

# CHAPTER I

## 1. BACKGROUND

In recent years, communication systems have experienced many dramatic changes and now it is very important and necessary to count with the best communication systems that can transmit large amount of information and provide a high quality service. Optical fiber is consider one of the best communication system because it has great ability to convey information and it can offer a high quality service.

In South America there is a remarkable proposal to have a modern kind of connectivity. UNASUR is going to carry out a very interesting project that will contribute in many ways to all South America countries. Countries of the UNASUR want to create a super South American “ring” of Optical Fiber.

Thus, will ensure a better connectivity and also will give more independence since Latin America pays thrice more for an Internet connection that someone in the United States. With this super “ring”, UNASUR expect that the South American communications do not have why go through United States and reduce the connectivity costs.

Also, the objective of this project is to improve the conditions of access to ICT since in rural zones there is not any kind of connectivity. The construction of an Optical

Fiber ring is going to facilitate the connectivity between countries of South America. In Ecuador to have a good connectivity and Optical Fiber is remarkable too for its many important advantages.

Also, in our country the government has been implemented a very ambitious project that will improve the connectivity and consist in create a National Network of Optical Fiber. This project is giving a great connectivity in Ecuador and also a more access to technology in all provinces of Ecuador, thus improving the use of ICT in education.

In Cotopaxi, specifically in the Technical University of Cotopaxi the Optical Fiber is used to Internet connections and the structured wiring is used in the internal connections.

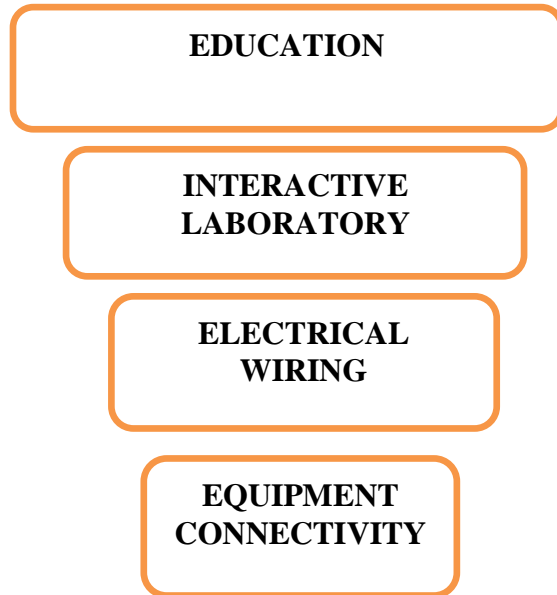
The implementation of an optical fiber in the English Laboratory will help to have high conditions and benefits in order to maintain a Laboratory with all technological resources that help students into the teaching Language

This investigation has importance since a good electrical wiring and equipment connectivity can provide safety and reliability to use in the equipment of the English Laboratory.

No execution of this investigation will have an effect directly in the English Laboratory equipment and also in the students of English career since if the equipment have no a good working operation the students could not use them.

The elaboration of a manual with electrical wiring and connectivity is matter of vital importance because will let students and teacher to have knowledge and could avoid the damage in the equipment of the English Laboratory.

## **2. FUNDAMENTAL CATEGORIES**



## **3. THEORETICAL FRAME**

### **3.1 EDUCATION**

Education has an immense impact on the human society. It trains the human mind to think and take the right decision. Education gives us knowledge of the world around us. It develops in us a perspective of looking at life. It helps us to build opinions and have points of view on things of life.

The words 'cultivate' and 'civilize' are synonymous with 'educate' because those words have the same purpose that is to improve and refine a person. Education is

important as it teaches us the right behavior and good manners thus making us civilized in order to improve our live styles in order words Education teaches us how to lead life. Education is the basis of culture and civilization. It is an instrumental in the development of our values and virtues.

Similarly PLATON said “the aim of education is the virtue and the desire to become a good citizen” and according with him the aim of education is shows us the correct way to become people civilized in order to improve as humans beings developing values, skills, knowledge to take good decisions in our life”

<http://es.wikiquote.org/wiki/Educaci%C3%B3n>

Education cultivates us into mature individuals, individuals capable of planning for our future and taking the right decisions in life. It arms us with an insight into our lives and teaches us to learn from experience. The future of a nation is safe in the hands of educated individuals. It is a great engine of our personal development giving us the opportunity to grow and become the future of the nation and build a new world too.

Also, it is important for the economic growth of a nation. It fosters principles of equality and socialism. It forms a support system for individuals to excel in life. It is the backbone of society.

It is by education that knowledge and information is received and spread throughout the world. An uneducated person cannot read and write and hence he is closed to all the knowledge and wisdom he can gain through books and other mediums. In other words, he is shut off from the outside world. In contrast, an educated man lives in a room with all its windows open towards outside world.

### ***3.1.1 ICT in Education***

The enormous amount of available information and the speed with we can access it, has made this technological revolution more accelerated and with a deep impact. The electronic revolution started in the 70's was the starting point for the development of the Digital Age

Using of ICTs by the society has been increasing and we can see their use in public and private entities. People are equipped with technology and use them in their work places, in restaurants, shopping centers, at home. In schools, high schools and universities computers and the Internet are technological tools used as supports for the teaching learning process.

In the new, social and economic framework we find currently, that cover all areas of society, the technologies of information have an important role, which have effects in the education and culture directly. ICTs are increasingly importance in social relationships, education and culture of our time, specially the inclusion of Internet in schools, libraries, museums, etc.

The ICTs evolution in the society causing new challenges to the education to the future obtaining and organizing of the information will convert the vital dominate activity for the population around the world.

The teaching of the English Language, language of wide International diffusion has as end, the development of the cognitive competition, a concept that implies the expression, interpretation of meanings in the interaction between two or more people as written as oral way.

Also, it has to contribute in the ability of to build and rebuild new knowledge, that means to develop in the students basic habits and abilities that permit them to communicate in the foreign language without any kind of difficulties.

The use of ICTs are going to produce excellent results and also create new environments of learning converting the most interactive, amusing and motivational classes for students.

It is necessary to recognize that the new technologies have grant benefits as economic, social, and pedagogic as cultural to who use them appropriately. Also the true revolution takes place with the appearance and the diffusion of the World Wide Web (WWW) since it has allowed putting within reach for all the access to the information and a numberless of communication resources.

KOFI ANNAN, General Secretary of United Nations Organization considers that: “The information and communication technologies are not a panacea or magic formula, but can improve the lives of everyone of the planet. They have the tools to reach the Millennium Development Goals, instruments that will advance the cause of freedom and democracy, and the means to spread knowledge and facilitate mutual understanding”

[http://es.wikipedia.org/wiki/Tecnolog%C3%ADas\\_de\\_la\\_informaci%C3%B3n\\_y\\_la\\_comunicaci%C3%B3n](http://es.wikipedia.org/wiki/Tecnolog%C3%ADas_de_la_informaci%C3%B3n_y_la_comunicaci%C3%B3n)

According with Kofi Annan, the information technology and communication are not the solution or a universal remedy that have the capacity to change the entire world. The ICTs only are tools that give US the opportunity to create new style of education, an education that improve the style of live of many humans beings since if everybody around the world, in the educational field access to them will permit obtain excellent results since the classes are going to be more interesting, with more kind of activities

that teacher can find in Internet, and students are going to feel motivated, an important aspect into teaching learning process.

The ICTs are producing important transformations in the society. People who are in countries that have technologies can have access to the information immediately and to exert a great influence to people around the world transmitting in an immediately way their thoughts.

In Education, the evolution of ICTs proposes new challenges with the good use that we make into the teaching learning process since the use of them exert new skills and variations that means to develop in the students innovative skills in order to create active and motivate students that can express thoughts and ideas using a foreign language.

Into the teaching learning process, specifically in the English teaching there are many institutions yet that only are using the typical resource” the book”, “blackboard”, “marker “and teachers follow it in a verbatim manner without any kind of creativity causing boredom in students.

Students learn better when they are involved in an active form in significant and interesting tasks and in this way they learn the different skills necessities to learn a language in a creative, dynamic and entertaining manner.

ICTs provide innovating opportunities to make our classes so interactive with our students, this aspect into the teaching learning process as teachers as students are the great importance since they can interact with other people in any part of the world also they afford new tools to help the learning using a lot resources that there are in Internet creating a new and interesting environment to learn English.

The impact of the new technologies in the teaching learning process is going to change the traditional way to teach. The typical book will be substitute with technology as laboratories with internet where students can do many exercise on line

accessing to more information only with one click. For this reason is the vital importance applying the ICTs in the classroom in order to improve the knowledge and the management of the different skills with the technology uses.

### ***3.1.2 English Laboratory into the Teaching Learning Process***

Into the teaching learning process of a new language the didactic resource is often used as a link or element among teacher, student and the environment. Ideally should be that all teaching learning process have contact with the real life since students can be interact and construct their knowledge but not always is possible and for this reasons we use a different kind of medias, resources or materials that serve us as bridge among teaching , learning and the real world.

Specialists in this area tend to use a varied terminology referring to the didactic materials. Some of them call “media”, “learning resources” , “aid teachings” “educational facilities” “didactic resources” or “curriculum materials” all of them have the same sense into the teaching learning process since they act as tool to create and catch the new knowledge.

In general, when we talk about didactic resources or materials we refer a series of Medias or tool that favor the teaching learning process. The didactic resources that teachers and students apply to teach and learn are the vital importance for many reasons: Motivate the teaching learning process when the didactic resource is using in an adequate form also students can work, investigate, discover and build the knowledge.



Today, we find various learning didactic resources such as books, handouts, charts, videos, audiovisual materials. Also, there are many interesting and available resources that we can find in Internet where the user in this case the student can interact through on line communities with other people using text, videoconference and also students can do self-assessment test, all in one application.

Traditionally, the norm for education has been the instruction in base of the transmission of knowledge through experts or teachers. However, on line environment support the acquisition of new knowledge and new skills driven by students. The professional on line communities of learning use these possibilities of communication by for computer to form reds between students and other people who shares interests and commons problems.

Taking into account the importance of the use of new Information and Communication Technologies in education, Nowadays, as Institutions as Teachers trying to focus efforts on developing multimedia and interactive applications, supported in the necessity to engage the attention of students making active classes where the students can be build their own knowledge and as indicate McFadden (1994) talking about multimedia and cyberspace

“An abstract space of acquisition of knowledge, which rise information and receive information”

<http://www.uib.es/depart/gte/cabero.html>

In this sense the multimedia and the Internet allow acquire new knowledge since if students have the opportunity of surfing in Internet looking for new ways of learning such as professional on line learning communities, students could change information, opinions, the interchange of knowledge and mutual support. Also they could access to video conferences in order to practice the language with native people. With the actual availability of Internet this new way of learning is going to change and revolutionize the traditional way of teaching learning process.

These possibilities to interactivity have great importance in the development of students for many reasons: Students can play an active role in the design of their own experiences of learning and can be in contact with other people through specific sites of discussion interchanging information and creating a good medium to learn.

There are many and important advantages of the interactive multimedia in education .For example: they give an innovative, motivated and informative function; also, they promote participation and activity of students increasing the understanding and retention of information.

### ***3.1.3 Interaction and Internet***

The English learning not only refers to an ordinary classroom, in which the theory gave by the teacher and the texts are the only sources of information that have students. Now, to complement it, it is necessary to use new methodologies and a special environment where they can work better with the latest tools that exist.

The new reality we live in forces us to a constantly methodological renovation and to adapt the teaching to the new technologies. Our responsibility as teachers is taking these technologies to facilitate the learning in students. Through them we can connect with the outside world and with the reality that they are interested. These new technologies are part of their reality.

Most use them daily as a mean of communication, information, entertainment. Integrating them into the teaching learning process students become an active and motivated students.

To Prats 1997:85 the most suitable resource or media is one that “facilitates learning intellectual skills, the control of techniques used in the disciplines and the approach of prototypes that simulate the construction of knowledge (methodology) of the various knowledge”

<http://www.ugr.es/~dmadrid/Publicaciones/Materiales%20didacticos%20enseñanza%20ingles%20CC%20Educacion.pdf>

An English Interactive Laboratory is the right media to intensify the teaching process doing in the classroom and thus they construct their knowledge by themselves. The English students have the opportunity to access to computer equipment with its specific operating programs, created for the practice of English especially. Also, students can do much kind of activities in Internet such as: having conversation with native people, practicing listening activities where it is very important, completing dialogues or answering questions.

### **3.2 INTERACTIVE LABORATORY**

The English Interactive Laboratory has a motivating environment, especially since students are aware that it is a great way to learn and at the end of the activities, the results are extraordinary. The Laboratory allows all students, to listen and be heard by the interlocutor at the same time, giving them privacy, as the headset with microphones offer students the psychological isolation that promotes their ability to speak, preventive normal inhibitions and help shy students in order to improve their skills. It also allows students to work individually with specific materials getting their attention.

### ***3.2.1 Internet in the English Teaching Learning Process***

The English Laboratory develops listening skills and helps to improve the communication process since students can record themselves in order to compare their pronunciation with their classmates and teachers. And the different kind of skills that students can develop using an Interactive Laboratory and Internet is awesome because in Internet there are lot resources as blogs, chat, practice grammar, vocabulary, listening, speaking, reading and writing web pages to work with students.

Internet enables us to learn languages on multiple pages and free. Approach to language, gives us a pleasant and attractive practice, a playful and interactive teaching. We can find different areas of courses of learning with different levels of difficulty. Most of the courses offer us thematic areas with access to exercises, practices, activities, books, readings, vocabulary.

The variety of content and integration that each web site found in Internet ensures that we can always find the appropriate resources.

But in Internet not only we find courses or activities to learn English; we can also use other resource that give us possibilities to practice the language for example “chats”, they allow us to communicate with people around the world in a real time. Several people use them in order to practice and improve the learned language. An Interactive English Laboratory enables the use of any kind of resource to teach and learn a Language and give students the possibility to work in an interactive environment.

## **3.3 ELECTRICAL WIRING**

### ***3.3.1. Electricity***

Electricity is essential for modern civilization, without it, our life, would be impossible, since all things that we know and the activities that we do depend of electricity. The uses of electricity are the vital importance because we use it in many ways of our live for example: in factories, schools, transportation, and medicine. Hardly, our society could be exists without the use of electricity since we use electricity every day.

#### ***3.3.1.1 Electricity at Home***

At home, the electrical industry, through technology, has made available to society the use of electrical appliances that facilitate the housework, making our life more pleasant. These electrical appliances give us comfort in home, saving time and decreasing in the number of activities to do.

In our daily routine when we do the chores we use these electrical devices such as: electrical stove, refrigerator, microwave, blender, dishwasher, hair dryer. Also, there is another type of devices that provide us entertainment, fun; they are tools of information and source of information too such as: television, stereo, video games, and computers.

### ***3.3.1.2 Electricity in the Community***

In our community the electricity is important too and is manifested by: street lighting in markets, parks, highways, tunnels, roads in order to provide us security and visibility at night. Lighting is a backbone of civilization, development and comfortable living. Without proper lighting, travel would be a dangerous experience with risking collisions, getting lost frequently and impacts with stationary objects.

### ***3.3.1.3 Electricity in the Communication Media and Medicine***

In the communication media we appreciate the importance of electricity since the operation of radio, television, cinema, depends largely of electricity. Since the electricity was discovered, it was always at the service of medicine through the various instruments and machines such as cobalt radiation equipment, X-ray equipment, CT equipment that have contributed in many ways to help people and numerous advances in science and investigation.

Most of the modern medical treatments that are commonplace today would be extremely risky if we do not count with electricity. Various tools and machines that we use to repair or renovate in our community need electricity.

#### ***3.3.1.4 Electricity in the Industry***

In the industry, electricity has an important impact since the necessity of increasing better productions at minimal cost forced to replace people for efficient machinery. This could be done by the development of electrical motors. In many factories we can see many machines that need electricity to operate.

According with Theodore H. White that said “With electricity we were wired into a new world...” <http://thinkexist.com/quotes/with/keyword/electricity/>

As in the past, present and also in the future electricity has permitted discover a new world. A world with new and development machines, devices, tools that give us numerous benefits, facilities, entertainment, new technologies advances. Without electricity we there would be no science and technology. We could not have a normal life without electricity, the entire world essentially runs with it, in one form or another, electricity is an integral utility in modern society. Electricity runs the entire world, as governments, corporations as financial institutions depend on it every day for communication.

Electric power is and will be continue one of the most important energy forms available for all human beings.

For all those benefits that electricity gives us, is important to use it in a better way. It is necessary to save energy and take a responsible behavior because if we save electricity we are contributing with the environmental protection. We must learn use it well and wisely.

#### ***3.3.1.5 Electricity in Education***

In the Educational field, the Information and Communication Technologies (ICTs) are causing a great impact in our society. They are important into the teaching learning process. Electricity plays an important role too since without it these technologies could not use and do not have good operation. All technological implementation ICTs are directly related with electricity.

In this sense, it is important to count with SAFE electrical installation and reliable in our English Interactive Laboratory. A safe and reliable electrical installation ensures to reduce the likelihood of occurrence of accidents that endanger life and health of users, as well as the possibility of damage in the electrical equipment. Through electrical installation, our houses, schools, and factories supplying of electricity to running of the equipment, devices, machines.

### ***3.3.2 Electrical Installation***

An electrical installation is an integrated set of pipes, structures, conductors, accessories and devices that allow transport and distribute electricity from the supply point to the equipment that use it. The electrical installations may be open with visible conductors, apparent in ducts or pipes, concealed inside false ceilings or panels, and drowned in walls, ceilings or floors.

#### ***3.3.2.1 Electrical Installation Features***

The electrical installation has to distribute the electrical energy to all connected equipment in the English Interactive Laboratory in a safe and efficient way. A safe and efficient installation should eliminate risks of damage as people as equipment. In



order to keep the equipment in good working order the electrical installations have to have some important and necessary characteristics.

They have to be:

- Reliable that gives security and fulfill the purpose that is keep the equipment in good conditions.
- Efficient that permits to transmit electricity as efficiently as possible.
- Flexible that can have changes or modifications easily.
- Simple that facilitate the operation and maintenance without problems.
- Easy on the eye since an installation well done that looks good.
- Safe that ensures the safety of people and equipment too.

### ***3.3.3 Electrical Wires***

Wire is an electrical conductor, which is formed by a series of thread conductors that give them great flexibility; their principal objective is to carry electricity.

An electrical wire is formed for a metal wire (the conductor) and a plastic coating (insulation). The principal materials used to produce electrical conductors are the copper and aluminum.

#### ***3.3.3.1 Copper Wire***

In the present times, copper is used across various industries like construction, metallurgy, medical, and more; but, copper's use in electrical industry, especially for making copper wires, is the most popular.

### ***3.3.3.2 Aluminum Wire***

Aluminum is the third most abundant element, and the most abundant metal in the Earth's crust. Aluminum is remarkable for the metal's low density and for its ability to resist corrosion due the phenomenon of passivation. Is a good conductor of electricity and heat, it is easy to use and it cost is cheaper than cooper wire

## **3.4. EQUIPMENT CONNECTIVITY**

Nowadays, we are living in a society of information where more than ever, to transmit huge amounts of information quickly through long distances are one of our needs. The technology is changing and advancing every day. Users around the world find the advantage of connecting to the computer network environment since they have immediate access to documents and resources.

Also, users have the possibility to participate in interactive conferences with other people, even without be in the same city or country. They have the facilities to converse in real time with a person who is in another continent or send a document by e-mail to a lot of people from different parts of the world.

This type of activity is only possible in computer networks without having to travel. This computer network becomes an issue of vital importance for all human beings

since today we are living in the information age where it is necessary to have an optimum use of information in order to share, process, store and transmit it.

The Global environment that we are living is aimed at the integration of Information Systems since every day there are new products, standards and modern technologies. The different industrial sectors, institutions, and thousands of companies depend in their infrastructure of Connectivity in order to transmit information as data, voice, video in a safe and reliable way and with the facilitate to do operations on line. Connectivity is advancing very quickly and it is necessary install in the Interactive Laboratory good Information Infrastructure, Optimal Computing Systems, Computer Network and Connectivity and Communication Devices.

### ***3.4.1. Connectivity***

Connectivity is the capacity of a device to be connected and ensure the data transmission. Its principal objective is to connect and communicate several computer networks without limitations of technology and mark. Connectivity provides reliable mechanisms for data exchange and computer services.

The principal and fundamental objective of a network is giving connectivity among its nodes that is the connection point in this case the computer or any connected device.

Networks can be connected through physical media such as coaxial cable, optical fiber or unshielded twisted pair and it permits to share resources such as hard drives, modems, printers, also, it shares applications and information that can be installed on a computer and be used by others in network too.

The basic connectivity network components include cables, network adapters and wireless devices that connect equipment to the rest of network since these components allow sending data to all equipment on the network, allowing communicates among them.

Another important component into connectivity is the computer network because it permits to share resources and information among two or more connected computers.

### ***3.4.2 Computer Network***

A computer network is set of equipment as computers or devices connected among them, that share information and services as Internet, e-mail, chat. Network makes that all programs, data, and equipment be disposable to any network user that need it, regardless the physical location as the resource as user. In other words, if the user is at 1.000 km away from data, user can use as if data was originated locality.

Within the most used we have:

Local Area Network (LAN)

Metropolitan Area Network (MAN)

Wide Area Network (WAN).

#### ***3.4.2.1 Local Area Network LAN***

A Local area network is a network of private property that interconnects computers in a limited area of a building or campus such as companies, home, school, university, and computer laboratory. They are used widely to connect computers and

workstations of company offices and factories in order to share resources and interchange information and applications.

The majority of this network is connected via wires. In short, it enables that two or more computers are communicated.

#### ***3.4.2.2 Metropolitan Area Network MAN***

A metropolitan Area Network is a high speed network that provides coverage in a large geographical area.

The IEEE 802-2002 standard describes a MAN as being:

“A MAN is optimized for a larger geographical area than LAN, ranging from several blocks of buildings to entire cities...”

[http://en.wikipedia.org/wiki/Metropolitan\\_area\\_network](http://en.wikipedia.org/wiki/Metropolitan_area_network)

This type of network is a larger version than Local Area Network since its covered distance is only 1 kilometer and Metropolitan Area Network has a covered distance more than 4 kilometers. MAN represents an evolution covering larger areas that in some cases are not limited to a metropolitan area but it can reach a regional and even national coverage.

This network provides capacity of integration of multiples services through data, voice and video transmissions, on transmission media such as optical fiber and twisted pair. Metropolitan Area Networks are applied in organizations, groups, offices, universities, libraries, and corporations too.

### ***3.4.2.3 Wide Area Network WAN***

A Wide Area Network is a computer network that covers huge distances; it extended on a so large geographic area from 100 km to 1000 km giving service to wide extensions as a country or a continent. Its function is to interconnect networks that are located at great distances between them. To this, they have a great infrastructure that performs the interconnection.

Business and government entities use Wide Area Network in order to transmit data or information among employees, clients, buyers and suppliers from several geographical locations.

WAN is a public network because the information traffic that flow through them comes from different places, being used for many people around the world in order to transmit information from one place to another. The speed at which data flow through the Wide Area Network is generally lower than the speed reached in the Local Area Network.

In addition, LAN is private, because its use is normally restricted to users who are members of a company, or institutions, which the network was designed. A Wide Area Network can use communication systems in a satellite or radio via.

### ***3.4.3 Transmission Media for Network***

Communication is the information transference from one place to another. This information can be transmitted through electrical signals or optical signals of a channel communication or a transmission media.

The transmission media is the electrical or optical link among the transmitter and the receptor, being the bridge among the source and destination. This transmission media can be pair of wires coaxial cable, even the air. But regardless the typo, all transmission Medias are characterized for the attenuation of noise, interference that offset the signal be propagated freely.

Transmission Medias are a fundamental part of computer networks. They are constituted by links that interconnect different network equipment and through them the information is transported from one point to another network.

This media has a very important role because of its characteristics will depend directly network aspects such as maximum transmission speed that can reach, the number of connected equipment, the maximum distance between equipment that are connected and the errors that may occur when to communicate data.

### ***3.4.4 Categories of Transmission Media***

The transmission media is classified into:

- Guided Medias
- Unguided Medias.

#### ***3.4.4.1 Guided Medias***

Guided Transmission Media uses a physical media by means wiring system that guide the data signals along a specific path. The Guided Medias that commonly are

used in the actual network computers are: twisted pair cable, coaxial cables and optical fiber.

#### ***3.4.4.1.1 Twisted pair cable***

This cable is a compound of copper conductors insulated for paper or plastic and twisted in pairs. These pairs are then twisted into groups called units, and these units are in turn plaiting until have the finished cable that is covered generally with plastic. The plaiting of pairs cables and the units lower the interference noise, better known as crosstalk. The twisted pair cable have the advantage of not be expensive, be flexible, and easy to connect and it is the most transmission media used in the Local Area Network.

There are two types of Twisted Pair Cable:

- **UTP** Unshielded Twisted Pair Cabling
- **STP** Shielded Twisted Pair Cabling.

##### ***3.4.4.1.1.1 UTP Unshielded Twisted Pair Cabling***

This cable is the most used and accepted, for its cost, accessibility and easy installation. Its two twisted cooper wires insulated with PVC have shown a good performs in the applications. However, at high speeds c may be vulnerable to the environment electromagnetic interferences.



It is the most physical s medium used in the networks LAN because it is cheap and its installation is easy and inexpensive and for it can make digital transmission as dates and analogical transmission as voice.

#### ***3.4.4.1.1.2 STP Shielded Twisted Pair Cabling***

This cable permits data transmission of high speed. It is formed for 4 shielded twisted pairs individually, covers with PVC lining material. In this case, each pair is covers by a conductive mesh which acts as shielding against electrical interferences and noise.

The level protection ofShielded Twisted Pair Cabling to external shocks is greater than Unshielded Twisted Pair Cabling. However, STP is more expensive and requires more installation than UTP.

#### ***3.4.4.1.2 Coaxial Cable***

This type of cable is composed of a central copper wire surrounded for a copper wires mesh. The space between the wire and the mesh is occupied by a plastic conduct that separates the two conductors and maintains the electrical properties. The entire cable is covered for a protective insulated in order to reduce the electrical emissions. It is typically used for television, long distance telephony, local area networks, and peripheral connections.

Originally, it was the most commonly cable used in the local networks due to its high capacity and resistance to interferences. Also, it was inexpensive, light, flexible and

easy to handles. But at present time it uses is declining. Its great defect is its thickness, which limits its utilization in small electrical conducts and very acute angles.

#### ***3.4.4.1.3 Optical Fiber***

Optical Fibers are glass strands of high purity. The fiber thickness is similar to the human hair. They do not transmit electrical signals if not signals based on light transmission eliminating the problematic interferences

Among their main characteristics can be mention that they are compact, lightweight, with low signal loss, large transmission capacity and a high degree of reliability because they are immune to radio- frequency interferences. Optical fibers have large transmission capacity, the order of hundreds of million bits per second.

#### ***3.4.4.2 Unguided Medias***

In the case of Unguided Transmission Media it is the medium that determines the transmissions constraints as data transmission speed, bandwidth that can support.

The data communications used in Unguided Medias are:

- Radio Signals
- Microwave Signals
- Infrared Signals.