe-type cable. Each conductor is made of aluminum or copper; insulated with high-quality, kraft paper insulation; and covered with metal shielding and skid wires.

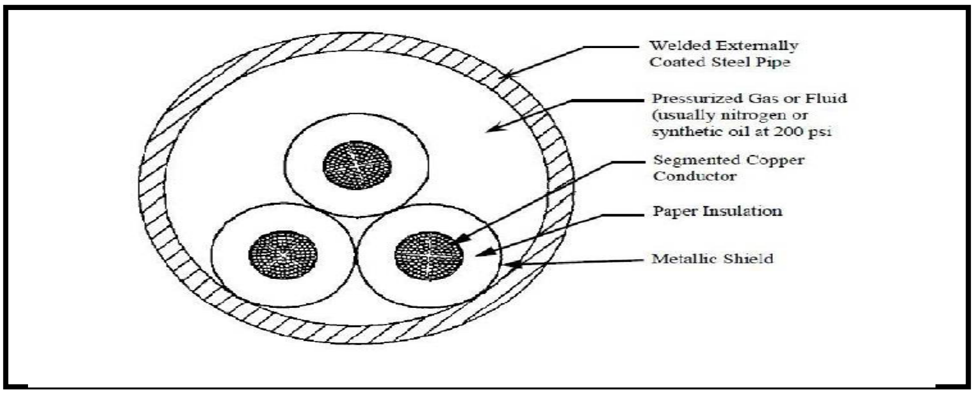

Figure.2.2 HPFF or HPGF Pipe type cross section.

Inside the pipes there are three conductors that are surrounded by a dielectric oil which is maintained at 200 pounds per square inch (psi). This fluid acts as an insulator. The pressurized dielectric fluid prevents electrical discharges in the conductors‟ insulation. The outer steel pipe protects the conductors from mechanical damage. The pipe is protected from the electrical and chemical environment of the soil by means of a coating and cathodic protection. Problems associated with HPFF pipe include maintenance issues and possible contamination of surrounding soils and groundwater due to leaking oil.

2.2.2 High-Pressure, Gas-Filled Pipe-Type Cable

The high-pressure, gas-filled (HPGF) pipe: this type of underground transmission line is a alternative of the HPFF pipe-type. Here dielectric oil is replaced by pressurized nitrogen gas to insulate the conductors. Comparatively Nitrogen gas is less effective than dielectric fluids at suppressing electrical discharges and cooling. Thicker insulation can reduce the amount of current the line can safely and efficiently carry. In case of a break or leak in the cable system, the nitrogen gas can deal better than the dielectric oil in the surrounding environment.

2.2.3 Self-Contained, Fluid-Filled Pipe-Type

The self-contained, fluid-filled (SCFF) pipe: This type of underground transmission is often used for underwater transmission construction. The conductors are hollow and filled with an

insulating materials i.e. pressurized to 25 to 50 psi. In this type of transmission lines the three cables are independent of each other. They are not placed together in a pipe.

Each cable consists of a fluid-filled conductor that are insulated with high-quality kraft paper and protected by aluminum sheath and a plastic jacket. The fluid protects from electrical discharge and line failure. This type of construction decreases the risk of a total failure, but the construction costs are much higher comparing to the single pipe used to construct the HPFF or HPGF systems.

2.2.4 Solid Cable, Cross-Linked Polyethylene

The cross-linked polyethylene (XLPE): this type of underground transmission line is often called solid dielectic cable. As shown in figure. 2.3 the solid dielectric material replaces the pressurized liquid or gas of the pipe-type cables. XLPE cable is declared as the national standard for underground electric transmission lines less than 200 kV. There is

ISSN(Online) : 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 4, April 2016

comparatively less maintenance with the solid cable, but it is much more difficult to monitor and detect insulation failures. The diameter of the XLPE cables increase with voltage.

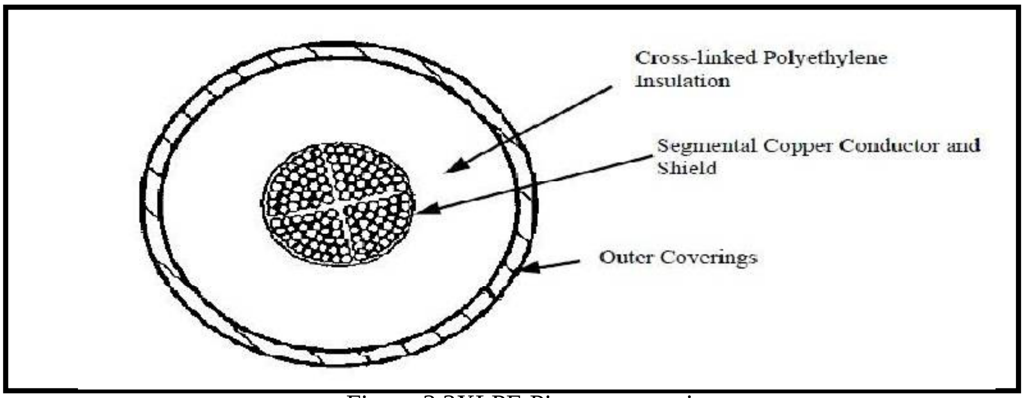

Figure.2.3XLPE Pipe cross section.

Each transmission line requires three separate cables, similar to the three conductors required for Self-contained, fuild filled transmission lines. They are not installed together in a pipe, but are set in concrete ducts or buried side-by-side. Each cable consists of a aluminum or copper conductor and a semi-conducting shield at its core. A cross-linked polyethylene insulation surrounds the core. The outer covering of the cable consists of a metallic sheath and a plastic jacket. [4]

2.3 Types of Cable Faults:

Cables are generally laid in ducts in the underground distribution system. So it generates chances of faults in underground cables. However, if a fault occur, it is difficult to locate and repair the fault because of underground conductors that are not visible. The following are some of the faults most likely to occur in underground cables:

(i) Open-circuit fault
(ii) Short-circuit fault
(iii) Earth fault.

(i) **Open-circuit fault:** When the conductor of a cable breaks, it is called open-circuit fault. This fault can be checked by a megger. For this purpose, the three conductors are shorted and earthed. Resistance between each conductor and earth is measured by a megger. If the megger indicates zero resistance in the circuit then the conductor is not broken. else the conductor is broken, it will indicate infinite resistance in its circuit.

(ii) **Short-circuit fault:** Due to insulation failure When two conductors of a multi-core cable come in electrical contact with each other, it is called a short-circuit fault. Again, to locate this Fault megger is used. To dectect this fault the two terminals of the megger are connected to any two conductors of the cable. If the megger gives zero reading, it indicates short circuit fault between these conductors. The same step is repeated for other conductors taking two at a time.

(iii) **Earth fault:** When the conductor of a cable comes in contact or touches the earth, it is called earth fault. To Locater this fault, one terminal of the megger is connected to the conductor and the other terminal connected to earth, if the megger indicates zero than it is earthed. The same procedure is repeated for other conductors of the cable.

III. UNDERGROUND VS. OVERHEAD

3.1 Transition Structures:

Transition structure is required for underground cables less than 345 kV, also known as a riser. Figure 3.1 shows the sample transition structure designs. These structures are between 60 and 100 feet in height. Transition structures are designed so that the three conductors are separated from each other and meet electric code requirements. Figure. 3.1 shows the underground and overhead transmission structure.

In overhead lines the insulated conductor is linked through a solid insulator device to the underground cable. This helps to keeps moisture out of the cable and the overhead line away from the supporting structure.

ISSN(Online) : 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 4, April 2016

Lightning arrestors are placed near to where the underground cable connects to the overhead line to protect the underground cable from lightning strikes. The insulating material is very sensitive and cannot be repaired. If the cable is damaged than a completely new cable is installed.

Figure.3.1 overhead to underground transmission structure.

3.2 Transition Stations:

AimTransition Stations are required for High voltage (greater than 345KV) underground transmission lines wherever the underground cable connects to overhead transmission cables. For very long underground transmission lines, intermediate transition stations might be needed. The appearance of a 345 kV transition station is comparatively same as that of a small switching station. The size is governed by whether reactors or other additional components are required. They range of size is approximately 1 to 2 acres. Transition stations also require access roads, grading, and storm water management facilities. Figure 3.2 is a photo of small transition station.

Figure.3.2 Small transition station.

ISSN(Online) : 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 4, April 2016

3.3 Transformers:

Transformers are used before the electricity reaches the end-use customer, to reduce in voltage before the power can be used. Residential areas and small businesses require 120/240 volt single-phase service. Larger businesses may require three-phase service at 120/208 volts, 120/240 volts, or 480 volts. This three-phase service is fed from three single-phase transformers electrically tied together on a pole (overhead) or from a three-phase transformer located on a concrete pad (underground) near the customer's location as shown in figure3.3.

The same kind of pad-mounted transformer is used for both residential and commercial facilities, except that the residential transformer provides single-phase service while the commercial transformer may be single or three-phase and is larger in size. Figure 3.3 shows the comparison between overhead and underground transformers.

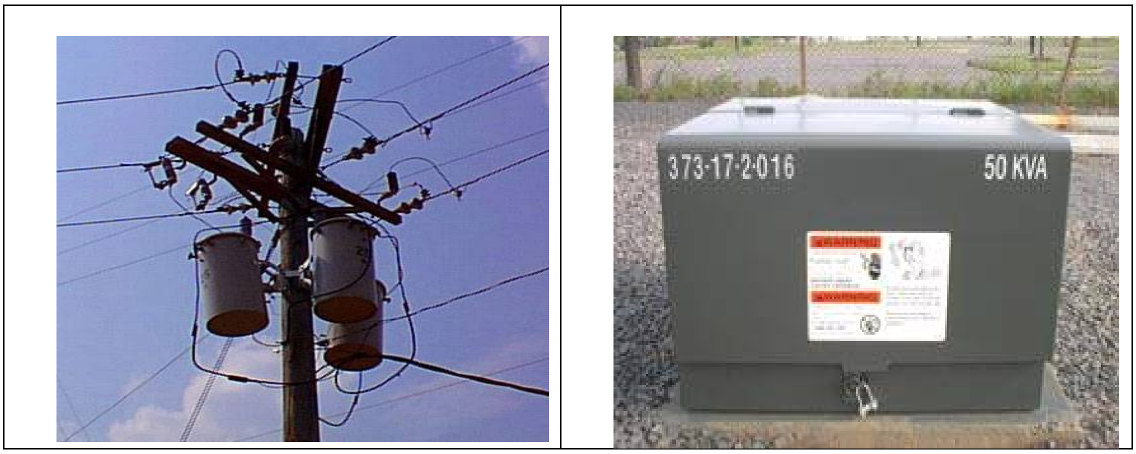

Figure3.3 Overhead and underground Transformers

IV. Fiber Optics Cables

Fiber Optic isthe medium and the technology associated with the transmission of information as light pulses along a glass or plastic strand or fiber. Fiber Optic Cable is a telecommunication cable in which one or more fiber optic are used as the propagation medium to transmit large amounts of information at the speed of light. For Underground installation Manholes are created so that man can get inside it (large and deep hole) for installation.

There are two basic methods of cable installation in a preinstalled duct –Blowing method and Pulling method. The cable installation method is selected based on site conditions and availability of machinery & resources. Mostly pulling method is used for FOC Installation.

PULLING METHOD: Cable installation in pre-installed underground ducts/pipes by puller machine or by manual pulling is called as "Pulling Method". Optical Fiber Pulling Installations method is generally preferred for less than 200 to 300 meters ducts/pipes and Manholes must be available at every 200-300 meters. If cables are pulled into inner duct, the 'Duct Fill Ratio' should be less below 65%. The ratio between cross sectional area of the cable and inner space of the duct is known as Duct Fill Ratio.

Pulling Rope:

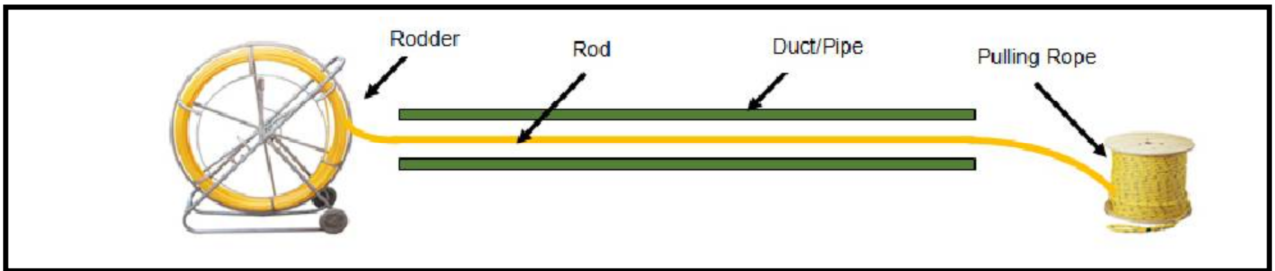

Figure 4.1 Pulling rope insertion by Rodder Rod.

ISSN(Online) : 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 4, April 2016

Pulling rope is installed in a duct or pipes with the help of rodder as shown in figure 4.1. push the rodder rod through one end of the pipe and as the rodder rod reaches the other end, tie the pulling rope with the rod and reel back the rodder rod.

Cable Pulling Grip:

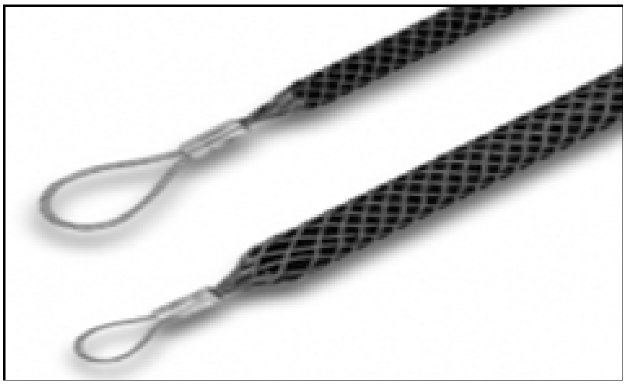

Figure 4.2 Pulling Grip.

Pulling Grip shall be fixed at the head of the cable as shown in figure 4.2, provides the grip over cable sheath which is very important during cable pulling. A Plastic tape shall be wrapped around the grip i.e. pulled tight over the cable.

Breakaway Swivel:

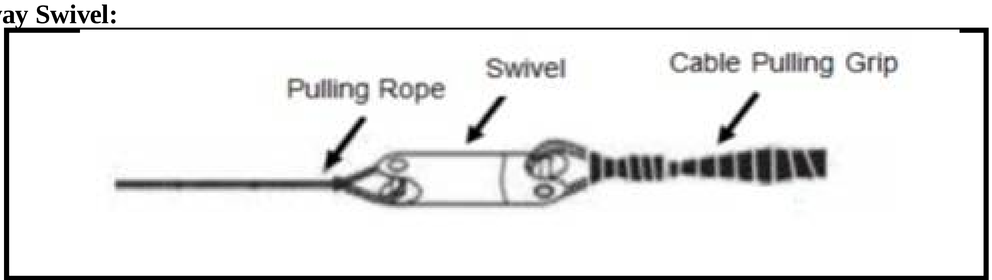

Figure 4.3 Breakaway Swivel

It is necessary to use breakaway swivel during manual pulling installation where pulling tension is not controlled. If the pulling tension exceeds the pulling tensile rate, it may damage the cable. There are different Breakaway swivel with different tensile rating that can be fixed between cables and pulling rope as shown in figure 4.3.

Cable reel pay-off:

Figure 4.4 cable reel

Cable reel is important for the Fiber optics cable installation. It takes care that the cable is smoothly reel off. The cable reel orientation should be such that the natural payoff direction is towards the pulling direction. To avoid friction of cable with ground it should be reeled off from top of cable reel as shown in figure 4.4.

ISSN(Online) : 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 4, April 2016

Cable Handling:

Optical fiber cable may be damaged during shipping, handling, or installation. Some parameters that needs special attention during installation are:

1. Cable Bending Radius: all Optical fibers are designed with a minimum bending radius. The cable should not be bend beyond the bending radius, else that may causes damage in cable
2. Cable pulling tension: Optical fiber cables are also designed with a maximum pulling tension. If the pulling tension exceeds the level than it may shorten the life span of the cable.
3. Cable twist: twisting of cable may develop stress on the fibers, and so must be avoided. While reel off of the cable, the cable must be reeled out making figure/design of '8' shape on ground to prevent twisting.

Cable Lubricants:

Cable Lubricants are used to reduce the friction between cable and inner surface of ducts/pipes. The lubrication material must not affect the outer shelter of the cable.[5]

V. RELATED WORK DONE

5.1 MAPPING OF CHENNAI ELECTRICITY DISTRIBUTION NETWORK

Electricity Distribution Network Methodology maps the power sector assets spread over a huge Geographical area and provide a Web based GIS solution with unique consumer indexing and asset coding of all the electrical network entities. The GIS based system may provide intelligent information system using internet technology. The focus of the integrated Web based GIS is to demonstrate sustained loss reduction and function as a base for energy accounting. National Informatics Centre (NIC) has commenced the Computer aided utility Mapping of Chennai City. NIC has supplied the required hardware and software.When the base map is available the power distribution network will be over-layed on the base map. All the assets like Pillar boxes, Distribution Transformer Structure, cables and consumers will also have to be Geo referenced and incorporated into the GIS. Electrical Distribution network will be overlaid on base map in different layers covering LT(Low Tension), HT(High Tension), and consumer details exactly as per site conditions with offset measurements. The cable routes should be exactly as per site. The attributes of all the network components including Underground and Overhead cables and joints should be collected including the network connectivity. Important junctions at location of Joints, Cable routes, Consumers, Structures, Pillars, Substation should be Geo referenced. The data should be entered in the Respective tables of the data base. It shall also be verified that the entire networks along with all consumers are properly covered. GIS can effectively manage information of the distribution of electricity and also the information describing the attributes of each consumer such as consumption pattern and location. GIS will improve the performance of Distribution system to meet the required target is a matter of selecting the most cost-effective and appropriate technology with right operating practices. GIS technology helps in fast, accurate and reliable data management. With periodic updating and monitoring, GIS mapping of the Electrical Network and Consumer database helps in improved load management, better revenue realization, loss reduction, asset and work management and possibly better consumer relationship [6].

5.2 Mapping of Power Distribution Network using geographical Information System (GIS)

Electricity involves generation of power, its transmission and distribution of the electric power to consumers. Power utility is very important for smooth performance & development of society. Geographical Information System is a tool that helps us design, store, analyze and manage spatial data. GIS has the facility to map complete HT/LT network, customer supply points and transformers with spatial locations displayed on satellite image. In this satellite image, the map represents a lot of information stored in layers. Databases plays very important role in operation of planning. GIS can also be linked with GPS to get information about utility facilities, which eliminate manual work of the requirement of sending a surveying team to locate utility equipment's and then transfer it on the maps. Figure 5.1 shows Steps involved in processing GIS data:

ISSN(Online) : 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 4, April 2016

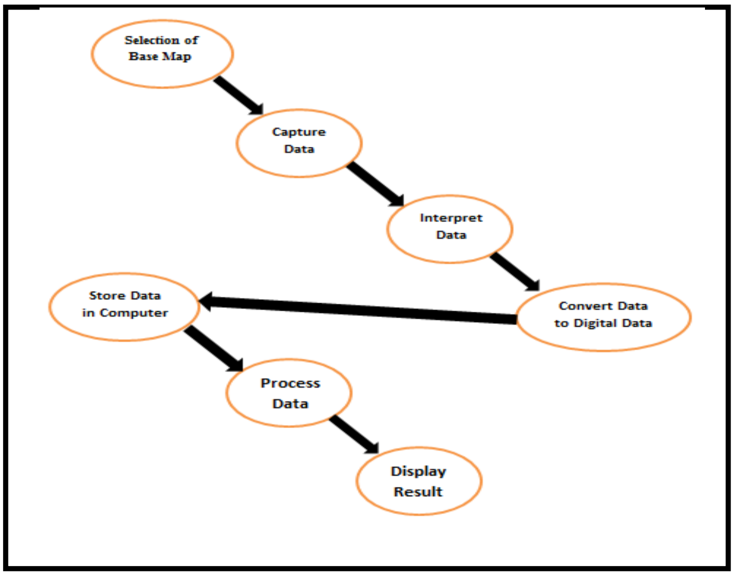

Figure 5.1. GIS Process

Mapping Process is implemented on UET Lahore as a base map. A lot of surveys have been conducted to gather data for Data Collection. Usage of GPS device has become a necessity to accurately determine the geo-coordinates of different attributes. Each consumer's data and its connectivity collected from the field. Each consumer must be defined using a unique numeric code, showing the connectivity of that consumer from Distribution Transformer, feeder and pole. Digitization means converting paper / scanned maps into digital form such as lines, polygons and points. Transformers have been mapped with green color points and Poles with red and blue colored points. Buildings have been represented through polygons [7].

When connected with spatial information Databases plays a vital role. Databases for poles, transformers and HT/LT line have been created in GIS, describing their spatial locations.

GIS mapping proved to be a very useful tool in decision making. No need of site surveys for preparation of new connections estimate. The following advantages may also be taken:

- Power Distribution Network in front of eyes
- Easy and Speedy Retrieval of Information
- Improved material management
- Better Preventive maintenance
- Easy extension in HT/LT network
- No need of site surveys
- Accurate calculation of line losses
- This would form the basic application to which all other business processes shall be integrated.
- Transparency in Distribution Management
- More control over line staff

5.3 GIS-based model for implementation on Power Transformer planning within Thailand Power Network

The electricity is an essential part of our everyday lives. The electric distribution system is used to delivering electrical energy to the end use. The electric distribution systems are realizing the benefits of GIS on designed for electric utilities that manages the distribution system which deliver the electric power to service drops, by providing a geographically oriented view of electric distribution structures. GIS-based model allow new processing methods to be used and provides high-quality presentation of processed data and decision making tool in situations when data relevant to a decision include a spatial component. GIS has become a very significant tool for electrical utilities for activities like utility asset management, outage management, maintenance planning and network planning. GIS can provide the utilities planning team a visual insight of areas which may experience higher growth rates of electrical demand, the

ISSN(Online) : 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 4, April 2016

Right of way availability for the utility, and the load concentration details in the service region. Customer information like the phase information, sanctioned load, connected load is also being maintained in GIS in addition to the utility asset information like transformers, cables, overhead conductors, and protective devices. These details, when maintained as accurate and live time update as possible in GIS will help in providing necessary information for building an electrical network model required for in-house electrical network analysis and planning for ensuring the growth and reliability of the network. The GIS application is designed for electric utilities that manages the distribution system which deliver the electric power to service drops, by providing a geographically oriented view of electric distribution structures. GPS uses satellites and computers to compute positions anywhere on earth. In electrical power distribution system for finding the location of any object e.g. poles, transformers, substations, tracking of routes etc. It gives the position in form of latitude and longitude, which can directly be imported on computer screen [8].

VI. CONCLUSION

Underground cabling improves the enviourment structure and also provides more space to use land overhead. Underground electricity power supply infrastructure is more secure and safe, but it is more expensive than overhead infrastructure. In addition to improving the landscape, undergrounding protects electrical equipment from bad weather and vegetation. It also helps to create more open space in neighborhoods. Also Mapping of system using GIS technology helps for instant decision making, maintaining and monitoring Power distributed System.

VII. ACKNOWLEDGEMENT

I am thankful to Dr. S.C.Mehrotra for his constant support and Guidance. I would also like to express my thanks to thedepartment of Computer Science &IT for providing facilities needed to carry out this study.

REFERENCES

[1] Sarah Bumby, Katya Druzhinina, RebeFeraldi and Dance Werthmann,"Life Cycle Assessment (LCA) of overhead versus underground primary power distribution systems in Southern Californial," Donald Bren School of Environmental Science & Management, University of California, Santa Barbara,Spring,page no. 499-505, 2009.

[2] Karlstrand,J., Bergman,G., and Jonsson,H.-A., "Cost-efficient XLPE cable system solutions", AC-DC Power Transmission, Seventh International Conference, page no. 60-65, NOV,2001.

[3] http://www.philadelphia.edu.jo/academics/afaoury/uploads/7-under%20graound%20cables.pdf

[4] "Underground Power Transmission Lines, The Public Service Commission of Wisconsin",http://electrical-engineering-portal.com/download-center/books-and-guides/power-substations/underground-power-transmission-lines.

[5] http://www.sterlitetechnologies.com/pdf/knowledgecenter/appl-note/optical-fiber-cable-by-pulling.pdf

[6] Mrs.N.Vijayee, "MAPPING OF CHENNAI ELECTRICITY DISTRIBUTION NETWORK", 10th ESRI India User Conference 2009.

[7] H.T Hassan, M. FaheemAkhtar, "Mapping of Power Distribution Network using Geographical Information System (GIS)", IJETAE, Volume 2, Issue 6, page no. 343-347, June 2012.

[8] N. Parkpoom, "GIS-based model for implementation on Power Transformer planning within Thailand Power Network",AORC-CIGRE Technical Meeting,pp-918-925,sept2013

BIOGRAPHY

Sachin Rajendra Bajaj Completed B.E. in Computer Science and Engineering from JNEC College,Dr.BabasahebAmbedkarMarathwada University, Aurangabad in 2014.CurrentlypursuingM.Tech.in Computer Science and Engineering from Dept. of CS & IT,Dr.BabasahebAmbedkarMarathwada University, Aurangabad, India.