

# Beneficial Implementing GIS in Optical Fiber Communication in Government and Private Industries an Overview

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**Abstract:** -Optical fiber technology is used to connect internet for long distances among branches of companies, cities, countries, and service provider and customer (home, company, shop, etc.). Therefore, it required from executed company for this service knowing accurate routes, coordinates and locations. This is helpful when a problem occur somewhere because finding the location of a problem manually is very difficult and take long time. However, with development of computer and software, it is possible now tracking any fault and determining its location easily. By knowing the coordinates, the troubleshooting team will find the defect quickly and fix it. Our objective from this project is to set up database (locations and attributes) for executed projects with optical fiber technology. Database consists of all required coordinates and connectivity places. In case of a defect, the defect place is sent to troubleshooting team to solve the problem quickly.

**Keyword:** GIS System concept, Optical fiber network, Methodology.

## 1. INTRODUCTION:-

The evaluation of the Internet technologies and the connection ways in recent years has fundamentally changed the way people interact and communicate. This growth of the Internet technologies has led to chaotic development of the infrastructure that supports it. The development did not take account of hardware used, the media, interconnection software employed, the size of networks that are interconnected or any structured expansion plan. Most extensions were made incrementally; within the limits of the available budget. One of these technologies is an optical fiber. It uses a lot of equipment's and it has largenetworks.Difficulties arose concerning network design and description, infrastructure expansion and troubleshooting failures. Areas where the focus is on real-time data transfer medicine, banking, police, army are seriously affected by lack of network reliability .Another result of the expansion of the network infrastructure is the increase in the spatial dimensions that can complicate the troubleshooting procedures done in the field by technicians if the location of equipment is not accurately noted. The best way for modeling the geographical dimension of networks is to use a geographical information system (GIS).

### 1.1. GIS System Definition and Concept:-

Managing, GIS integrates hardware elements, software and data for capturing, analyzing, and displaying geographically related information. This system allows

viewing, understanding and querying data in multiple ways that reveal relationships and patterns in the form of maps, reports or charts. A GIS helps with answers to questions and solving problems by looking at existing data in an intuitive and easily distributed way. A GIS can be seen in three different ways: in terms of a database (database view), the map(map view) and model (model view). In Database View the GIS is seen as a structured database that describes the world in geographical terms. In View map the GIS is seen as a set of intelligent maps and sketches which characterized relations over the Earth.

### 1.2. GIS System Used for Optical Fiber Networks:-

The application integrates a GIS engine based on vector graphics. This means that the application stores all its information in the form of vector primitives: points, lines and polygons. This enables the GIS rendering system to manipulate the information as a vector image. The geographical component of the data describing the network is divided into two major layers. Each of the layers is later subdivided into several sub layers

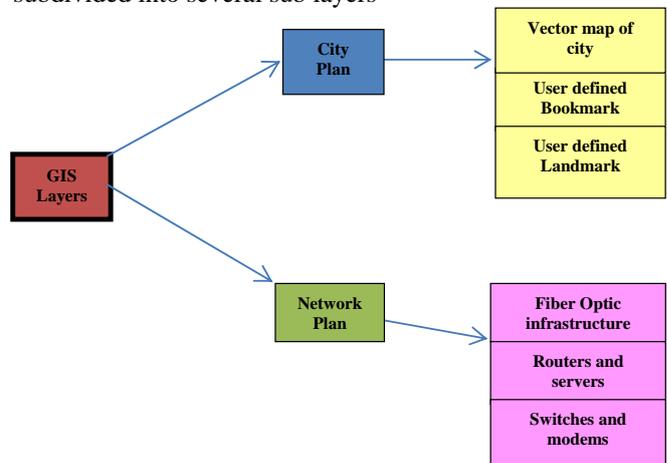
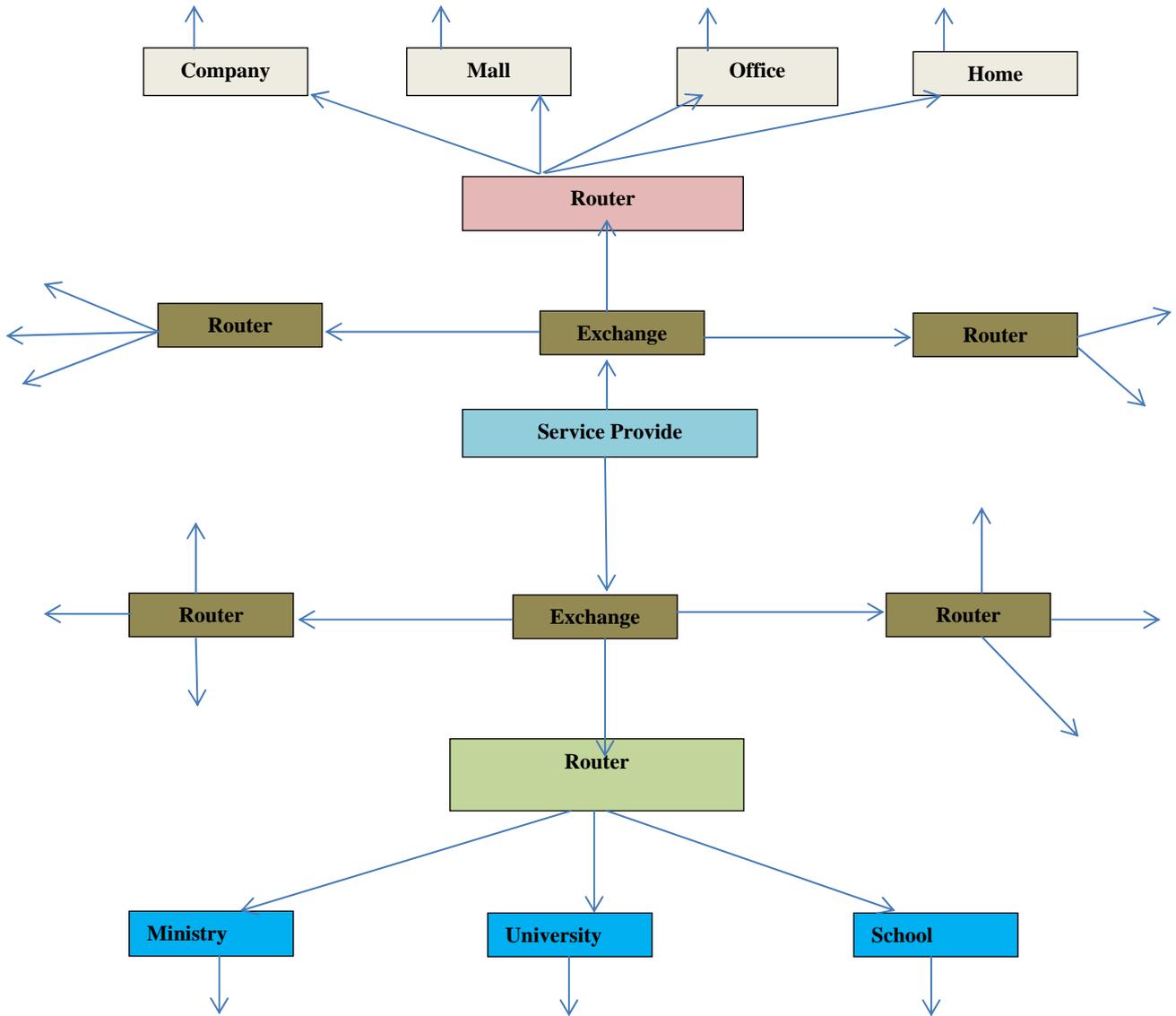


Fig 1. GIS Network

### 1.3. Optical Fiber Network:-

The fiber uses light to send the information. Therefore, the capacity of data is verylarge, the speed is very fast, and it has a large security for the information. For these reasons, most of the countries, companies, industrials, and others prefer to use this technique for thecommunications and connections. Optical fiber networks have a lot of topologies that enters for building the network. Theequipment such as cables, routers, switching, PSs, screens and others. We can use theTechnology is called fiber to home.



**Fig2.Optical Fiber Network**

**1.4. Methodology:-**

Implementation of GIS on optical fiber passes on many stages:

1. Knowing the location of the customers (Company, shape, home, etc.) and determining the coordination.
2. After determining the coordination of the location. The company that provides the service searching the nearest exchange to connect the location with it. If they find it, they search enter the exchange if it has free ports in routers that use in the connection of the network.
3. If the technician find free ports, he send a message to the team planning that includes all the information such as ( name of exchange, name of a router and it number, number of ports,...etc.).Implementing GIS in Optical Fiber Communication 8
4. Planning team takes a picture for the location of the customer and the exchange and then they choose the best route for the connection.
5. After the planning team taking the pictures from the Google Earth and choose the route, they sent these pictures to the GIS team with all the information about the customer location, data of the location and the exchange, names and numbers.
6. GIS team begins to build a database for the project with this information in the message from the planning team. They enter the pictures into the ArcCatalog and make shape files for these pictures.
7. The GIS team using ArcMap to editing on these shape files. They enter the data that is needed for the project. Determine the street, buildings, exchange...etc. They build full databases for the projects.
8. They make a lot of different pictures for the map of the connections between the customer and the exchange. Writing the names and the numbers on the maps.
9. After the GIS team finishing, they send again back to the planning team and the sent to the implementation team to start doing the project.

10. If any updates do at any time, the GIS team makes update on the database that depends on the data that given to the GIS team, so the company has a full databases that are updated.
11. If any problem occurred at any place, the customer will send messages that contain information about the problem and where it happened. He will explain what the type of this problem and how and where occurred.
12. Troubleshooting team send a message to the information and data team to find the coordinate for the location and send a message that include all the information and maps for the location to the troubleshooting team.

These stages that the project of the optical fiber passes them for a real project. However, in our project will we explain some stages of them by pictures and note for every picture.

Using GIS for this project is useful. In the past, if we have cut in connection. The technician tracks where the problem by using some simulation and monitoring programs. If he found the location, he went to map that draw by computer, take the coordinate, and send message to the fixing team. However, with GIS he will save the time by taking all the information of this project and make cope for the map and then to the fixing team. So, the company saving the time and fixing the problem quickly. GIS system gives us more details that we need to know. It gives us the name of street, number of building, tall, and length...etc. Without it, we need to come back to paper map or digital map to know where the location. This will take a long time and may not find the location correctly. Also, it assist us to track the location pint by point by using the computer. In addition, it easy to edit if we find any mistake.

#### **CONCLUSION:-**

In summary, our project to implement the GIS program on the optical fiber communication to make a good data base for this project, and to be a reference at any time we need to come back to these details. At the first, we collect the data and coordinate for the locations and attributes. Then, we use Google map to get a pictures for the locations and enter these pictures in ArcMap program. We see that using the GIS assist us to determine the locations and save them in a good database. Also, we can do edit or add or update at anytime. The big problem for this project is to find the data and information that we need, because some this data is a secret and cannot any one give it. Our recommendation is to develop using GIS in optical fiber. Our goal was to use it also to find the location of the problem directly. This meaning is to connect the GIS with other tracking program that use in mange and troubleshooting of the optical fiber network. Where if we have a problem and track it, the GIS directly give us the coordinate for this location and send messages to specialist of the fixing

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